

*Analytics*

# THE INTERNATIONAL HANDBOOK OF CULTURES OF TEACHER EDUCATION COMPARATIVE INTERNATIONAL ISSUES IN

Béatrice Boufoy-Bastick

CURRICULUM AND PEDAGOGY





# **The International Handbook of Cultures of Teacher Education**

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**The International Handbook of  
Cultures of Teacher Education:  
Comparative international issues  
in Curriculum and Pedagogy**

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# **PREFACE**

## **THE INTERNATIONAL HANDBOOK OF CULTURES OF TEACHER EDUCATION: COMPARATIVE INTERNATIONAL ISSUES IN CURRICULUM AND PEDAGOGY**

### **Introduction**

This series, '*Cultures of Education*', offers readers a cultural lens through which to view issues of common concern to educationalists worldwide. This volume puts the seeming vicissitudes of teacher education under that cultural lens (Allen, Glassman, Riegel & Dawson, 2011; Boufoy-Bastick, 2003; OECD, 2011). Educationists who specialise in Teacher Education as well as both pre-service and in-service teachers who are interested in re-evaluating and improving their practice can benefit from the new cultural perspectives presented in this book. Traditional perspectives focus mainly on what stakeholders do (Allen, 2003; Burke, 2010; OECD, 2010a; OECD, 2010b). However, this can be misleading or even irrelevant to success because people do different things for similar reasons and do the same things for different reasons. Here we look at the values, attitudes and intentions of stakeholders, how these are communicated and

aligned. Using the new objective lens of *Culturometrics* we invite examination and comparison of different values underpinning similar practices and examination of the different practices that serve similar values (Boufooy-Bastick, 2002, 2010a, 2010b, 2012). Through a series of authentic case studies within teacher education we invite educationalists to question their own meanings of the contexts explicated in these studies, to identify the values, attitudes and intentions of the stakeholders in each study and to question how these values are communicated through the research processes that the authors describe. However, the eddies and flows of cultural values represented by the authentic case studies in this book are all influenced by the spread of global international values to the formal educational systems in which the studies are embedded (Rivzi, & Lingard, 2010, Rodriguez, & Sjostrom, 1995; Spring, 2008). Formal education is forever being reformed and teachers are in the forefront, melding community cultural values to this continuous change because children who share the current cultural values of their formal education system will be their prodigies (Feinberg & Soltis, 2004; Horde, 2011; Patrikakou, Weissberg, Redding, & Walberg, 2005; Sahlberg, 2011; Weschler, 2001). How does globalisation impact formal education systems and how does formal education most obviously impact cultural values? The authentic case studies presented in this book illustrate cultural comparisons at different levels of group representation and individual teacher and student inclusion. Some chapters compare and contrast values across countries; others compare and contrast pluricultural values within a single multi-lingual context. Other chapters attempt to align subject teachers' traditional values with those demanded by modern pedagogy. In this book, we look afresh at the roles of Teacher Education in changing cultures at the international level, at the national level, at the school

level at the classroom level and at the level of individual children and teachers who through education are constructing and reconstructing who they are.

## **1. Curriculum and Pedagogy - Their cultural ties**

Curriculum and Pedagogy are the two main foundations of Teacher Education worldwide (Appple, 2004; Cochran-Smith, 2005; Handler, 2010; Stronge, 1997). By Pedagogy we mean the value-laden theories and methods cultures use for addressing the needs of formal learning. By Curriculum we mean the specific application of these methods to the learning and teaching needs of specific school subjects. Cultures of education continuously change and today Curriculum leads the way in moulding the meanings of education on the global stage (Baker, & Le Tendre, 2005; Harrison, & Kagan, 2006; Rivzi, & Lingard, 2010; Spring, 2008; Stein, 2004). The mass reason is a pressure on formal education systems to fit children's lives to the needs of economic globalisation through accountability for work-valued skills (Tchibozo, 2010, 2009a, 2009b, 2009c). These common work-valued skills influence the increasingly similar school syllabi and accountability is made visible through increasingly common skills assessments of increasingly similar selected abilities. The stage in children's educational progress at which this pressure is most powerfully applied is at that moment when most children have to leave the influence of formal education and are served to regimes of employment - at the termination of compulsory education. Success through the education system is then accredited by school leaving exams whose essential core abilities mirror the international league tables - PISA, IAEP-II, TIMSS, INES, IALS, PIRLS (Eurydice European Unit, 2002; Fuhrmann, & Beckmann-Dierkes, 2011) - which, from a cultural perspective, are our educational benchmarks of

cultural compliance with the global values (Rivzi, & Walsh, 1998). For the economically stressed who can fortunately go on to tertiary education there is further narrowing of the employment curriculum pulse at Bachelor's and again at Master's graduation. In cultures with cash-strapped universities the shared values of employment training now even define their doctoral programmes.

Teachers and parents of younger children further from the pressure point have more latitude in creatively fitting educational requirements to their cultural values (Alexander, 2001; Cunningham, 1988). We see this freedom expressed through the wide range of pedagogic innovations of our primary, elementary and early childhood level teachers and teacher trainers - curriculum serves and enriches community cultures. The younger creative child learns that things are different; an aeroplane can be many things, and pedagogy rules. Teachers and parents of older children closer to the pressure point have less latitude in retrofitting their cultural values to the given educational requirements. Here, the philosophy and meanings of the subject are mined by educationalists for alignments of cultural values that can be enacted through improved/approved protocols for teaching and learning - community cultures serve and can enrich the curriculum. The creative older student learns a different difference; the aeroplane can have many functions and curriculum is king. At the doctoral level, the personal cultures carried by our graduates can change the meaning of curriculum and enrich the world.

## **2. 'Cultures of Teacher Education': Overview and progression**

Cultures of practice within the two main pillars of Curriculum are presented first - Science Curriculum

and Arts Curriculum. In these first two sections, the focus is primarily on aligning stakeholders' values to the cultural values of the school subject. In *'International issues in the Science Curriculum'* we start this process with three contributions on cultural values in teaching science. Chapter 3, on using the shared values of science and mathematics, gives the transition to the next three chapters on cultural values in teaching mathematics. We finish the section with two chapters showing how technology can be used to promote values, attitudes and intentions of subject specialists. Language is a major marker of culture and so we begin our section on *'International issues in the Arts Curriculum'* with five chapters dealing with the different cultural issues involved in the different areas of language education. Chapters 10 to 12 illustrate interactions of cultural values when teaching English as a Foreign Language (EFL) where the target culture is often not directly accessible. This differs from the immersion tensions involved in cultural issues of teaching English as a Second Language (ESL), especially when EFL students are moved to an ESL teaching environment, as when French-speaking Haitian students are taught English in Trinidad which is the topic of Rómulo Guédez-Fernández in Chapter 13. From our cultural perspective, because language teaching categories- EESL, EFL, L1, L2 etc. - are defined by cultural relationships of learners to their environment, it is effective to compare their respective teaching methods using this cultural perspective. For example, moving an EFL learner to an ESL teaching environment, as Rómulo's project has done, can be viewed culturally by Educationalists as a massive, valuable and highly applicable upgrade of the language teaching/learning resources. Immersion language teaching methodologies, like Subjectivism, can be similarly analysed as cultural up-grades with the teacher supporting students to more fluently negotiate selected identity imperatives (Boufoy-



Bastick, 2008). However, first language teaching (L1) has a high curriculum priority in all schools around the world. Is the language culture of the home sufficiently different from that of the L1 classroom for second language identity issues to intrude - as they do with the presence of class differences in UK schools. The next three chapters, chapters 14 to 16, allow readers to compare diverse cultural implications of L1 teaching in French, English and Greek. The section on Arts Curriculum is nicely rounded by the physical, attitudinal and aesthetic representations from our last three contributions on the Performing arts, on Physical education and on Peace Studies presented in chapters 19 to 21. In our third section '*International issues in Pedagogy*' we look at how the alignment of stakeholders' underpinning cultural beliefs about teaching and learning can make or mar our educational endeavours. The first five chapters, chapters 22 to 26, look directly at influences on and of 'Attitudes' from the direct encouragement of student participation to the transference and counter-transference effects of teacher's attitude on students' attitudes as benchmarked but Loraine D. Cook's extended Locus of Control (LOC) studies in Jamaica. Our optimum teaching outcome in many contexts is 'higher order thinking' which can vary in cultural meanings from the almost spiritual humanistic attainment of Abraham Maslow's highest level of 'self-actualisation' to that of the trained Behaviorist control of a worker's frontal-lobe executive-function that alleviates the costly need of management oversight. Chapters 27 and 28 illustrate a range of cultural values that contribute to Educationalists' diverse meanings of 'higher order thinking'. The last five chapters of the section on Pedagogy, and of our book, are case studies that look at how alignment of stakeholders' cultural values can contribute to successful applications of the tools and techniques of

Media-Based Teaching - the last chapter reporting a pan-European project.

### **3. The Culturometric lens - Stakeholders negotiating their cultural identities**

One of the best ways that readers can get the maximum benefit from reading this book is probably to prioritise the chapters that resonate with their interests. Then to also consider these chapters through the Culturometric lens by relating the context, values and communications of the stakeholders with their own context, values and communications - compare similarities and differences, learn from the experiences of others, not by what was done, but by its cultural meanings to the stakeholders in the studies. More specifically, readers can read their selected chapters from the Culturometric perspective of enabling successful negotiation for alignment/acceptance of stakeholders' cultural identities. Cultural Identity is defined as 'values in context'. Successful negotiation of alignment/acceptance needs three actions, (i) definition of the context, (ii) definition of the values to communicate and (iii) calibration of the values associated with the means of communication - screaming 'I love you' has a very different meaning from whispering 'I love you'. Alignment is preferred to mere acceptance or tolerance of cultural values between stakeholders. Tolerance is acceptance of risk corresponding to low negative or neutral benefit; whereas Alignment recognises positive mutual benefit.

Dynamics of Cultural Identities is studied using the philosophy and methods of Culturometrics. Culturometrics operationally defines 'Cultural Identity' as 'values in context' and has various methods to objectively measure cultural identity in different contexts. It seeks to empower by its philosophy and methods that promote 'choice to change' one's cultural

identity. Hence, its typology of groups is based on how easily people can change their criteria of their personal group membership. How easily could Juliet claim 'I am a Montague' or Romeo doff his name or declare 'I am a Capulet'. Membership by congenital criteria (race, sex, genetic disorders) is less flexible than various socially determined membership criteria (class, poverty, divorcee) which are less flexible than criteria for self-selected group membership (gang, graduate, customer). Enculturation into these groups is a negotiation of identity - a consensus of values in context. Successful research, such as presented in this book, is similarly this process of cultural identity negotiation - presenting evidence, within the authority of the scientific method, to influence values in context and hopefully change behaviour. The Culturometric methods are intentionally empowering in that that they become objective, not through comparison with a questionable Norm group, but by calculations of self-reference. Culturometrics also empowers by vesting authenticity of cultural identity in the consensus of group members rather than in any external authority. More can be learnt about Culturometrics by visiting [www.Culturometrics.org](http://www.Culturometrics.org), from which this series of books on Cultures of Education can be freely downloaded.

#### **4. Cultural perspectives - Selected chapters**

The reader needs do only three things to benefit from this new culturometric perspective: Identify for themselves - (i) delimitations of the context, (ii) values, attitudes and intentions of the stakeholders; and (iii) values associated with the medium of communication by the stakeholders' cultures. Readers should do these three things to achieve new understandings of their selected case studies. Readers can then benefit personally by comparing with their own values in context - that is, within their own

educational contexts comparing the above with their own Educational cultural identity and those of their own stakeholders. To facilitate these reader benefits, our authors have, to varying extents in each chapter, identified the stakeholders; their values, attitudes and intentions within the research context; and values associated by their cultures with the medium of communication. The authors have also noted where failure follows misalignment of cultural values and where success follows congruent communication and the alignment of cultural values. Some editorial comments on selected authors' references to success following congruent communication and the alignment of cultural values from all three sections on the Cultures of Teacher Education in this book will clarify this new cultural perspective for the reader....

#### ***4.1. Editorial comments on 'Comparative cultural issues across the Science Curriculum'***

Our opening chapter addressed a common problem educationalists face globally as the science curriculum develops from traditional transmission teaching and passive learning to active investigative learning (Stavy, & Tirosh, 2000). It can be partially a problem of teacher confidence. In our opening Chapter, Sivbritt Dumbrajs discusses teachers' personal values and beliefs about promoting investigative learning in the Teaching of Physics and Chemistry in Finland and notes the problem that although all class teachers were interested in physics and chemistry and of the opinion that their students would react to laboratory tasks in a positive way, they were sometimes at odds with those supporting investigative learning. The misalignment of cultural values seemed possibly due to a lack of confidence in their subject knowledge, prompting solutions that supported teachers' confidence in their content knowledge that was sufficient for them to deal with the variety of challenging situations that could arise in investigative

learning but from which they had been protected by traditional 'transmission' teaching.

In chapter 2, we address cultural aspects of the current crisis in science education in the United States. After a decade of the most oppressive years of governmental oversight of science (2000-2010) that we have seen in a long time, science education is in need of a "shot in the arm" as to how science is communicated to our children and to the general public. This dark decade has allowed for the US to slip and stumble in ways that were unlikely to have been predicted in the realm of science and technology. The US now relies on other countries for some of the technical expertise they require and some of their once proud and first-rate science programs have now gone. One of the outcomes of this dark decade is the lack of thinking about the values that are inherent in a scientific view of our world. Some of the anti-science advance during this decade directly counteracts the values underpinning the scientific method. The disbelief and disdain for understanding climate change is one example. Reluctance to rationally examine programs such as stem cell research is another. In this chapter, Janice Koch and Yael Wyner, who are both from the US have attempted to place this problem in context and to approach the values issue. Many Educationalists think that understanding how we disrupt the natural world with our activities should be an important aspect of American culture. The environmental disruption produced in the US and in other countries affects us all. The authors of this chapter have involved the federal government whose grant funding made their research possible; the enlisted teachers and their students; museum educators whose materials were incorporated into the curriculum; and school administrators where the curriculum was implemented. Their project shows how we can use an *Ecology Disrupted* model, incorporating

authentic scientific data, to change values through understanding how we disrupt the ecology of our environments.

In Chapter 3, Andrzej Sokolowski and Robin Rackley from the US, move the discussion to mathematics and its overlapping value set it shares with investigative science. These shared values have made mathematics the queen of the sciences and their necessary underpinning. In this chapter, our authors show us how to incorporate these shared values into a successful practical teaching unit for use in high school math classes.

In Chapter 7, Amelia and Harvey Allen consider the perennial problem of maths anxiety. From an educator's perspective, this chapter is significant for all educators because in today's society there are students internationally who are not being successful in math class because they have a phobia towards numbers, unsecure about their responses, and tend to shy away from participating in class discussions because they do not want to be embarrassed by their teacher. Cosgrove, Shiel, Sofroniou, Zastrutzki and Shortt (2005) for example give a typical finding that links "maths anxiety" with poorer performance on the international PISA mathematics assessment. Anxiety is a delicate and necessary guide in mathematics. The niggling anxiety generated by an anomalous pattern questions and redirects mathematical thought and progress. However, when we compare the values propagated by teachers of examination classes with those of professional mathematicians, it is questionable that what we are teaching is mathematics. Somehow the motivating beauty, aesthetics even the astounding power of application is replaced with an overload of personally irrelevant compartmentalised facts and processes, and that necessary delicate anxiety is drowned by a monstrous

overwhelmingly debilitating high-stakes fear of failure. The information provided in this chapter allows an educator to incorporate strategies that have helped other students overcome their fear of mathematics. In doing so, professional development may assist a teacher to gain different ideas for teaching mathematics in his or her classroom setting.

Bruce Sheppard and Jean Brown, from Canada, close our section on science curriculum with a report in chapter 9 of an extensive four-year investigation of how partnerships and leadership can transform classrooms through the use of technology. They acknowledge the many challenges related to leadership and implementation of classroom innovation and note that in spite of the extensive literature related to the implementation of innovation in education, it appeared to have had minimal impact on the actual implementation practices in the schools and school systems that they had studied. Rather, implementation appeared to be dependent on the distribution of leadership and systems alignment among key partners in respect to values, attitudes, and purposes of the stakeholders, and so they underscore the importance of distributed leadership in cultivating an alignment of values, attitudes and purposes, and the development of shared visions that enable innovation.

#### ***4.2. Editorial comments on 'Comparative cultural issues across the Arts Curriculum'***

Pilar Couto-Cantero and Tanya Fernández Maceiras from Spain, open our Arts Curriculum section with their chapter 10 on stakeholders values, attitudes and purposes towards the teaching and learning of a foreign language through drama. The chapter explores and examines how the values promoted through the research converge with those of the stakeholders. This

project included teachers with diverse training - training from North-American and in New Zealand. This collaborative work among school teachers and university researchers involved some challenging cultural alignments as it was carried out in a multilingual and multicultural context in which at least three languages and their cultures were taken into account.

In chapter 19, Clio Fanouraki breaks new ground in a systematic survey of the effects of theatre frameworks in the context of Greek education interestingly mixing the culture of theatre and L1 teaching of Greek.

#### ***4.3. Editorial comments on 'Comparative cultural issues in Pedagogy'***

Thomas Schalow, in chapter 22, examines cultural differences in a Japanese school between the traditional teacher/learner relationship and the teacher/learner relationship involved in self-directed learning. He notes that although self-direction, motivation, and a desire to learn will be the key elements that determine success or failure in the future, these values were difficult for the Japanese students to embrace. Cultural differences in attitudes toward learning and traditional expectations about the role of student and teacher were shown to present formidable obstacles to the introduction of the new teaching methods at the heart of this new form of education. However, whereas other authors, when faced with the same problem, place the blame with teacher's lack of confidence in their subject knowledge, Schalow embeds the problem in the culture of the wider Japanese society when he notes:

"One of the great lessons to be learned from globalization is that cultures that readily embrace change and emphasize their similarities with other cultures prepare their citizens to feel at ease in the



broader world, while cultures that stand apart from the outside world and emphasize differences with the rest of humanity prepare their citizens to feel at ease only in the local culture."

He then parallels the general cultural conservative values with the retention of 'expert status' which interestingly mirrors the formulation to the same problem in Finland that is presented in chapter 1:

"In regard to education, it is clear that cultures and teachers that promote active participation in the learning process best serve the interests of their students. Teachers need to abandon their role as "expert," and embrace their role as appointed moderator of the educational process. There is certain to be a great deal of reluctance to abandon a privileged position, but the disruptive technologies shaking the educational establishment make the outcome a foregone conclusion."

In chapter 29, Hans Giessen explores Emotions in Media-Based Learning in Germany. His argumentation starts with the fact that so-called 'authoritarian' teaching models still predominate in many countries – in contact teaching in schools as well as in media-based education. Hans looks for a reason for this. He finds an explanation in the very traditional communication model presented by Shannon and Weaver, a model that many teachers still seem to consider valid. This model was actually constructed for other purposes, and interestingly Hans uses contrasting values to show how limited and inadequate it is for teaching processes, especially for media-based learning. He incorporates his wide knowledge of different fields of research – like neurosciences, cognitive and brain research, theories of (mass) communication, system theory, etc. – to offer an alternative means to improve learning, media-

based learning processes in particular: It is the emotional involvement of learners by including them in common storytelling and games. This suggestion is unlikely to surprise those who are experienced traditional teachers. But Hans delivers an explanation and a theoretical background for the suitability and relevance of this method, by using relevant axioms of a constructionist theory of learning processes and of hypertext theories. Hans Giessen's broad theoretical scope leads to new insights which produce a solid cultural basis for the development of suitable methods of media-based teaching and learning.

In chapter 31, Maria Aparecida Mamede-Neves draws on data collected and analysis of their results with young high school students and their teachers from public and private schools in Rio de Janeiro, to show that Brazil today is suffering a change in their cultural base and in their challenge for the future of their young people in education. Change and challenge include rethinking the values involved in the use of information and communication technologies in educational projects. The combination of values in this research involves young people teachers and government measures and Professor Mamede-Neves notes that "This combination points to a very large gap between values, attitudes and effects on the issue of education on the part of the stakeholders." and finally she concludes on the necessity of cultural alignment between the stakeholders for the research to be successful....

"From all I have researched ... I draw from it the sure knowledge that, in the field of Education, any proposal, which is intended to be successfully implemented in any culture or group, will have to be necessarily oriented by the comprehension of the specific conditions of the values of such group and its traditions."

Having shared cultural values with respondents also eases access for the researcher. In chapter 32, Jana Krátká notes how alignment of cultural values between researcher and respondents contributes to the researcher's acceptance by a group of respondents.

"I knew the respondents of this study for more than two years thanks to the discussion forum at [www.buffy-angel.org](http://www.buffy-angel.org), which enabled long observation of the group development in the sense of our similar values, attitudes and purposes."

Later she gives an example of how shared cultural values can unite disparate socio-cultural groups:

"They belong to various socio-cultural groups but they are unified by a number of real-life traumas that drove them towards the identification with the TV series characters. In their community they share values, attitudes and purposes, as loyalty and confidentiality. A good example of how things go well when two members of the virtual community share common values can be the marriage of two fans (who differ in age) from this virtual community."

Our last chapter, chapter 33, is widely multi-cultural at the international level. "*A European Project: Developing Communicative Competence and Subject Content through Digital Tools*" uses information and communication technology as a context for exploring cultural values throughout Europe. Primary and secondary school teachers from six European universities - in Spain, Slovakia, the United Kingdom, Portugal, Finland, and Turkey - worked together with the common aim of sharing cultural values. Currently, the development of communicative competence is fostered and subject-content knowledge promoted through the use of digital tools. The methodology detailed and the materials described are meant to actively involve both teachers and learners and

achieve digital literacy while learning language and subject-matter content.

The authors add:

"This team, though sharing the same common values as educators, can also add different perspectives to the project as they come from different geographical, cultural, personal contexts, they can also incorporate different pedagogical points of view due to their academic profiles and their own professional experience acquired from different situations in education. All this can benefit and enrich the development of the project."

They express the cross-cultural benefits thus

" ... the project promotes linguistic diversity as six languages are involved and used in the project in the CD in mother tongue and also Culture as one of its aims is to give student teachers the opportunity to exchange their own culture with that of host countries, so the tutors, mentors, teachers and pupils at schools will benefit from this exchange. Student teachers' mobility can also increase understanding among educational staff and young people in Europe, it reinforces tolerance and respect for other social realities provoking collaborative and democratic work in student teachers in order that they can transmit to their pupils the ideas of collaboration, tolerance and respect for every human being and for different cultures."

## **Acknowledgements**

We are indeed fortunate to have safe and vicarious access through these chapters to the extremely varied rich professional cultural experiences and insightful commentaries of these multilingual educationalists. For many authors English is not their first, or second or even third language; yet they have made considerable efforts to share the different cultural qualities of their educational experiences with our English readers. In mono-lingual environments one

social function of language is to judge the educational level of the communicator and to - perhaps rashly - infer the same level to the content of their communication. For example, spoken French can be learnt without formal education, but written French is so different that it is a social marker of formal education. To generalise this inference to judge the quality of content communicated in a multilingual context - such as this book - is a gross limitation of culturally cosseted monolingual speakers. The editors considered sixty nascent research reports from central and peripheral world cultures which were ideally fitting expositions of comparative cultural perspectives on Teacher Education. However, this publication process does not offer what our Aussie colleagues call 'a level playing field'; particularly with regard to equal access to resources - internet access, time and support for research, access to the cultural capital of Standard English, etc. Hence, the thirty-three chapters in this handbook - each submitted to at least three peer-reviews for the different qualities of experiences presented - also stand for the authors of the twenty-seven chapters who did not have the resources to meet the numerous rigours and deadlines of this publication - we must thank them. It is to our advantage that we find ways of giving them a voice.

*Who are the fifty-two authors who have contributed to this book?*

Authors who successfully negotiated the selection and review processes are listed, with their affiliations, at the front of the book. Readers who would like a more intimate introduction to our authors will find brief BioPics listing interesting background information from page 859 at the end of the book.

*Who are the International Board of Associated Editors?*

Who are the forty-five international subject experts whose local and international knowledge and experience have guided the publication of this book? The members of the International Board of Associated Editors, including their affiliations are also listed at the beginning of this book. For those readers who are interested in the amazing range of academic expertise that has been graciously and freely given by these stewards of the Academy, we direct you to their interesting, and often surprising, credentials from page 887, near the end of this book.

I would like to personally thank the in-house copy editors, my post-grad students who helped with the extensive editing chores, my colleagues worldwide for their local knowledge and cogent advice, and particularly my doctoral student Uta Rampersand who so accurately organised the initial internet communications on which the success of this extensive project has subsequently been built.

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usage'. This e-book can be downloaded freely from the resource pages of the publisher's website at:

<http://www.analytrics.org/Pages/EESENOtherEventsandResources.aspx>

Last, and perhaps foremost, we must thank you, our reader, whose interest has led you to this especially tailored book and new starting point. We trust as you now read this, that you can also move forward and use the Culturometric lens we give you to engender new visions of how you will enrich our world Cultures of Education.

*Béatrice Boufoy-Bastick*

*Editor*

### ***Abbreviations and acronyms***

- CSAUS - Cross-National Studies of Adult Understanding of Science
- IAEP-II - International Assessment of Educational Progress
- IALS - International Adult Literacy Survey
- ICCS - International Civic and Citizenship Education Study
- INES - International Indicators of Education Systems
- PIRLS - Progress In International Reading Literacy Study (e.g. PIRLS 2001, PIRLS 2006)
- PISA - Programme for International Student Assessment
- SPSE - Study on Performance Standards In Education
- TIMSS - Third International Mathematics and Science Study

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# PART 1

## COMPARATIVE CULTURAL ISSUES ACROSS THE SCIENCE CURRICULUM

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# **C**HAPTER 1

## **CLASS TEACHERS' PERSONAL VALUES AND BELIEFS ABOUT TEACHING PHYSICS AND CHEMISTRY**

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### **Abstract**

In Finland physics and chemistry are taught as separate subjects in grades five and six of comprehensive school since the beginning of 2006. The stakeholders involved in the curricular change were, besides the National Board of Education, the directors of education in cities and communities, class teachers, and subject teachers of physics and chemistry in comprehensive schools. Some class teachers participated in workshops organized by subject teachers in order to prepare for the curricular change. Teaching units prepared by the subject teachers formed the base of the workshops. Class teachers had to grapple with the new paradigm of teaching sciences in an investigative manner. The interest of this study was: How and by which means can class teachers be supported in



their task to give instruction in physics and chemistry. The participants were interested in physics and chemistry. However, they did not feel confident about their subject knowledge. Beliefs, values and goals that describe teachers' orientation were sometimes at odds with those supporting investigative learning. All class teachers were of the opinion that their students would react to laboratory tasks in a positive way.

## **Keywords**

Class teachers – Science instruction – Investigative learning

## **Introduction**

A new national curriculum came into use in Finland in the year 2006. According to this curriculum physics and chemistry is taught as separate subjects in grades five and six in comprehensive school. Earlier these subjects had been included in the environmental and natural studies.

Every teacher in comprehensive school can develop his or her own curriculum, building on the basic curriculum published by the National Board of Education and the more detailed curriculum accepted by the school, in which every teacher has played a part in developing. In addition, every teacher has the freedom to choose the textbooks needed for his or her class from those made available by different publishers. All this freedom gives every teacher an active role in the profession, making them highly interested in their work and offering them an opportunity to develop their experiences.

The class teacher education consists of a 5-year program preparing the teachers to teach students aged 6-12 years. The education is strongly research-based and is realized in the university departments. Class teacher students' major subject is education.

Students can choose an intensified course in science education. However, if they do not, their knowledge of teaching physics and chemistry may be minimal, as biology is seen as more important, especially in the lower grades.

When the new national curriculum came into use, many class teachers felt that they were not prepared for teaching physics and chemistry. The research questions in this study are: How and by which means can class teachers be supported in their task to give instruction in physics and chemistry? How can the teachers respond to the curricular change? How do they need to change their teaching methods and, thereby, their understanding of the nature of physics and chemistry?

## **1. Method**

The director of Swedish education in Espoo suggested that class teachers would participate in workshops organized by subject teachers during the school year 2003-2004 in order to prepare for the curricular change. Teaching units prepared by the subject teachers formed the base of the workshops. During the workshops class teachers felt themselves at ease and expressed their opinions quite freely. Therefore their recorded discussions may give useful hints about the support they need and want.

The class teachers were divided into groups of 2-3 teachers each. Discussions during workshops were audio taped. The recorded text, one for each group, as giving an account of events was treated as a narrative. According to Labov's definition (Labov 1997) a narrative has an abstract, orientation (time, place), action (sequence of events), evaluation, resolution (what finally happened), and coda (return to the present). We posit an event as a connected sequence

of utterances. In the present study the text starts by presenting the background or prior knowledge of the teachers, and then turns to the performance of an experiment, thereupon reflection on the results, and finally discussion about how to use the experiment/similar experiments in instruction. In a broad sense the text can thus be considered a narrative that describes the development of each group during the intervention. Below four such narratives will be presented and analyzed parallel to each other.

The narrative method brings out features of the teachers' thinking and learning needs that may have been neglected through other methods. Formal rules of causality can be applied to a sequence of events. Thus the thick description of the interpretive mode combines with the rigor of causal generalization produced by an explanatory mode of inquiry. Some events may be critical turning points in the process. An event is called critical when it demonstrates a significant or contrasting change from previous understanding, a conceptual leap from earlier understanding, or a cognitive obstacle (Webster and Mertova 2007, 77). A critical event is a designation that depends on the subject of the researcher's inquiry. Critical events that are significant and meaningful can be gathered. The lack of an event can be just as important as an event happening. In our study critical events that promote learning were looked for at each stage of the narratives. Such events could be unique, illustrative or confirmatory. Critical events are identified through close analysis of what teachers say and do. The structure of a critical event could show conceptualization, preparation and planning, innovation and creativity, convergence and consolidation. (Webster and Mertova 2007, 84) In the processes in the working groups the pattern of a critical event should be reflected by utterances where

a participant announces a doubt, a question, or a curiosity, which we see as a first step of a process of change.

The audio recording took place in a noisy classroom. Thus it was not always possible to catch every word of an utterance. However, in the sense that four different groups went through the same experiment, the same procedure, the different stories can be used as confirmation of each other. Like events disclose the common background against which the critical events protrude (Webster and Mertova 2007, 84)

## **2. The process of change**

The participants, altogether 14 teachers, filled in a questionnaire before and after their first workshop (Dumbrajs 2005). The participants in general were interested in physics and chemistry. This conclusion could be made from the fact that almost all had studied more than the obligatory amount of these subjects in upper secondary school (Dumbrajs 2005). However, they had on average only little experience of teaching physics and chemistry.

All class teachers were of the opinion that their students would react to laboratory tasks in a positive way. They would be curious and interested and they would have lots of questions. Some teachers would have liked to get the "right answers" to the experiments. A problem seemed to be at which age it would be possible to give the students responsibility for their own work. Certainly the teacher should test the experiments beforehand and the parents should be informed that their children start doing laboratory tasks.

### **2.1. Description of a workshop: Science of heat. Change of volume of water and air.**

Experiments were always supervised by a subject teacher. The following instruction for one experiment on science of heat that the class teachers performed was given:

Material: An empty water bottle of thin plastic with cork, cold and warm water from the tap.

Instruction: Fill the bottle with hot water so that it becomes quite warm. Pour out the water. Close the bottle properly. Put the empty bottle under the cold water tap. What happens? Then try to warm it under the hot water tap.

#### *2.1.1. Prior knowledge*

In order to find the shared knowledge base in the group the subject teacher allowed the class teachers to study the instructions and then asked if these could imagine what would happen.

Group I:

Teacher 2: So it (the bottle) can make a bang, then?

Group II:

Teacher 4: I read and read ... I considered ...

Group III:

Teacher 8: Yes. That ... that is ... is expansion, yes ...

.....

Teacher 8: Well, something I thought was said about that this ... it is needed ... later when that air becomes cold ... then the bottle shrinks ...

Group IV:

Teacher 10: There will be a bang ... there will be a bang

...

Clearly the subject matter is new to most participating teachers. Only teacher 8 uses the scientific concept "expansion". She also understands that air is of interest in this experiment, not the plastic bottle. This is a critical event. From here on group III as being

enabled to share the thoughts of teacher 8 accelerate their learning. But also this teacher explains the phenomenon with the help of every-day-knowledge: "... when the air becomes cold ... then the bottle shrinks..." The other teachers plainly admit their ignorance or even disinterest. Some suggest that there will be a bang.

### *2.1.2 Performance of the experiment*

Group I does not show a deep interest for the present experiment. They think that having come to the conclusion that there will be a "bang" this is all there is about it. They are quite happy with their surface knowledge (Marton and Booth 1997, 175) about the phenomenon. Now they are interested in other funny effects, like the possibility to get a boiled, peeled egg into a bottle with smaller diameter, or to put a balloon on the bottle instead of corking up and see what happens to the balloon. – Teacher 3 thinks that the "bang" should take place when the bottle pulls together.

Group II:

Teacher 6: Is this enough (hot water in the bottle)? Ok.

Teacher 5: Then you need to have the cork ready and then you pour out the water.

Teacher 6: What? - Shall I pour away this?

Teacher 5: ... pour out ...

Teacher 6: Precisely, when ...

Teacher 5: Pour away the water and cork up the bottle.

Teacher 6: Yes. The cork.

Teacher 5: ... and then ,,,

Teacher 5: Put the empty bottle under cold running water.

Teacher 6: Ok.

Teacher 4: ... the empty ...

Teacher 5: Yes, it would be this, then

..... (water running) .....

Teacher 4: It becomes triangular now ...

Teacher 6: Yes.

Teacher 5: Then try what happens ... happens when it is put under hot (running) water ...

..... (water running) .....

Teacher 6: Here still is ... it looks quite white ...  
..... (bang; crying) ....  
Teacher 4: Now it plopped out!

The teachers work collaboratively and take care to follow the instructions. Their results are reliable and they feel pleased with their achievements.

Group III:

Teacher 8: Then you must empty it (the warm water bottle) ... because ...  
.....  
Subject teacher: Very well. Under cold water.  
..... (water running) .....  
Teacher 9: ... (inaudible) ... hops! It begins ... yes ... yes ...  
Look!  
Teacher 7: ... it like ... shrinks here ...  
Teacher 8: Shall I now put it back under hot water?  
Wasn't it this still?  
Subject teacher: Yes, yes.  
.....  
..... (bang) .....  
All together: Ouuuu ...

In this group the teachers feel insecure and need more interventions from the subject teacher when performing the experiment. They do not understand why the warm water should be poured away. Teacher 8 wants to know why. This is an important step in the process of understanding, forming a critical event at this stage. The teachers use the concept "shrinking" in connection to the bottle. Do they understand that the bottle is not the cause of what happens?

Group IV:

Teacher 10: Now I think it is ... Yes. It is shrinking.  
.....  
Subject teacher: Yes I think you should do it (put the bottle under hot water).  
..... (water running) ....  
..... (bang) .....  
Teachers: Yes, yes!  
Teacher 11: It is funny, being that hard ...

These teachers also use the concept "shrinking", but they seem to be ready to consider other possibilities:

"It is funny, being that hard ..." Teacher 11 demonstrates a willingness to develop and change her previous understanding. The event might be deemed critical. The subject teacher now and then confirms the teachers' intentions, but her interventions seem not to be very necessary.

### *2.1.3 Reflection on results*

Group I:

Teacher 1: Well, I suppose that it has to do with the expansion ... how to say ... rather simply ... warm air or cold air.

.....  
Teacher 3: ... from here one can deduce that air exists, air that needs less place when it is cold.

Teacher 3 connects the knowledge that teacher 1 shares with her to understand the concept of air. A conceptual leap as distinguishing a critical event takes place.

Group II:

Teacher 4: It has to do with the air ...

... (inaudible) ...

Teacher 5: ... the molecules ...

Group III:

Teacher 7: Well, it is, I assume, that the molecules in the air collide with each other and it becomes denser when it is cold. Smaller.

Teacher 7 might not yet have quite understood the connection between density and particle movement in gases! However, she is about to take a conceptual leap in her understanding.

Group IV:

Teacher 10: It has to do with the movement ...

Teacher 11: It moves less then ... and then more.

Now, already, the teachers discuss about what happens to the air molecules, not about what happens to the bottle. Only group IV does not yet explicitly mention the concept air.



### 2.1.4 Discussion

#### Group I:

Teacher 3: Yes. Then it is similar to water, also ... That when it starts boiling ...

Teacher 1: Yes. Well, this I have also ... this way ... with the water molecules and this precisely to try to get it described just in this way ...

Teacher 3: It is very good. Everyone surely understands this when it starts to get warmer ... (inaudible) ... when it gets warmer they get more speed

.....  
Teacher 1: ... and then that, what I have participated in, that with the egg, that one has ...

Teacher 3: Just so. You have a peeled egg?

Teacher 1: Yes, a peeled, boiled egg.

Teacher 2: Yes, yes, the top of it must of course ...

Teacher 1: The opening can't be unlimitedly small ...

These teachers have a lot of knowledge about different experiments. This was noted already, when they performed the present experiment. They wanted to tell about other similar experiments they had come into contact with. Also they know some concepts; "molecule" and "expansion" are mentioned during the reflective discussions. But it seems that the deep knowledge about these concepts is nonexistent. They do not want to discuss backgrounds, but go over to talk about air and how to show that air exists. They can answer "what"-questions, but not "why"-questions. They also seem to be unaware of the behavior of different forms of the same material. Events that include instances of cognitive obstacles of significance can also be considered critical for the process of change.

#### Group II:

Teacher 5: Was it not called molecules?

.....  
Subject teacher: Can you from this deduce why a warm air balloon flies?

.....  
Teacher 4: Like there it is cold and there are active warm air molecules ... so they will jump upwards ... (inaudible)

...

The application of the fresh knowledge about air molecules is too difficult. Maybe these teachers have not been able to see the connection between the concepts density and particle movement in a gas.

Group III:

Subject teacher: One can do a rather funny thing with this, also ... Instead of this cork ... you do everything: put it (the bottle) into warm water and pour out the water and instead of that cork you put on a balloon. One puts a balloon as cork.

Teacher 7: What happens then?

.....  
Teacher 8: It will be blown up ...

Teacher 7: It probably is warmed by that warm air ... the balloon is warmed.

Teacher 9: If it goes in?

Teacher 7: No ...

... (inaudible) ...

Teacher 9: Is the air warmed again, then?

... (inaudible) ...

Teacher 8: Yesyes. As you said that ...

Subject teacher: ... it becomes cold ... it is sucked in.

Teacher 7: Yes. – Yes.

Teacher 8: Yes. If one puts it under hot water again, then it will ... then it pops up.

.....  
Teacher 7: But it is ... everyone can't understand this with ... that ... on the whole that it (the air) exists, but then also that the air is particles ... it is rather difficult to understand when one can't see anything.

Teachers try to find reasons for what would happen to a balloon. Their common reflections lead them to a conclusion. There is convergence and consolidation of their understanding.

Group IV:

Subject teacher: Well ... this can also be done ... be done in a more funny way if one has a balloon ... instead of corking up you put on a balloon. What happens then? What do you think?

Teacher 12: Yes ... well ... it comes out, I assume ...

Teacher 11: No....

Teacher 12: Yes, wait ... No-no ... it ... it is pulled inside.

Subject teacher: It is pulled in, yes. It is pulled in. Yes.  
Yes. And then, if you then put it under warm water, then  
it pops up again.  
Teacher 12: Yes.

Also in this group the teachers reach a conclusion by reflecting collaboratively. They seem to experience pleasure and acquire new knowledge. They really try to understand what happens.

I have collected the main features from the class teachers' discussions in the four groups in Table 1. The initial missing content knowledge of the teachers is protruding. Of course, it is not possible to request the same content knowledge as from subject teachers, but these class teachers stand at the same level as their students (Dumbrajs 2007, 160). They might have extended every-day-knowledge, they have larger experience, but this sometimes leads to knowledge, which is different from scientifically accepted views. The teachers ask few "why" questions. And they cannot easily apply what they have learned to new situations. However, when the first critical event appears, an increasing flow of new understanding develops as a consequence of collaborative sharing of thoughts and intervention by the subject teacher. This flow is shown in Table 2.

Table :.Summary of class teachers' discussions.

Expansion of gases				
	Prior knowledge	Performance of the experiment	Reflection on results	Discussion
Group I	- "bang"	- interventions - what about the bang? (hard bottle) - I do not think that you get it ...	- expansion (warm or cold air) - air exists - air needs less place when it is cold	- molecules - when it gets warm they get more speed - peeled egg

<b>Group II</b>		- collaborative work	- molecules	- molecules moving (children) - warm air rises (but why?)
<b>Group III</b>	- expansion - the bottle shrinks	- the bottle shrinks - interventions - because .... ?	- colliding molecules- the air becomes denser when it is cold	- one can't see the air particles - the balloon (why?)
<b>Group IV</b>	- "bang"	- confirming interventions- "it is shrinking"- "it is funny: being that hard"	- movement	- the balloon; it is pulled inside
<b>Overall content</b>	- experience (2) - every day- knowledge (1) - scientific concept (1)	- experience (4) - intervention (3) - reflective thoughts(2)	- air (3) - molecules (2) - density (1) - expansion (2) - movement, collision (2)	- molecules get more speed when heated (3) - warm air rises (but why?) (1)

Table 2.Development of change process.

<b>Critical events</b>				
	<b>Prior knowledge</b>	<b>Performance of the experiment</b>	<b>Reflection on results</b>	<b>Discussion</b>
<b>Group I</b>			air exists	when molecules get warm they get more speed
<b>Group II</b>				
<b>Group III</b>	air expansion	why?	colliding molecules, density	the balloon instead of a cork
<b>Group IV</b>		why?	why? movement of molecules	the balloon instead of a cork

## **2.2. Teaching Methods**

The teaching profession has changed a lot over the years. New ideas, attitudes and values are realized. When the context of practice is changing, the teachers are not able to function as competently as earlier. Reflection on practices therefore forms an integrated part of their profession. After the workshop some class teachers discussed their experiences.

Teacher 4: The situation is that one thinks that physics and chemistry must be so terribly difficult.

Teacher 3: Mm..

Teacher 4: But it is not.

Teacher 3: But surely it is... The discussion, to carry it out ... that, that the experiment as such, but then to be able to carry out that ... - After ... after the presumptions. They can bring forth presumptions, then it is still, like, free to guess anything.

Teacher 4: Yes.

Teacher 3: All sorts of ideas. But then, when one comes to that result, one has to formulate it somehow ... cleverly.

Teacher 1: I think it is partly the idea in primary school with these discussions. Really, it is not the experiments as such that are important.

Teacher 4: No. No-no. It is what they experience and the thoughts that are raised. But it does not matter, if it would fail completely. It does not matter at all. To create the train of thought, like ... to highlight ... and then that one ... is careful not to ... to tell too much.

## **3. Results and discussion**

The class teachers did not feel confident about their subject knowledge and also felt that they lacked the time to explore a wide range of materials. Generally, they did not want to seek help. They preferred ready units that worked. They thought that subject content should be expressed in terms that easily can be conveyed to their students. They asked themselves if time is used in an effective way if they allow their students to pursue their own investigations, if the activities should not be teacher-controlled so that the students get the "correct" results, and if students

really can learn in a self-directed way. Similar experiences have been quoted by Geelan (1998) from implementation of innovative teaching approaches in a mixed community of primary and secondary school teachers. Beliefs, values and goals that describe the teachers' orientation are at odds with those supporting investigative learning (Volkman, Abell, and Zgagacz 2005, see also Rice 2005). However, the teachers in this study themselves clearly enjoy learning by investigating. Reflection in groups is intense and lively. Teachers develop and learn change towards a more active engagement in constructing knowledge. Here they strongly consider parents' views and include their opinions.

The above study is as such not generalizable. However, hints are given about problems that might occur, when a curriculum introducing investigative teaching methods is taken into use. The contexts within which teachers work, their commitments, and engagement with colleagues, influence their willingness to change.

## **Conclusion**

Although teacher education subscribes to ideals of constructive and investigative learning, it is not always clear how teachers translate these ideals into their views concerning curriculum design and implementation. Lay culture norms are strongly ingrained. Most teacher education supplies a weak intervention to alter particular views regarding teaching. An important goal to teacher education programs ought to be to alter teachers' beliefs. However, principles that challenge teachers' beliefs are often dismissed by teachers as being theoretical, unworkable, or simply wrong. As professionals teachers need to value knowledge, to work with others in teams in order to achieve common goals, and to

concern themselves with the well-being of their students. Focusing and reflecting on such skills and practices might develop and change beliefs. When the first critical event appears an increasing flow of new converging and consolidating understanding evolves.

From the above considerations it can be concluded that class teachers might be helped by implementation of the following features in their everyday learning and teaching process:

1. Teacher teams should be developed to reflect over practices. Thus an informal learning situation could be achieved. There would be an array of teachers, each one with knowledge of a particular kind of domain or skill. They would together find out about content knowledge. They would discuss meaningful goals for their teaching and they could encourage each other to test innovative teaching approaches. (Levander and Repo-Kaarento 2004)
2. Expert knowledge and further education should be available. Class teachers should not be afraid to ask subject teachers for help. When someone attends a course for further education, the new knowledge must not stay with this person, but the whole team should be informed. Nowadays expertise is also available on the web. Teams of teachers at many sites can log in concurrently. They hear from and interact with a remote expert/facilitator but then return intermittently to discuss the topic face to face with people in their own team. This contextualizes the topic to the local school site. Thus learning activities are focused directly on work-related issues (Levander and Repo-Kaarento 2004, Knight 2002).

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## **C**HAPTER 2

# **USING AUTHENTIC SCIENTIFIC STUDIES TO ADVANCE SCIENCE TEACHER EDUCATION AND SECONDARY SCIENCE TEACHING AND LEARNING IN THE FIELD OF ECOLOGY: THE ROLE OF DIVERSE STAKEHOLDERS IN SCIENCE EDUCATION**

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### **Abstract**

This paper addresses the implementation of a secondary biology curriculum designed to introduce urban students to the role of scientific authentic data in drawing conclusions about issues related to ecology and human impact on the environment. Teachers in New York City were enlisted to implement two ecology curriculum modules and provide feedback. The goal of this pilot-testing was to learn how best to increase module effectiveness and usability, including how to

improve the teacher guide, ease of technology use, and general classroom usability. The stakeholders for this project included the federal government whose grant funding made this possible; the enlisted teachers and their students; the museum educators whose materials were incorporated into the curriculum; and the school administrators where the curriculum was implemented.

## **Keywords**

Science Learning – Environmental Science – Curriculum

## **Introduction**

The objective of the Ecology Disrupted project is to use resources of the American Museum of Natural History (AMNH) in New York City to develop and implement two ecology curriculum modules and pilot-test them in the classrooms of over sixty New York City public school biology teachers. The goals of the modules are to increase student learning of the nature of science, ecological principles, and personal and human environmental impacts. The goal of pilot-testing was to receive teacher feedback on how best to increase module effectiveness and usability, including soliciting teacher feedback on how to improve the teacher guide, ease of technology use, and general classroom usability. We also solicited feedback on how to improve student assessments, activity scaffolding, and student differentiation. We asked participating teachers for ecology case study modifications that increase student learning by enhancing student prior knowledge and by further contextualizing these units into the daily lives of students. The result is two curriculum modules that use authentic scientific research to study ecology and environmental science in the secondary school biology course, a significant inclusion in secondary biology.

Increasing public awareness about the role of human activities in shaping the environment has led to a greater interest in offering more environmentally themed courses at both the high school and college levels (Edelson, 2007; Galbraith, 2009). Environmental science is now a more common course in high schools than Earth Science (Edelson, 2007). In the past, one of the biggest obstacles to environmental education in a high school setting was a lack of prescribed time in the curriculum (Cherif, 1992; Ham & Sewing, 1987). The increasing amount of time allotted to environmental science at the high school level in the United States has been a boon to environmental education, potentially increasing student understanding of ecology and raising student awareness of how their own lives impact the natural world.

This paper explores two major themes in science education: (1) The importance of teaching students about ecological function (2) the significance of teaching science to students through the use of real scientific studies. Science educators need to teach what they know about science, along with the various, specific ways these facts came to be and the variety of methods and techniques that scientists use to explore the diverse phenomena in the world—that is, the process of knowledge construction as it's actually practiced rather than the common stereotype of a singular scientific method. A group of scientists and science educators developed ecology curriculum modules that use electronic media and authentic scientific data.

Science educators since the 1960s have recognized the need for bringing authentic scientific practice into the science classroom. Originally, this recognition took the form of new curriculum written to influence the type of instruction. The goal of the new curricula was

to bring science practice to schools by designing materials that asked students to develop science process skills like making observations and hypotheses, designing experiments, and collecting data. The thrust of the reform was very teacher centered. Improve the curriculum and the students will learn (Duschl, Schweingruber,&Shouse 2007). In the past 15 years there has been a growing recognition of the importance of student prior knowledge and experience for influencing science learning. Therefore, today's recommended instructional practices seek to build on students' prior knowledge and conceptual understanding (Bransford, Brown, & Cocking, 2000). Teachers need to actively engage students in the process of science and guide students to reflect and discuss their explanations.

## **1. The stakeholders**

Ecology Disrupted is the title of a United States federally funded project which seeks to develop unique curriculum resources that can be pilot tested in the field and that can enhance science learning. The authentic scientific research which informed the curriculum modules was selected from the American Museum of Natural History (AMNH) situated in New York City. These data are prepared for the public in the form of electronic media called *Science Bulletins*. These media present an overview of contemporary scientific studies published in peer reviewed scientific journals. One set of stakeholders are the technology developers at the AMNH who were clearly thrilled that their *Science Bulletins* would find a larger audience amongst high school biology students. The officials at the museum were also supportive of the project as they were co-principal investigators and received a portion of the funding. The authors were important stakeholders who designed the curriculum from these modules and engaged researchers in exploring its

efficacy. They also implemented the field testing of the curriculum modules and were invested in testing their hypotheses about using authentic scientific data to teach ecology. The most significant group of stakeholders was the 29 high school biology teachers who were recruited to test these curriculum modules in their classes. For their efforts, they received remuneration and membership to the AMNH. High school administrators were asked to support the professional development time required to train teachers to use these modules. They had to consent to the necessary classroom release time and to the authors visiting their classrooms. This latter group of stakeholders was a “deal-breaker,” for without their cooperation, it would have been difficult to work directly with the teachers. The school administrators who consented to be part of the *Ecology Disrupted* project had to be convinced that these modules would serve their goals for student learning in high school biology and their subsequent achievement on the standardized tests. Finally, the students were unwitting stakeholders since, in the end, it is their understanding of ecological principles that was the most important goal of the project.

## **2. Ecology disrupted theoretical framework**

By using real life studies of environmental systems replete with electronic media, the *Ecology Disrupted* method creates curriculum modules for secondary school science that seek to transform the major themes of environmental science classrooms, environmental issues and ecology into the language of conservation biology. In this method, students learn about the importance and complexity of normal ecological processes by studying what goes wrong when people *disrupt* them (environmental issues). Just as geneticists study mutated genes to discover gene function, secondary school ecology students would

learn the complexity of fully functioning ecosystems from studying human caused disruptions (environmental issues) in ecological processes. Harkening back to the writings of Leopold, by examining the human role in ecological communities (environmental issues), we can learn to appreciate "the integrity, stability, and beauty of the biotic community" (ecological function). We may then "see land as a community to which we belong" and "begin to use it with love and respect."

In order to best "see land as a community to which we belong" the *Ecology Disrupted* approach uses daily life to connect environmental issues to ecological principles. The use of local environmental issues has already been shown to engage a diverse range of students about the increasing human impact on nearly all of the Earth's environmental systems (Pfirman & National Science Foundation Advisory Committee for Environmental Research and Education [NSF AC-ERE], 2003; NSF AC-ERE, 2005), nurture the development of civically engaged citizens (Bjorkland & Pringle, 2001; Hungerford, Litherland, Peyton, Ramsey, & Volk, 2003; Science Education for New Civic Engagement and Responsibility, 2011), and add a new and vibrant dimension to environmental science curricula (Bouillion & Gomez 2001; Eliam, 2002; Johnson, 2004; Gardenmosaics, 2011). The *Ecology Disrupted* approach seeks to bring some of the excitement and engagement of local environmental issues to the formal classroom setting by using daily life to connect ecological principles to environmental issues. Linking everyday behaviors to environmental issues increases student understanding of specific environmental issues like climate change (Cordero, Todd, & Abellera, 2008). Further linking daily life to ecological function can help students discover the hidden interconnectedness of basic ecological principles (Elder, Coffin, & Farrior, 1998; Thomashow, 2002; Johnson, 2004; North

American Association for Environmental Education [NAAEE], 2011). For example, teenagers from the northeast United States are well versed in the perils of Lyme disease but most students are ignorant of its connection to fragmented habitats and disrupted food webs. By placing Lyme disease in its ecological context, students can deepen their understanding of the causes of Lyme disease, and habitats and food webs, its related ecological principles (Elder et al., 1998; Bransford et al., 2000; Thomashow, 2002). This approach will help students develop a deeper understanding of sustainability and of environmental issues and ecology and also help them learn that no matter where they live, they are part of an ecological system whose principles, and disruptions, affect their daily lives.

### **3. Using published scientific data in the ecology disrupted method**

Conservation biologists have accumulated decades of information that illuminate the effect of humans on ecological function. These data can be transformed into formats that can be understood and manipulated by high school students using the *Ecology Disrupted* approach to help students learn about both the human impact on the natural world and about normal ecological function. Compelling, interesting and educationally accessible lessons can be developed from these real science examples, to explore ecological principles that are the foci of secondary classroom instruction. This paper describes two case studies that transform environmental issues from published studies into the language of ecology, a topic specifically addressed in a classroom setting. Both case studies use real scientific data and media produced by the American Museum of Natural History (*Biobulletins* *Snapshots*; <http://www.amnh.org/sciencebulletins/biobulletin/index>



[x.html](#)) to link daily life to environmental issues and basic ecological principles. Currently, environmental issues are usually classified as separate units of study from ecological principle units in science textbooks and in district and state scope and sequence guidelines and frameworks. By segregating these topics into different units or semesters, these textbooks and districts are missing an opportunity to use environmental issues to understand ecological principles, for environmental issues are simply the result of human disruptions of normal ecological function. Just as geneticists use disrupted genes, mutations, to understand gene function, ecology students would learn from using disrupted ecological function, environmental issues, to understand the complexity of functioning ecosystems. Explicitly linking environmental issues to the ecological function that they disrupt is potentially transformative for understanding ecology and environmental science. A new paradigm of 21<sup>st</sup> century science, sustainability, already links daily human actions to environmental issues (Dennison, 2008). Our *Ecology Disrupted* approach of using case studies on daily life to link environmental issues to ecology, defines the sustainability paradigm to include ecology.

### **3.1 Highways and bighorn sheep:**

The first example is based on 2005 conservation biology research published in *Ecology Letters* that shows that highways bisecting the Sierra-Nevada Mountains block the movement of bighorn sheep, and leads to inbreeding (Epps et al., 2005). As formulated this example is not appropriately formatted to bring into a secondary school classroom in a contextualized manner. The media developed around this research in fact was not originally intended for the classroom setting, but was produced in order to bring up to date content into the Museum's exhibition halls. The

Museum also posted the media online, so that a teacher interested in sharing this story can download it and show it to her students. However, the story in and of itself acts as a barrier for bringing it to the classroom. It is a stand-alone entity, unrelated to the topics of the classroom. Therefore, we reformulated the scenario established by the scientific research using the *Ecology Disrupted* method. In this case, we used the scientific research and results of the research to ask what goes wrong when people disrupt habitats (the ecological principle that is the focus of classroom units) in unexpected ways.

This methodology has the added benefit of linking daily human life (highways and transportation, in this case) with the ecological principle (habitats). Students must use source material and scientific data from the published study to investigate the question, "*How might being able to drive between Los Angeles and Las Vegas in just four hours put the bighorn sheep at risk?*" Students are provided with maps of the mountain habitats and roadways in this region of Southern California. They measure the distances between mountaintops and take note of the location of roads. They then study the genetic data of the sheep populations (names for the mountaintops they inhabit) and they can see that certain big horn sheep populations have very few choices for mating and the resultant offspring show genetic weaknesses that threaten their viability.

They then watch and analyze other Museum produced media stories to connect this question to other instances, where people have disrupted habitats in unexpected ways. The goal of this example is to encourage students to recognize the complexity of ecological function and the variety of daily behaviors that can have negative impacts on ecosystems and habitats. It is the hope that recognizing the

environmental impact of mundane daily activities will help students understand how their behavior impacts the natural world and lead them to be more environmentally responsible citizens.

### ***3.2 Salting icy roads and water quality:***

The second example is based upon data from a long-term study that shows that salt added to roadways to melt ice causes freshwater streams to become progressively saltier (Kaushal et al., 2005). As in the previous example, we use the scientific scenario to ask what goes wrong when people disrupt an ecological principle. In this case, we are concerned about unforeseen consequences to changing abiotic factors. Like in the bighorn sheep example, we link daily life (snowy roads) with the ecological principle (abiotic factors). Students must use source material and scientific data from the published study to investigate the question, *"How do snowy and icy roads put the Baltimore area's water supply at risk?"* The source material contains seasonal salinity data that shows the g/ml of salt present in fresh water streams and rivers in urban, suburban and forested areas. Students then graph each of these sets of data and study the ways in which areas with dense roadways contribute more salt to the environment in snowy and icy winters than areas that are suburban or forested. As in the previous example, the students then watch and analyze other Museum produced media stories to connect this question to other instances where people have disrupted abiotic factors in unexpected ways.

## **4. Conclusions: conservation biology as a tool to expand student stakeholders' sense of personal agency**

The goal of this project was to help secondary science teachers embrace the possibility that biology curricula could integrate ecological principles using every day

experiences and authentic scientific data. The teachers who piloted these modules demonstrated that student learning occurred and that there was enthusiasm and interest in making these connections and bringing secondary biology curriculum to life. Currently, new testing on modules that incorporate teacher modifications, enhancements and suggestions further refine the content of the curriculum. The process of implementing the pilot modules engaged participating teachers in authentic professional development through a shared web site, email lists and discussion groups. The electronic and material resources of the AMNH motivated these urban teachers to reach beyond the standard curriculum to enhance student understanding of ecological principles. The modules themselves motivated the students to think about what scientists study and how the unintended consequences of daily life impact their environment. The teachers reported many levels of success in field testing this module, including, but not limited to using the electronic media as a hook to engage students in abiotic factors that impact ecosystems. The authors had a lot of data on which to base their conclusions that this approach to teaching ecology works in terms of student understanding and their potential for future action.

These resources will be made available globally by this project's end. This approach is a straightforward and useful technique for developing educational materials that provide classroom teachers with an obvious methodology for bringing ecological discoveries into the classroom, thereby helping the students to reframe their understanding of their community to include the natural world. We hope that the *Ecology Disrupted* model encourages students to understand the complexity of ecological processes and the role of human behavior in disrupting ecosystems, thereby leading students to be more environmentally aware

and perhaps to be more environmentally responsible. The hope is that students can see themselves as posing alternatives and becoming part of the solution.

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## **C**HAPTER 3

### **ENGAGING MATH STUDENTS IN SCIENTIFIC DISCOVERY: REFLECTIONS ON AN EXPERIMENT**

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#### **Abstract**

The purpose of scientific discovery is to infer regularity in experimental observations. The regularity can be verbalized qualitatively or can be quantified using mathematical apparatus. Learning through scientific discovery is classified as a self-directed form of knowledge acquisition (De Jong & Joolingen, 1998). Can this type of learning, predominantly applied in science classes, be induced in a math class? What are the rewards for the learner? What are the roles of the stakeholders—students, teachers, parents, and curriculum policymakers—in this method of teaching and learning math? Are math teachers adequately prepared to lead their students through the stages of scientific discovery? These are some of the questions that this study attempts to answer. New technologies open the gate for experimenting



with new teaching strategies and allow for integrating virtual scientific learning environments and mathematics to quantify the outcomes of the experimentations. Through this type of integration, we formulated an exemplary instructional unit for trigonometry students. The students found the lessons utilizing simulations very attractive, and they highly praised the learning effects. They claimed that this virtual world makes abstract mathematical equations tangible and retainable longer. The unit is described in detail here for use in high school math classes.

## **Keywords**

Mathematics Learning –Inductive Reasoning–Physics  
Simulations

*The concepts of mathematics are derived by abstraction from direct experience of the physical world, from the generalization and reflective abstraction of previously constructed concepts, by negotiating meanings with others during discourse, or by some combination of these means.*

*–Paul Ernest*

## **1. Inductive Reasoning as an Effective Teaching Method**

Although inductive reasoning produces multiple learning outcomes, this teaching method is rarely applied in mathematics classes traditionally taught deductively. Is there an opportunity for applying this teaching method to immerse math students in a wider range of its applications? It seems that in reference to rich scientific contexts led by the process of scientific experimentations, inductive reasoning can be more widely exercised. Reasoning is a thought process that involves judging, inferring, generalizing, and comparing. Among the many types of reasoning, inductive reasoning is one of the most commonly utilized across all subjects and grade levels (Joyce, Weil, & Calhoun, 2009). This type of reasoning has

vast applications in engineering and is believed to produce high learning outcomes (Prince & Felder, 2006). What are the possibilities of applying this teaching method in mathematics in order to immerse students in a scientific content where the applications of mathematics and discovery of scientific relations via mathematics tools will be the leading theme? We suggest that by utilizing easily adoptable virtual experiments, inductive reasoning can be more widely exercised in mathematics classes.

Implementing this discourse in high school not only enhances the learning objectives of high school mathematics curriculum but also encourages and prepares students to enter the field of engineering, where the skill of inductive thinking is key to success.

Inductive reasoning, or induction, leads to a general law (statement) derived from specific cases. This bottom-up approach draws inferences from observations in order to make generalizations. Instructional units involving inductive teaching usually contain four stages (Joyce et al., 2009): focus, conceptual control, inference, and confirmation. In order to parallel this approach with scientific discovery, we modified it by adding a leading stage: problem statement. Thus, our approach contains the following five stages:

1. Problem statement involves forming a question that students answer while working on a given experiment.
2. Focus is building (collecting) data and asking students to study the attributes of the data set and formulate the hypothesis.
3. Conceptual control (analysis) is classifying the facts and identifying patterns of regularity.
4. Inference is forming a generalization (a pattern or law) about the relations between the collected

- facts that leads to acquiring a general (mathematical) equation or function.
5. Confirmation is verifying the derived model in new (physical) circumstances conducted through testing the inference and further observations.

Inductive reasoning as an instructional method allows for encompassing factual information in an environment that the student retains and can easily apply in other subjects. Students are placed in the role of scientists who actively construct new knowledge from observation and abstraction. By exercising inductive thinking, practitioners learn to select information based on scientific validity. By exercising this type of inquiry in math classes, they learn how to integrate the knowledge of both science and mathematics. This skill will allow them to mathematize new natural phenomena.

## **2. Why Utilize Physics Simulations?**

Mathematics classrooms, traditionally, are not designed for conducting scientific experiments. Considering this logistical factor, for our experiment, we established criteria for selecting a scientific environment that was highly adaptable to any mathematics classroom and that did not demand additional funding. Based on these criteria, we decided to use a virtual scientific environment in the form of physics simulations. From the wide range of scientific simulations available, we selected physics simulations provided free online by the Physics Education Technology Team (PhET) at Colorado University at Boulder. These simulations may be run online or downloaded and used for non-profit educational purposes without permission from the University of Colorado. A substantial body of recent research on the use of PhET simulations and student achievement may be accessed from

<http://phet.colorado.edu/new/research/index.php>.

Due to their primary purpose of enhancing the teaching of physics, biology, and chemistry, these simulations underline the scientific nature of the phenomena. Respectively, mathematics tools such as functions or the Cartesian coordinate system are not visible to students. We considered these factors as advantageous. We intended for students to analyze, search, and embed appropriate mathematical representations to be able to describe assigned phenomena. Thus, albeit virtual, these simulations presented great contexts for inducing scientific discovery in mathematics classes.

While working on the virtual labs, students can state hypotheses, observe scientific processes, take measurements, and construct and validate derived mathematical models. The inputs of the experiments can be progressively modified, and new responses can be predicated and further verified. This dynamism encourages students to experiment and simultaneously immerses students in the process of scientific discovery. With the aide of graphing technology, derived abstract mathematical embodiments can be effectively validated. Research conducted by PhET (Finkelstein et al., 2004) proved that the simulations can be substituted effectively for even real laboratory equipment in physics classes. Due to these findings, we hypothesized that these simulations could be used to enhance the process of mathematical modeling and provide a reach field for exercising inductive reasoning in math classes.

### **3. Structure of the Activity**

Following is a stem of the instructional unit that we created for our experiment. It discusses how the

simulation “Wave on a String” can be utilized to exercise inductive reasoning in a trigonometry class. The key stages of inductive reasoning are highlighted. Practitioners can work independently in front of the computer, or the simulation can be displayed on a screen and the instructor can guide the students through the process of inductive reasoning while the students analyze prepared screenshots of respective stages of the process. We suggest that for students who are not accustomed to this novice learning environment, the former class setting is more appropriate. The role of the instructor is to stimulate the process and offer suggestions if needed. Students are the primary stakeholders in the experiment, and for many, it may be the first such encounter. Being able to conduct and analyze a scientific experiment in a mathematics class may seem an exciting yet odd task for many of them. Thus, we believe that they need to feel encouraged and supported when they face obstacles.

### ***3.1. Introduction of the concept and demonstration of the simulation***

The teacher opens the simulation at [http://phet.colorado.edu/teacherideas/view-contribution.php?contribution\\_id=326](http://phet.colorado.edu/teacherideas/view-contribution.php?contribution_id=326) and demonstrates its features, concurrently focusing the students’ attention on the shape of the string while it transmits the mechanical energy. Figure 1 displays an exemplary interface of the environment. The wave can be generated by various methods: manually by producing single pulses and automatically by using an embedded oscillator. These options can be exercised by checking the respective mode shown above the icon “Reset” in the following screenshot.

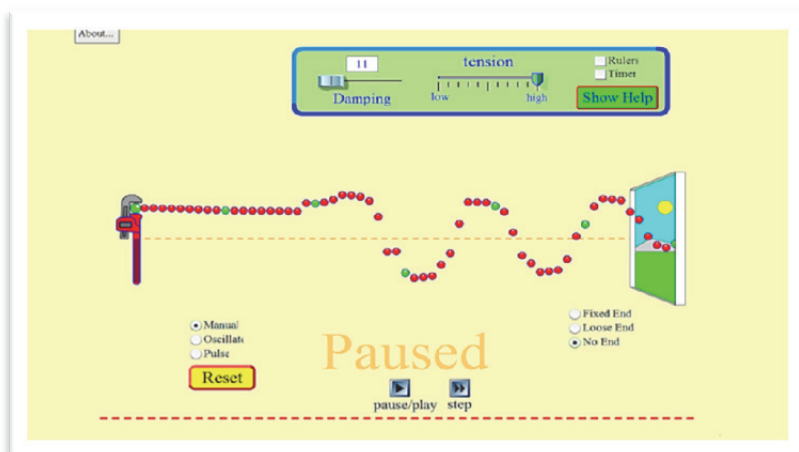


Figure 1: General demonstration of the features of the simulation.

The teacher might direct students' attention to frequency and amplitude of the generated wave, as these two physical factors reflect directly fundamental parameters needed in the process of formulating a sinusoidal function. The teacher addresses students' questioning of the high irregularity of the produced wave and demonstrates the effects of various damping factors on the energy transmission. Damping factor indicates the amount of inefficiency of the medium in which the energy is transmitted. Although including this factor was appealing to us, initially, we set it to be negligible to sustain regularity of data. Furthermore, in order to eliminate wave reflections, we suggest checking the "No End" icon located on the right side of the above screenshot.

### 3.2. Problem statement

In this stage, the teacher presents the problem statement: Can a *sinusoidal function* be applied to model motion of energy on a string? The students write their hypotheses and support the predictions. Students will refer to irregularity of the wave as a main concern. This concern is valid, but it can be

overcome. The phase of removing this obstacle will be discussed during the stage of gathering information.

### **3.3. Focus/gathering information/stating hypothesis**

Since the purpose of scientific discovery is to infer regularity in experimental observations, the instructor uses another feature of the simulation: generating regular pulses by turning on an embedded rotating oscillator. This feature can be activated by selecting the "Pulse" option located above the "Reset" icon shown in Figure 2. The pulse represents half of the full cycle of a periodic motion. The students might still be doubtful of whether a trigonometric function that contains positive and negative pulses, using the language of physics, can be applied to properly describe what is observed.

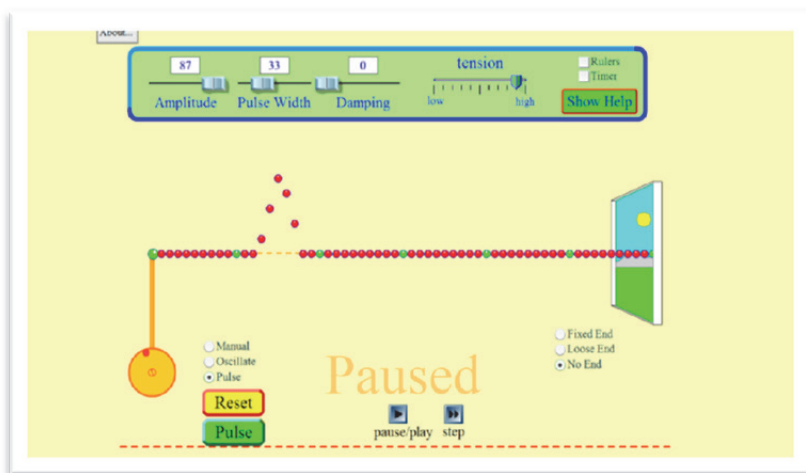


Figure 2: Reducing irregularity of the wave motion

Students will be anxious to see what another option of generating waves called "oscillate" can produce. The teacher might ask for their predictions and then display the result. The purpose of this scaffolding elimination of extraneous variables is to amplify to

math students the scientific nature of experimentation. At large, as we stated, the elimination should allow an emergence of inferences. A high interactivity of this simulation makes this process possible. A regular wave produced by a generated oscillator is displayed in Figure 3.

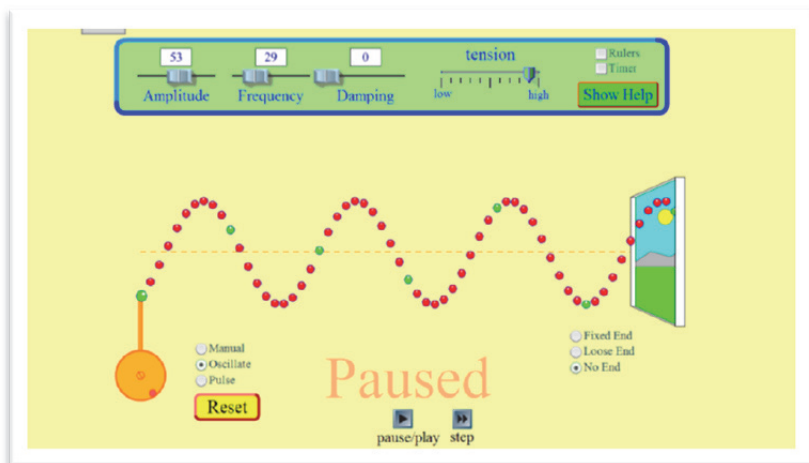


Figure 3: Further wave modifications.

The wave, depending on the selected frequency, can contain multiple wavelengths.

### 3.4. Analysis/conceptual control

In order to quantify the outputs of the experiment, some measuring devices are necessary. Devices such as the ruler and the stopwatch are embedded in the simulation. They can be conveniently utilized to quantify the magnitudes of parameters that will be further used for a construction of sinusoidal function. During this stage, students focus on identifying and measuring the parameters, which are *period (or wavelength)*, *amplitude*, and *vertical shift* of the wave. These parameters will be used to mathematize the wave.



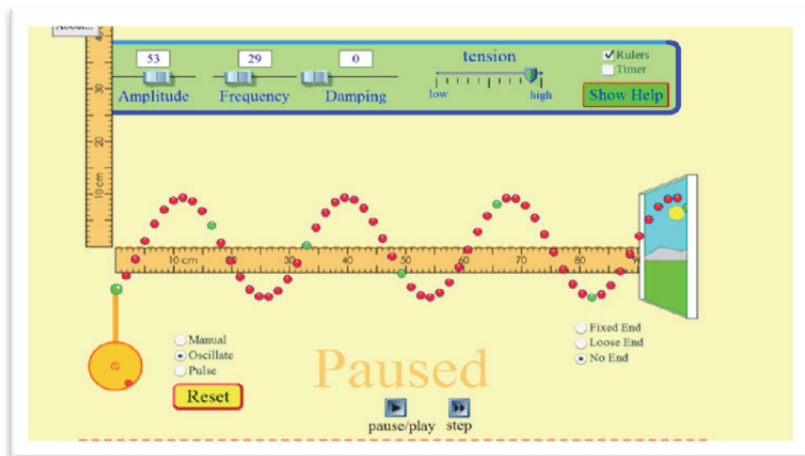


Figure 4: The process of quantifying the parameters of the wave.

An alternative method of quantifying the parameters is providing students with copies of the screenshots and asking them to measure the parameters using a metric ruler. We found that when asked, students preferred this method of data acquisition.

### 3.5. Generalization of the analysis

This stage, during which students transfer measured parameters to formulate mathematical abstraction, is critical in the process of function construction. In order to assist them, the teacher might offer a review of properties of sinusoidal functions in the form of multiple-choice questions. Following are samples of such questions.

A general form of a sinusoidal function is by

$$f(t) = A \sin\left(\frac{2\pi}{T}t\right).$$

Select the quantity that represents the average time of one full cycle of the wave.

- A. frequency ( **$f$** ) B. amplitude ( **$A$** ) C. period ( **$T$** ) D. general time variable ( **$t$** )

Select the quantity that represents the maximum vertical position of the wave as measured from the rest position.

- A. general time variable ( **$t$** ) B. height of wave ( **$f(t)$** ) C. amplitude ( **$A$** ) D. period ( **$T$** )

Select the quantity that represents the dependent variable of this function.

- A. amplitude ( **$A$** ) B. vertical position of wave ( **$f(t)$** ) C. general variable ( **$t$** ) D. period ( **$T$** )

After students complete this assessment, the teacher verifies their responses. There is one element of this experiment that requires clarification. In trigonometry textbooks, for instance in Stewart (2006) or Sullivan and Sullivan (2009), periodic motion is usually represented by a function that models the vertical position of the oscillating object in the function of time

$y = f(t)$ , or more specifically  $y(t) = A \sin\left(\frac{2\pi}{T}t\right)$ . In this

experiment, students will mathematically describe an observable wave that has two dimensions: vertical and horizontal. In order to mathematize this physical wave, a modification of the general equation is needed. There are two options that the instructor can choose from: students can parameterize the motion, i.e., they can find  $y = f(t)$ , and  $x = f(t)$ , or they can express the vertical position of the wave in the function of its horizontal position,  $y = f(x)$ . The second option is more appropriate, as parametric equations are usually studied later in the course of trigonometry. The mathematical model that students are then going

to apply is  $y = A \sin\left(\frac{2\pi}{\Delta x}x\right)$ , where  $\Delta x$  represents the

wavelength of the wave, traditionally called period in trigonometry, and  $x$  represents the horizontal position of the front of the wave. The modification of the

general form can be easily verified and is presented in Sokolowski, Yalvac, and Loving (2011). On another occasion, the teacher might refer to this experiment and demonstrate more sophisticated techniques of wave description through harmonic analysis, called Fourier analysis.

### **3.6. Verification and confirmation of the derived model**

The stage of validity of the derived model is very important in the process of mathematical modeling. The learner will seek an assurance that his/her constructed mathematical representation reflects the behavior of the system and, more specifically, the anticipated dependence of isolated variables. When working on typical textbook paper-and-pencil problems, this element is omitted because either the physical representations of the experiments are not provided or, if they are provided, they are presented in a static form. The availability of the dynamic, highly interactive simulation and the physical embodiment of the wave provide a great opportunity for contrasting the observed path of energy motion with the graph of its mathematical model. Students can use a graphing calculator or any technological device that converts an algebraic function into a graph. If graphing technology is not available, students can verify the model the old-fashioned way—using a *table of values*. For example, for a given horizontal position ( $x$ ), in cm, students might calculate the respective vertical position ( $y$ ) and then construct a respective graph. They would then verify whether their handmade graphs corresponded with the ones from the snapshot of the simulation. However, after utilizing the highly interactive virtual environment, students may not be excited about using this old-fashioned method of verification.

Further testing confirms that the model is adequate, not only in the given conditions but also in a modified environment. Samples of questions that will have students verify or modify the model are presented below.

1. Suppose that the x-axis—the draggable reference (dotted) line—is moved 30 cm below the string. Which parameter of the derived function changed?
2. wavelength B. vertical transformation C. period  
D. horizontal compression
3. Construct an equation for the new function: \_\_\_\_\_
4. Due to modified frequency, there are twice as many waves observed on the string now. Which parameter of the sinusoidal function changed?  
A. amplitude B. vertical transformation C. period  
D. horizontal compression
5. Construct an equation for the new function: \_\_\_\_\_
6. Suppose that the maximum *height* of the wave increased by 10 cm as compared with the one used in the experiment. Which parameter of the wave changed?  
A. amplitude B. vertical transformation C. period  
D. horizontal compression
7. Construct an equation for the new function: \_\_\_\_\_

### **3.7. Conclusions of the experiment**

During this part, students conclude their hypotheses, share their thoughts about the experiment, and suggest ways of modifying or improving this novice way of math knowledge acquisition. Students' suggestions might constitute a valuable resource for lab improvements. They might point out elements that

seem insignificant from the teacher point of view but which might improve the flow of the lab when used. For instance, during our experiment, in the first author's classroom, a student stated that it was not clear in what units, cm or mm, the wavelength should be expressed. This information was then included in the general outline for the experiment. Another student suggested including the damping factor and consequently generating a function with decreasing amplitude. The second suggestion was included, though with an initial hesitation. This inclusion surprisingly resulted in extremely positive student responses. Students were thrilled when they could construct, with some instructor assistance, and observe on their graphing calculators functions that resembled exponentially decreasing wave amplitude such as illustrated in Figure 5.

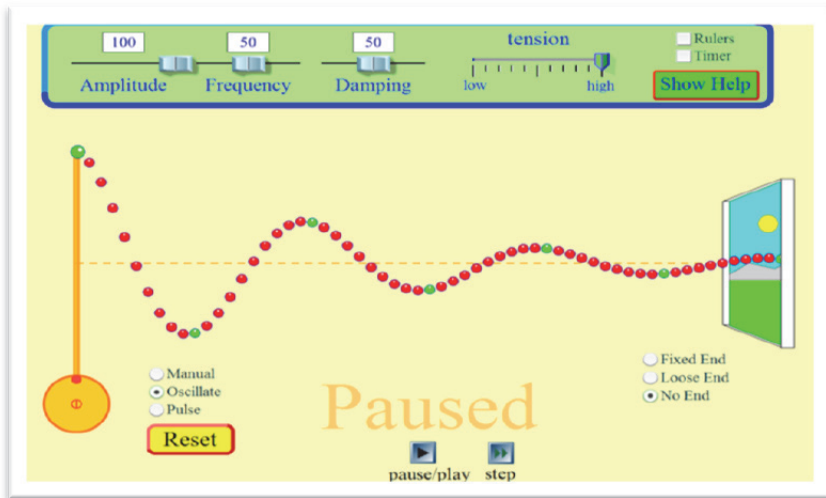


Figure 5: The process of generating wave with decreasing amplitude.

To accomplish this, students were asked, after general discussion, to first mathematically describe the change of amplitude using  $A(x) = e^{kx}$ , and then to incorporate

this amplitude function in the general trigonometric model. This process incorporated a product of two different functions rarely applied in mathematics.

#### **4. Stakeholders' Roles in Facilitating Discovery Learning in Math Classes**

What are the roles of the stakeholders—the students, the teachers, the parents, and the curriculum policymakers—in facilitating discovery learning in math classes?

In our experiment, the students found the lessons utilizing simulations very attractive, and they highly praised the learning effects. They claimed that this virtual world makes abstract mathematical equations tangible and retainable longer. Encouraged by the positive feedback, we used other virtual experiments to enhance not only the teaching of trigonometry but also other mathematics sections such as polynomial and transcendental functions. These simulations were also used in calculus classes to show students dynamic applications of the concepts of derivatives and integrals. It might be of importance to mention that all calculus students in our experimental study groups took the advanced placement calculus exam in 2009 and 2010, and all passed the rigorous exams. In addition, they exceeded the national means by more than 100% in all main calculus sections. Independent *t-tests* also proved the statistical significance of these results. We believe that the virtual physical world and applications of mathematics to understand the world helped the students achieve this success. These results support the findings of research conducted in a South-Central Texas high school by Sokolowski and Walters (2010), which revealed that mathematics students not only appreciated the new learning environment but that it helped them deepen their understanding of math concepts, as evidenced by

higher achievement on standardized tests, especially in areas pertaining to applying math to real-life situations.

Parents need to realize how changes in society have resulted in generating different needs for their children's education. Learning mathematical tools in isolation from real-world applications no longer meets the demands of modern society. Students need to experience application of the tools in order to appreciate the meanings.

The instructor in such learning environment stakes the role of a facilitator. The instructor's purpose is to offer encouragement and informative suggestions to students while placing them in the roles of scientists actively constructing mathematical representations for selected variables. The purpose of immersing the students in scientific discovery is not only having them acquire new knowledge but also having them apply that knowledge across other subject areas. In our experiment, the purposes of both the instructor and the students were paralleled. The instructor was able to walk the students through the guided inquiry with the intention of applying the properties of sinusoidal functions to formulate a concise mathematical form of the scientific system, and the students benefitted not only from the positive effect on their test scores but also from being exposed to a practical application of abstract math concepts in physics. They experienced the importance of learning mathematical concepts because these concepts advanced their understanding of the world that they live in.

There is also a role for curriculum policymakers, particularly in encouraging and promoting this type of learning environment. Inductively organized lessons require careful preparation, often encompassing multiple academic areas. The union of various

academic contents must be carefully designed so that the focus is placed on mathematization. Any obstacles might discourage the learner. The aim of the inquiry is placed on having the learner integrate the knowledge of science and math with an adherence to the principles of both subjects. However, it is important to keep in mind that teacher and student science background may be limited. In our experiment, for instance, we did not expect the students to know that the amount of transported energy depends on the wave amplitude, which is a core element of physics curriculum, nor was the math teacher expected to discuss this dependence with the students. These extensions are presented to students in their physics classes. We carefully planned the instructions to avoid such interactions with pure physics contexts. These concepts, though, could constitute independent student explorations.

Will a math teacher of average experience and professional background be willing and able to prepare instructional support of such lessons and implement the lessons to his/her school practice? Research conducted by Sokolowski and Gonzalez y Gonzalez (2012) showed that mathematics teachers are very interested in implementing activities in which simulations can be used as a context supplement. The concern that they expressed was a lack of training that would familiarize them with the stages of conducting such activities. Thus, we strongly suggest organizing professional development sessions for math teachers to help them prepare, experiment, question, and appreciate this new learning environment before deciding to implement it. Curriculum policymakers might be involved to help math teachers obtain the necessary training. There might occasionally be some unpredictable events that occur during the lab that might challenge the math teacher. Our experience has shown that students easily become engaged in such



activities, and this ignites their curiosity to know more about the physical aspects of the presented phenomena. A math teacher might not feel comfortable responding to questions that do not apply to his/her domain of expertise. Thus, providing supplementary materials with answers to typical student questions, pooled by teachers experimenting with such learning environments, is also suggested.

Finally, placing such activities in math curriculum requires detailed consideration. Are the students familiar enough with the properties of involved functions to be able to apply them? Can they handle evaluation of these functions and interpret the results? This cognitive knowledge must be possessed by the students and verified beforehand.

We would like to encourage the readers of this manuscript to utilize this lesson in their school practice and share with us their observations.

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## **C**HAPTER 4

### **MULTIPLE REPRESENTATIONS: AN ACCESSIBLE AND INCLUSIVE STRATEGY FOR FACILITATING THE CONSTRUCTION OF STUDENT MATHEMATICAL KNOWLEDGE**

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#### **Abstract**

The National Council of Teachers of Mathematics urges teachers to create an environment where students learn mathematics with understanding. The use of various representation forms, which help students to make connections and communicate their mathematical understanding, is an effective strategy to make students' construction of mathematical knowledge most effective and meaningful. This case study determined how an elementary mathematics teacher in Western Canada used multiple representations in her Grade One classroom. Findings based on qualitative data from interviews and classroom observations show that the teacher uses multiple representations to scaffold student mathematical understanding. By exposing her students to different representation forms, the teacher made the learning of the

material more accessible to students with different learning styles and ability levels.

## **Keywords**

Constructing knowledge – Elementary education –  
Mathematics education – Multiple representations –  
Professional development – Teaching strategies

## **Introduction**

Construction of knowledge has been studied by psychologists and educational theorists for many years (e.g., Alagic, 2003; Piaget, 1995; Vygotsky, 1978). Researchers have examined how students learn and highlight strategies and environments that students should experience in order to make their construction of knowledge most effective and meaningful (e.g., De Bock, Deprez, Van Dooren, Roelens, & Verschaffel, 2011; Mevarech&Kramarski, 1997; Van de Walle& Folk, 2005; Vygotsky, 1978).

True understanding occurs when a student is able to use what they know and apply it to new situations (Perkins, 1993). A student demonstrates understanding by “being able to carry out a variety of actions or performances with the topic by the ways of critical thinking: explaining, applying, generalizing, representing in new ways, making analogies and metaphors” (Alagic, 2003: 384). For this reason, teachers must create situations where students are given the opportunity to show their understanding in a variety of situations to ensure that they are successfully constructing knowledge. Students with a deep understanding of concepts are able to grasp subsequent concepts more efficiently (Alagic, 2003). Students of this nature will be more successful in their academic career and beyond. Instilling in students the goal of deeper understanding is to prepare them for the future.

The National Council of Teachers of Mathematics (NCTM, 2000) urge teachers to create an environment where students learn mathematics with understanding. Research shows that multiple representations is an effective teaching strategy to foster student mathematical understanding (e.g., Alagic, 2003; Panasuk, 2010; Suh& Moyer, 2007). This paper is a case study of a teacher who participated in a larger study about professional development for elementary mathematics teachers (McDougall, Jao, Kwan, & Yan, 2011). I use this case study as an example of one teacher's beliefs about multiple representations and how she integrates them into her teaching practice. I will also recount one specific lesson that incorporated multiple representations. Although this paper does not focus on student outcomes, this narrative of a teacher's use of multiple representations and her emergent understanding of the influence of this teaching strategy on student engagement is valuable to our understanding of the construction of knowledge.

## **1. Theoretical framework**

When constructing new knowledge, students make sense of new information by linking new and existing knowledge (Vygotsky, 1978). The student refers to "strategies, tactics, or principles that are already in memory and compare[s] the problem at hand with problems that have been solved before" (Mevarech&Kramarski, 1997: 367). Thus, exposing students to a variety of teaching tools early in their education will help them in future studies by giving them more options to which to compare the problem at hand.

Students are naturally most comfortable with concrete ideas over those that are abstract. In mathematics, when first exposing students to new ideas, getting the

students to interact with concrete tools (such as manipulatives) can ease them into the concept and develop the basic connections needed for them to progress to abstract ideas and the use of more complex mathematical language (Reys, Suydam, Lindquist, & Smith, 1998). It is a step-by-step progression as learning does not happen instantaneously and takes time to develop. If concrete tools make learning accessible and the use of abstract mathematical language demonstrates deeper knowledge, it is important to incorporate each into a mathematics lesson. The inclusion of various modes for the purpose of communicating an understanding of knowledge is called multiple representations.

### ***1.1. Multiple representations***

The NCTM (2000) states that students should “create and use representations to organize, record, and communicate mathematical ideas; select, apply, and translate among mathematical representation to solve problems; and use representations to model and interpret physical social and mathematical phenomena” (p. 67). The NCTM’s representation standard states that representations can be used to strengthen a student’s mathematics conceptual understanding and their ability to communicate mathematical principles. It is mentioned that representations are both a means of processing as well as a format of showing a product.

The work of Lesh, Landau and Hamilton (1983) highlights five representation forms that teachers should use in their teaching: real life experience, manipulative models, pictures or diagrams, spoken symbols and written symbols. The combination of using all of these representation forms, along with encouraging the students to make connections between the types of representations, deepens

mathematics understanding. When a student is able to demonstrate their knowledge using all of these forms, it shows that the student has a secure understanding of the material.

Representation forms can vary in levels of abstractness. Using multiple representation forms provides a chance for a group of students with diverse ability levels to become engaged. Students can choose to use the representation form that is most meaningful to them and can move to higher levels of understanding using increasingly complex forms (Alagic, 2003). Teachers can also use this fact when they are assessing their students. If a student chooses a simpler representation, chances are the student has a more basic understanding of the concept.

Bruner (1966) declared that students need three levels of engagement to build a complete understanding of a mathematics concept. The first is enactive, where students use manipulatives and other concrete materials to construct their understanding. The second level is iconic, where students represent their understanding using pictures and graphs and the final level is symbolic, where the students use numerals to represent what they know.

Similarly, Dienes (1960) created levels that students move through to create a thorough mathematical understanding. He created five levels in total: free play, generalization, representation, symbolization and formalization. During free play, students work with physical materials and manipulatives to discover basics about the concept. In generalization, the student notices patterns and commonalities and then takes these ideas to be represented by images in the representation level. Next, the student describes their representation using mathematical language and symbols. Finally, they create a set of rules and



algorithms to match their understanding of the concept.

With both structural levels set by Bruner and Dienes, one can imagine them to be rungs on a ladder, where the first rung (level) is the most basic and the upper rungs are most abstract. In both structures, the first level involves the use of concrete material, often in the form of manipulatives. By scaffolding the forms and guiding students to see the progressive lean towards abstract representation forms, students may be able to make the connections more easily (Alagic&Palenz, 2006).

## **2. Method**

### ***2.1. Research context***

This case study is drawn from a larger study examining peer coaching as a mode of professional development for elementary teachers looking to improve their mathematics teaching practice (McDougall, Jao, Kwan, & Yan, 2011). The participants of the School Improvement in Mathematics study (McDougall, 2009) used the Ten Dimensions of Mathematics Education conceptual framework (McDougall, 2004) to focus their professional growth. The Ten Dimensions of Mathematics Education framework enables teachers to focus on key areas that will generate higher levels of student achievement (e.g., McDougall, 2004; McDougall, Ross, & Ben Jaafar, 2006).

Dimension 5, Constructing Knowledge, focuses on the variety of instructional strategies and effective questioning techniques used by teachers. Teachers should use these practices as they elicit mathematical thinking. As my study investigated the types of teaching strategies used to help students construct

mathematical understanding, I focused on those teachers working with Dimension 5 as part of their professional growth.

## **2.2. Methodology**

Case study research was conducted (Stake, 1995), focusing on a Grade One teacher and the teaching practices and strategies that she uses to elicit student mathematical understanding. A series of interviews was conducted to further examine emerging themes uncovered from the data. The initial interview was general in nature whereas subsequent and final interviews asked more detailed questions specific to the area of study and relevant to the emerging themes. Questions were also asked to find out more about Sabrina's background, her school's culture, challenges that she faced as an educator and general opinions about mathematics education (McDougall, 2009). The Grade One classroom was observed on four occasions.

The Ten Dimensions framework provided a more focused lens that assisted me in understanding how learners construct their knowledge. The early interviews and observations suggested that multiple representations was a teaching strategy used by the participant as a means to facilitate the construction of student mathematical knowledge. As a result, I returned to the literature to gain a deeper understanding of her teaching strategies to better allow me to investigate the use of multiple representations.

## **2.3. Participant**

Sabrina started her teaching career in Central Canada, teaching at the elementary level. She then moved to Western Canada and continued to teach in this division. She has been teaching for 25 years and has

experience teaching Kindergarten, Grade One and Grade Two. She also has experience of being a part-time resource teacher. During the study, she was the only teacher teaching Grade One at St. Brendan.

Sabrina was involved in the School Improvement in Mathematics study (McDougall, 2009). As part of this study, she learned about the Ten Dimensions of Mathematics Education framework in a workshop and took an Attitudes and Beliefs for Teaching Math survey that asked questions about the teacher/administrator's current attitudes and practices about mathematics education (McDougall, 2004). The 20-question survey gave the participant quantitative data regarding her alignment to reform-based teaching qualities categorized by dimension. After reviewing the data, teachers selected dimensions that they would work to improve. Sabrina selected Dimension 5, Constructing Knowledge, and Dimension 7, Manipulatives and Technology, for personal growth.

#### **2.4. Data collection**

Data were collected in three ways: teacher interviews, peer coaching sessions, and classroom observations. An initial visit with Sabrina consisted of a semi-structured interview to determine her thoughts about success in the classroom and her goals for her students.

As part of the School Improvement in Mathematics study (McDougall, 2009), Sabrina was paired up with Paige, the Grade Three teacher, to engage in peer coaching sessions. Four peer coaching sessions were completed, where each teacher had a chance to observe their partner twice. Each peer coaching session consisted of three parts: a pre-observation interview, lesson observation, and a post-observation interview. During the peer coaching sessions, I sat in

on but did not actively participate in the pre- and post-observation interviews. I also attended the classroom lesson and took field notes as the lesson progressed.

A final semi-structured interview was carried out to gather more data about what Sabrina learned from the process and her focus on the construction of knowledge within her students. The School Improvement in Mathematics study (McDougall, 2009) took place between September 2006 and June 2008. All teacher interviews and peer coaching pre- and post-observation sessions were audio recorded. Observations of classroom sessions were recorded in the form of hand-written field notes.

### **3. Findings**

The data indicated that Sabrina used multiple representations as a teaching strategy to foster students' mathematical understanding. In this section, I will discuss how Sabrina introduces multiple representations to her students and how she integrates them into her teaching. To provide a thick description of her use of multiple representations, I recount a specific lesson in which these categories were prominent.

#### ***3.1. Introducing/Integrating multiple representations***

Sabrina uses modeling and scaffolding as two approaches to present a new representation form for the first time. She also uses these approaches to present subsequent, often more abstract, representation forms. When using the modeling approach, Sabrina involves as many members of her class as possible. She asks a volunteer from the class to help her demonstrate, or asks students to model the form as she prompts them on how to use it. If Sabrina, herself, demonstrates the form, she tries to

include the students during simple procedural steps. She will, for example, ask her students to count out loud as a class.

Sometimes Sabrina asks her students if they have any representation forms that they have come up with themselves and would like to share with the class. During one lesson, a student shared his strategy and Sabrina acted as the scribe to put his words onto chart paper. Sabrina asked the student to clarify what he was trying to explain so that she could accurately represent the student's thoughts on paper. Sabrina often acts as a scribe because she believes that "some [students] can explain so much more and some cannot explain at all". By acting as a scribe, Sabrina alleviated the problem of students not being able to communicate their understanding through text. This allowed her student to concentrate on verbally explaining how he represented his understanding of the mathematics concept. All members of the class would then benefit from a verbal and written explanation of the student's representation.

Sabrina also asked the student probing questions about his method. She did so for two reasons: in order to understand what he did so that she could scribe more effectively, and to help both the student and his peers to fully understand the process of his method. Sabrina believes that it is important for students to "talk about what they understand". By questioning the student, Sabrina encouraged him to share and deepen his understanding.

As a result of the student verbalizing his representation, Sabrina hoped that more connections to previous knowledge were made. Sabrina also hoped that the student helped his peers to make additional connections for themselves. She believes that these

extra connections could spark another strategy that they could, in turn, share with the class.

### ***3.2. From a nautical tale to a number sentence – scaffolding multiple representations in practice***

Sabrina is able to use multiple representations in her classroom to engage her students, be inclusive, allow for student participation, facilitate group work, encourage student creativity, and cater to different learning styles. The following is a description of how Sabrina incorporated multiple representations into one lesson.

#### ***3.2.1. Representation form 1: Drama and storytelling***

In an introductory lesson on subtraction, Sabrina started by telling a story about pirates out at sea. Sabrina invited students to volunteer to play the part of pirates sailing on their ship. Almost all of the students put their hand up to volunteer and Sabrina selected 6 students to act as pirates. The six students enacted the scenario that Sabrina created and four students dramatically 'fell off' the ship when a 'large wave' swept them into the water. At this point in the story, Sabrina paused to ask the rest of the students how many 'pirates' were left on the ship. The students stated that there were still two 'pirates' on the ship and Sabrina summarized the story as a subtraction sentence: "Six pirates take away four pirates equals two pirates."

#### ***3.2.2. Representation form 2: Manipulatives***

Next, Sabrina asked the students to work in pairs and collect bags of manipulatives, including coloured stones, toy dinosaurs and stars. Sabrina asked the students to use the manipulatives to create subtraction sentences just as she had done through

her storytelling about pirates. As the pairs re-created the subtraction stories, they personalized them based on the manipulative with which they were working. I observed a pair of students with toy dinosaurs recount a story of a "Tyrannosaurus Rex" coming to eat some "Stegosaurus dinosaurs". The students grouped their "Stegosaurus dinosaurs" together and then moved some of them aside after they had been "eaten". Students finished their story by summarizing the events. This summary was similar to that of the subtraction sentence that Sabrina had modeled at the end of her story, but used less mathematical terminology and focused on the storyline. "There were seven Stegosauruses [sic] in the forest. A T-rex ate four of them and 3 were left." Sabrina asked her students to chart their work by drawing their scenarios on paper.

### *3.2.3. Representation form 3: Drawings*

Using their manipulatives as a guide, students drew their subtraction sentences in different ways. Some students drew pictures of their manipulatives while others drew dots representing the initial quantity. There was also variety in the approaches used for the subtraction itself. Some students crossed out the number of items that corresponded with the subtrahend, while others erased the subtrahend. The resulting difference was either the non-crossed out items or those that remained on the page.

### *3.2.4. Representation form 4: Introduction to symbols*

The final segment of the lesson brought the class together in a group discussion to share their pictures and subtraction sentences. The students were able to see each other's approaches to the visual representations and Sabrina concluded the lesson by

describing that, when the numbers got larger, it would be tedious to draw each item for the minuend and thus, mathematical symbols (numbers, '-', and '=') can be used in place of pictures. In the final interview, Sabrina shares that she believes that multiple representations are an effective way for students to "use what they know already and go from what they already know to where they are going".

In the post-lesson discussion, Sabrina said that she would build from this idea in the next lesson and have the students practice representing more subtraction sentences in pictures as well as with mathematical symbols. Sabrina says that, when using representations, a subsequent lesson always begins with a review, not only of the mathematics concepts that were studied previously, but also of the representation form. She says that her students are developing the skills and knowledge of how to use the various representation forms while using the forms to construct their understanding of mathematics concepts. Sabrina believes that the more her students can practice a concept, the better they will understand it.

## **Conclusion**

The use of multiple representations is an important way by which Sabrina fosters the construction of knowledge. By incorporating a variety of strategies to learn mathematics, her students are given a variety of opportunities to create, experiment and demonstrate their knowledge.

Sabrina's scaffolding of the multiple representation forms that she uses in her class parallels Bruner's (1966) levels of engagement: enactive, iconic and symbolic. Sabrina uses manipulatives as a starting point with her students (enactive). This level is



accessible to all students no matter their ability level. Sabrina then moves her students to more abstract representations in the form of drawings and pictures (iconic). The final stage in Sabrina's progression occurs once her students are ready to represent their mathematical understanding using symbols and more advanced mathematical terminology (symbolic). By going through Bruner's three levels, Sabrina's students have a chance to build their mathematical understanding in a progressive manner so that they are not expected to quickly make the drastic jump to understanding abstract concepts. While some students may not need the first level to be competent at the second level, exposing her students to all levels gives students of varied abilities a safe zone where they can join the group and move up to the most abstract level together (Alagic, 2003).

Alagic and Palenz (2006) assert that multiple representations allow all learners a chance to become engaged in learning. Multiple representations give students of all ability levels somewhere to start. The type of representation form used will draw out certain types of learners. No matter the ability level, the student has an access point to start their learning that is appropriate for them. Sabrina has put into place a model of progression where all of her students can use these multiple representation forms to build their mathematical understanding.

By introducing her students to a variety of forms from which they can select to express their mathematical understanding, Sabrina's students are able to explore different ways to communicate their knowledge. Students will not feel limited by the constraints of how they are able to communicate their learning and can experiment with different formats that will help them to grow as a learner. As Sabrina's students are used to experimenting with different representation forms,

they do not get easily frustrated when they do not understand how to deal with a difficult concept. Sabrina's practice echoes work by Pape, Bell, and Yetkin(2003) who state that students who have had to learn by using a variety of representation forms have developed skills to support their emerging mathematical understanding. These students have the creativity to take risks and try other routes to solving their problems.

Sabrina has chosen to use multiple representations to help her students learn mathematics concepts. She empowers and engages her students by exposing them to different representation forms that will make the learning of the concepts more accessible. Concrete representations in the form of manipulatives are a fundamental representation form. The steps that she took to foster student mathematical understanding provide a solid foundation for student learning. Multiple representations are used to scaffold the construction of knowledge and expose students to various forms of representation. Multiple representations facilitate the students' progression from concrete ideas to those that are more abstract.

Using multiple representations in a lesson gives Sabrina's students a chance to work with the form that is most understandable and useful. Each student has a natural strength and by incorporating many forms into her lessons, Sabrina gives all of her students a chance to feel like her teaching strategies are geared just for them.

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## **C**HAPTER 5

### **DEVELOPING COMPUTATIONAL FLUENCY**

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#### **Abstract**

The literature related to computational fluency and visual learning is reviewed. Insights from many researches support that fluency in basic skills and operations is very necessary and is a pre-requisite to higher-level functioning in both reading and mathematics. Bobis (2006) emphasizes that computational fluency, whether employing mental or written methods, and number sense should be developed together. The standards describe the computational fluency as a "connection between conceptual understanding and computational proficiency" (NCTM, 2000). Analysis of recent research papers indicates that the level of number sense and computational abilities in elementary stages is very low. It is recommended that untraditional approaches are used to develop these abilities.

This research aims to develop the computational fluency by using a package of activities based on visual approach in elementary stage. The main research question was: What is the impact of using Activities based on visual models on students' computational fluency? To address the research

question, Pre and post test scores were statistically compared using the t-test. Results indicated that there was statistically significant differences in favor of using visual approach. In other words, the visual approach was successful in helping third grade students to improve their computational fluency.

## **Keywords**

Visual Models- Computational Fluency-Teachers' Attitudes

## **1. Introduction**

Principles and standards for school mathematics (NCTM: 2000) emphasize the importance of computational fluency for all grades, especially in elementary grades.

It has also been shown that computational fluency plays a critical role in helping students for solving mathematical problems. The NCTM lists "the ability to compute fluently" as a number and operation standard for kindergarten to eighth grade.

- Computational fluency is an essential goal for school mathematics (p. 155).
- The methods that a student uses to compute should be grounded in understanding (pp. 152-55).
- Students should know the basic number combinations for addition and subtraction by the end of grade 2 and those for multiplication and division by the end of grade 4 (pp. 32, 84, and 153).
- Students should be able to compute fluently with whole numbers by end of grade 5 (pp. 35, 152, and 155).
- Students can achieve computational fluency using a variety of methods and should, in fact, be comfortable with more than one approach (p. 155).

- Students should have opportunities to invent strategies for computing using their knowledge of place value, properties of numbers, and the operations (pp. 35 and 220).
- Students should be encouraged to use computational methods and tools that are appropriate for the context and purpose, including mental computation, estimations, calculators, and paper and pencil (pp. 36, 145, and 154).

Building on the work done to develop mathematics curriculums during the last few years and the results of descriptive research related to number sense, it is clear that there is a dire need for our students to have high procedural ability when they deal with numbers and their operations.

In fact, computational fluency is a key for learning to reason about the base-ten number system and the operations of addition, subtraction, multiplication and division (Russell, 2000, P.154).

It is preferred also that high levels of efficiency in computation remain a goal of our mathematics curricula; the process by which it is achieved needs to take account of how students develop a sense of number. The path to computational fluency is not a straight-forward one for most students. However, it is clear that the promotion of number sense is critical to a basic understanding of mathematics and to a child's ability to compute easily (Bobis, 2006, P.23).

Furthermore, computational fluency aids in the ability to solve problems by allowing students to use generalized methods while monitoring and organizing (Naglieri&Ashman, 1999; Calhoon, Emerson, Flores and Houchins, 2007).



### **1.1. Computational fluency**

According to the principles and standards for teaching mathematics of NCTM (2000), fluency includes three ideas:

- Efficiency implies that the student does not get bogged down in many steps or lose track of the logic of the strategy. An efficient strategy is one that student can carry out easily, keeping track and making use of intermediate results to solve the problems.
- Accuracy depends on several aspects of the problem solving process such as, careful recording and concern for double-checking results.
- Flexibility requires the knowledge of more than one approach to solving a particular kind of problem. Students need to be flexible to be able to choose an appropriate strategy for the problem at hand and also to use one method to solve a problem and another method to double-check the results (Russell,2000,P.154).

Fluency demands more of students than memorizing a single procedure does. Fluency rests on a well-built mathematical foundation with three parts:

1. An understanding of the meaning of the operations and their relationships to each other.
2. The knowledge of a large repertoire of number relationships, including the addition and multiplication.
3. An understanding of the base-ten number system, how numbers are structured in this system. (Russell,2000, Pp.154-155).

Drawing upon research, theory, classroom and personal experience, Bobis (2006, P.23) emphasizes that computational fluency, whether employing mental or written methods, and number sense are intertwined and should be developed together.

While a number of Egyptian Researchers provide good description of computational and number sense ability

which students have, they in fact didn't give us efficient models for developing number sense, and thus computational fluency for elementary students.

Altogether, some studies ensure that Algebra achievement manipulate visual-spatial representations mentally. Correlations between visual-spatial require the ability to represent functional relations graphically. The abilities and math achievement involving computations and problem-solving in children are generally in the low to moderate range (Friedman, 1995, Pp.22-50)

So, this paper focuses on activities based on visual approach for developing elementary –children's computational fluency, and using multi – mental strategies.

### ***1.2. Computational fluency and Number sense***

Carboni (2001) stated that "number sense is that intuitive feel for numbers and their relationships", and she also emphasized the importance of teaching and developing number sense through elementary mathematics.

On the other side, the computational fluency in this research is "A well-practiced and efficient use of procedures to compute. But according to NCTM standards, we can state that number sense and computational fluency go hand in hand especially in elementary mathematics.

Cotter (1998) referred to many international studies, such as the TIMSS studies; these studies show that Asian students do better than American student in mathematics". She asserted that (1) although some of the differences seen in Asian classrooms can't be implemented in American classrooms, some of the

ideas can,(2) the American students depend on manipulative in counting, but in the Asian classrooms, every time a number is spoken, the value is given. Twenty one ,and would be stated Tow Tens and One , so Asian students have "built in" number sense, and much fluency in computation.

### ***1.3. Visual Approach***

The beginning step in developing basic facts is to build an understanding of the operation. Manipulatives are the important key. Children should have opportunities to represent the number sequences with physical models. (Hatfield et. Al., 1993: 205)

In order to develop students' math algorithms, the visual-spatial models could be used as an aid tools in solving mathematical problems. Some authors describe these models as part of a mental model developed in the brain, whose attributions have a direct relationship to the physical aspects of the problem (Huttenlocher et. al., 1994; Carpenter, Ansel, Franke, Fennema, & Weisbeck, 1993).

Our world is full of information that comes to us visually. The color and shape of a red, octagonal sign says, "Stop." A pie chart tells us percentage at a glance. Graphs demonstrate the ups and downs of financial markets. A smiling face conveys joy; a frown tells us there's trouble. This visual information is conveyed constantly and consistently; red usually indicates, "stop"; a smile rarely means "go away." It forms a language that students must learn if they are to become able to navigate a visual society. And when students use all three parts of the communication system—words, numbers, and images—together, they achieve better comprehension. (Murphy,2009)

So, it is clear that the teacher's attitude towards using visual models like ;mathematical charts, solid shapes, graphs, data presentation...etc in classroom teaching is very important to enactive this approach within classroom communication, especially the interactive between math. Teacher and his students.

Recently, Many curricula have begun to expand the role of manipulative materials in early mathematics education. Manipulative materials can include simple objects such as coins, blocks, or tiles. More complicated materials can be used to represent multiplication and division problems.

The use of concrete representations may assist the learning process in a variety of ways. Using physical materials for math may facilitate ;

- Creation of mental images representing concepts used for calculation.
- Allowing students to practice figuring out important parts of problems and disregarding unnecessary information.
- Ability to abstract the central ideas represented in mathematics problems (Chao, Stigler, & Woodward, 2000).

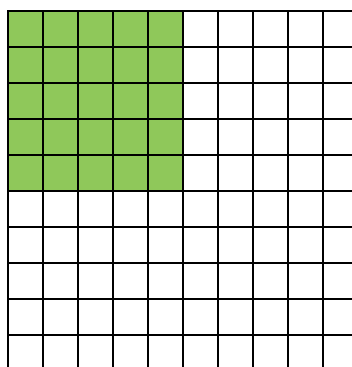
With this importance of using manipulatives, we have to realize that If materials are not presented in a way that allows for individual representation in problem solving, students may have flexible internal models supplanted by a rigid external system that they cannot use effectively. So, Classrooms should provide a variety of manipulatives that complement the material to be learned and allow for creative solutions to problems.

With Gardner's identification of spatial intelligence as one of the intelligences, visual learning techniques like visualization, color cues, picture metaphors, concept

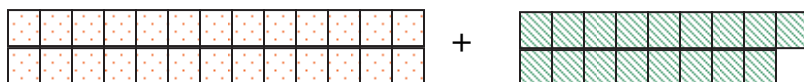
maps, sketches, diagrams, and graphic symbols came into greater use. (Armstrong, 1994) For those students who are visual learners, these created new opportunities for participating more fully in the learning process. (Cited in Murphy, 2009)

Visual representations will also help students connect benchmark fractions and percents (eg:  $25\% = \frac{1}{4}$ ).

Another example, a real-life application would be, a girl who sells sweet breads. She knows that it costs her 25 pound in materials to produce one batch. If she wants to make a modest, 20% profit, how much should she charge for a batch? In this case,  $100\% = 25$  pound, so the entire grid filled in represents 25 pound. The girl might cut the grid into fifths (20%). 20 squares therefore represent 5 pound. 10 squares equal 2.50 pound and one square, or 1% is 0.25 pound. Building back up, 120% would represent ( $120 \times 0.25$  pound) or 30 pound.



Third example, adding  $26 + 17 = 23 + 20 = 43$ , by using visual approach as following:



Equivalent to



Finally, Teachers can prepare materials that help to convey ideas visually- like charts, graphs, physical models, and diagrams. They can encourage students to draw images to explain or solve problems.

In addition, Models can be created to demonstrate processes, such as the addition and subtraction of integers and fractional numbers. Students can discuss visual models, how they interpret them, and what they mean.

## **2. The Research Importance**

First, the most important point in this Research is to provide a resource to improve computational fluency ability for students in elementary stage in governmental schools in Alexandria. Second, this research highlights the correlation between the achievement level, and computational fluency ability.

## **3. The Research Questions**

- What is the impact of Activities based on visual models on students' computational fluency?
- Is there significant relation between achievement and computational fluency?

## **4. Method**

### ***4.1. Participants***

The Participants in this study were Two samples (Two Classes) in Elementary school in Alexandria. The first Sample had 40 students (22 males, 18 females) and formed the experimental group. The Second Sample had 38 students (21 male, 17 female). The two groups didn't differ in mean age (9 years), or mean achievement.

4.2. Procedure

First, after preparing the computational fluency test in the written form, The Internal consistency reliability (Cronbach’s alpha) was calculated using SPSS; the reliability value was .85

Second, Pre and post test “computational fluency test”(CFT) were administrated Mentally during the first term 2009/2010., The experimental group was taught by the new teaching model, which includes many of the suggested Mathematical visual activities (MVA), for six weeks, and the control group was taught by the traditional model.

5. Results

To address the first research question that looked at using activities based on the visual approach to develop computational fluency, the *t*-test was computed for the post test measures of the tow groups’ students (control and group). For post test data, the t-test for total test 803 was statistically significant (*t*=5.803). After that the effect size was computed for the pre and post test of the experimental group (*d*=3.41).

Table 1: *t* - test results for components of CFT for the two groups (experimental and control)

Test components	Group	M	SD	t	t
Word problems (Addition& Subtraction)	experimental	3.1750	.7808	4.88	5.803
	control)	2.2368	.9134		
Numerical problems (Addition& Subtraction)	experimental	8.4500	1.6787	9.39	
	control)	5.0526	1.5058		

Note. *df*= 76. All comparisons significant at *p* < .001.

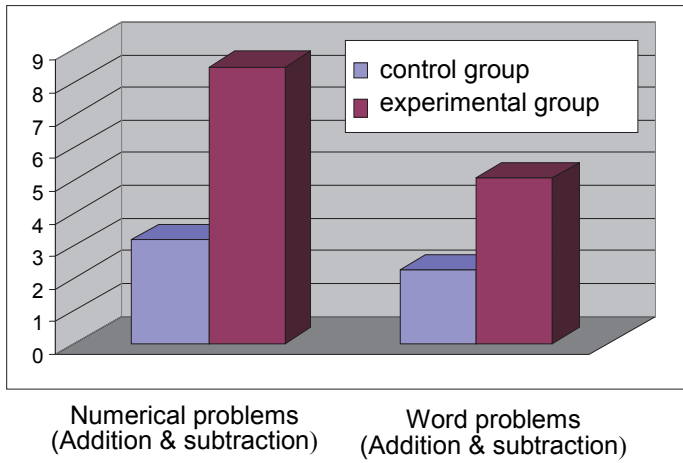


Figure1: Distribution of post computational fluency test scores

To address the second research question that looked at the relation between achievement and computational fluency, bivariate correlations were computed for the post test measures to investigate that relation. For post test data, the correlation coefficient between achievement scores (the latest monthly achievement scores) and computational fluency scores was statistically significant ( $r=0.68$ ).

## 6. Conclusion

The results showed significant differences across two major components of computational fluency test for the experimental group, specifically, for the numerical problems related to basic arithmetic process (addition & subtraction) as shown in figure1. According to this result, there is a very high statistical significance in using a package of activities designed in the light of the visual approach in increasing students' ability for computing fluently.

It is clear that the promotion of number sense through teaching basic facts using visual models is critical to a



basic understanding of mathematics and to a child's ability to compute easily.

The second result show significant correlation between achievement level and the ability for computing fluently. Hence, any increasing in computational fluency will be followed by an increase in the level of overall performance.

Stakeholders involved in the study are teachers, mathematical curriculum designers, Mathematical supervisors as their positive attitude towards supporting mathematical teachers to build learning environment based on visual models is too important to make this approach successful>

These findings necessitate further research on classroom practices, curriculum content and organization at the other elementary grades and at the middle level to examine the decline in mathematics proficiency seen in these students.

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## **C**HAPTER 6

### **MAKING ALGEBRA MORE ACCESSIBLE: HOW STEEP CAN IT BE FOR TEACHERS?**

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#### **Abstract**

Teacher educators need to support middle grades teachers in developing mathematical knowledge for teaching algebraic concepts. In particular, teachers should become familiar with possible introductions and sequencing to the concept of slope, and common middle school students' limited conceptions about measuring the steepness of an incline. Steepness can be expressed directly in terms of an angle or indirectly as a slope. Encouraging middle school students to find a measure of steepness using a ratio may help support students' transition to multiplicative thinking. This mixed – methods study explores middle school students' responses in solving a comparison problem involving the steepness of two inclines, in order to gain

insight into common student strategies. The quantitative portion of the study involved written surveys distributed to 256 Grade 7 participants in the United States. We examined the frequency and types of solutions offered by these participants. We found that 27% of the participants provided an incorrect solution which was consistent with additive reasoning. The qualitative portion of this study consisted of small group interviews of 19 Grade 7 participants, who were conflicted in the different solutions they produced from using additive reasoning and their geometric knowledge.

## **Keywords**

Steepness – Slope – Multiplicative reasoning

## **1. Mathematical Knowledge for Teaching Slope**

The preparation of middle school students to learn algebraic concepts such as slope is of international concern. Many researchers have uncovered middle school students' lack of preparation to learn algebraic concepts such as distinguishing between word problems involving additive or multiplicative reasoning (Van Dooren, De Bock, Vleugels, & Verschaffel, 2008), determining characteristics of a valid measure of the steepness of an incline (Lobato & Thanheiser, 2002), determining what measurements are involved in the "rise over run" procedure (Lobato, 1996), and understanding what the slope of a linear function means (Yerushalmy, 1997). In the United States, mathematics educators, business specialists, and policy makers nationwide collaborated to produce the Common Core State Standards (2011), which suggests that between sixth through eighth grades, students should learn a progression of concepts leading into the learning about slopes of lines. The progression includes constructing ratios for multiplicative relationships in a variety of contexts, finding equivalent ratios, understanding constants of

proportionality and their relationships to the steepnesses of graphed proportional relationships, and interpreting the slopes of these lines. We discuss middle school students' responses to a steepness task in an effort to shed light upon ways that teacher educators can help increase preservice teachers' mathematical knowledge for teaching the connections between proportional reasoning, steepness, and slope.

Much research on teacher knowledge has mapped out the kinds of subject matter knowledge teachers need in their work of teaching mathematics (Ball, Thames, & Phelps, 2008). Specifically, in the domain of subject matter knowledge, teacher's mathematical knowledge for teaching (Hill, Rowan, & Ball, 2005), researchers have identified a specialized content knowledge that only teachers will need in their tasks of teaching students. Another important sub-domain of subject matter knowledge is the Horizon Content Knowledge (HCK), which refers to knowledge that "supports a kind of awareness, sensibility, disposition that informs, orients and culturally frames instructional practice" (Ball & Bass, 2009). This kind of knowledge involves being cognizant of the large mathematical landscape in which the present experience and instruction is situated (Ball & Bass, 2009). HCK plays a crucial role in teachers' knowledge and influence their instructional practices, which in turn affect students' learning (at the moment and future possibilities) and their learning trajectories. Such knowledge necessarily influences the nature of the tasks teachers set and how they are implement them in the classroom, in particular with respect to regulating the mathematical demands involved (Charalambous, 2008).

How, then, might teachers become better prepared to teach their middle school students about slope? Simon and Blume (1994) suggest that teacher educators need to help preservice teachers become more familiar

with the content, that is, to understand how to use proportional relationships to find a measure of an incline's steepness. Preservice teachers often do not understand that a mathematical measure must be reproducible, that is, the measure alone should be sufficient for producing an incline with a given steepness. They also often have difficulties distinguishing between additive relationships and multiplicative relationships. Simon and Blume's (1994) findings about preservice teachers' conceptual difficulties are similar to the middle school students' difficulties identified by researchers such as Lobato & Thanheiser (2002) and Van Dooren et. al., (2008). It is unsurprising that Hill, Rowan & Ball (2005) found that teachers' mathematical knowledge for teaching correlated their students' achievements; thus it is especially important to focus on preservice teachers' understandings of the content at hand, measuring steepness.

It is not only imperative that preservice teachers themselves understand how to measure steepness using a ratio, but also preservice teachers should have knowledge of the students and how they might respond to questions regarding the steepness of inclines. If preservice teachers acquire the skill of anticipating student responses, they will be better equipped to address their future students' difficulties (e.g., Wallace, 2007)). In an effort to reveal common student understandings for the purposes of teacher preparation, this article presents information about how seventh grade students responded to a comparison question asking which of two inclines is steeper.

## **2. Methods**

The sample for the survey study consisted of 256 students in grade 7 who attended one public middle

school. Teachers handed participants the instrument. All students were given unlimited time but most finished in about twenty minutes, on average. Participants did not receive incentives for participating in the study and were told that their participation would not impact their mathematics course grades. The authors had prior relationships with the school and the mathematics teachers; teachers mentioned to participants that this was part of a research study and they expected students to try their best.

In addition, group interviews were conducted during one mathematics period for a class of seventh graders in a small private school. Discussions in each of the groups were facilitated by the authors and the classroom teachers. Facilitators were provided with a list of prompts which would ensure that each student had a chance to be heard but did not guide the discussion in any particular direction.

### ***2.1. Instrument***

To assess middle school students' abilities to compare the steepness of lines, the Spider Web Steepness Test was developed, and face validity on the test was confirmed by mathematics and mathematics education experts. The participants in this study could be expected to correctly answer all of the items on the test and they were introduced to nonstandard units of measurement in elementary school.

To assess middle school students' responses to steepness problems, the Spider Web Steepness Test was developed, drawing on past research and piloting by the authors (Cheng & Sabinin, 2008; Sabinin & Cheng, 2009) as well as prior research by Noelting (1980). Since Moyer, Cai and Grampp (1997) recommend that instruction on slope begins with comparison activities, 90% of the problems on the

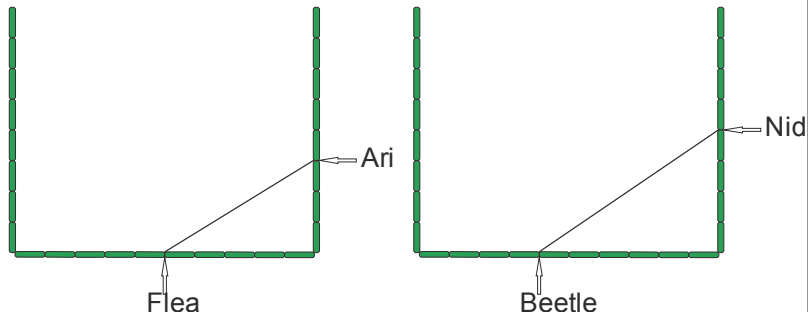


Spider Web Steepness Test were comparison problems. The test includes 9 problems that asked participants to determine which of two drawings was steeper. Each comparison problem asked participants to compare the steepness of two inclines and had three answer choices: 1) left incline is steeper, 2) right incline is steeper, 3) the inclines have the same steepness, or 4) it was not possible to tell. Correct responses earned 1 point and incorrect responses earned 0 points. Students' correct responses indicated that they found productive ways of solving the steepness problems, although the strategies may have been only applicable to specific contexts or structural difficulties. The pairs of slopes of the lines presented in the context of webs are in a variety of difficulty levels, as found by Noelting (1980) in empirical studies. For example, easier pairings of slopes include having equal vertical dimensions in both inclines but different horizontal dimensions. A more difficult pairing of slopes would involve having relatively prime horizontal measures and relatively prime vertical measures. The tenth problem on the Spider Web Steepness Test was a missing value problem involving steepness where participants were asked to create an incline with the same steepness as a given incline.

### 3. A problem involving steepness

One possible way to lead participants to think about steepness using proportions is by providing them with tasks in which it is difficult to determine steepness solely by looking at angles. The following question was given to grade 7 participants:

Two spiders, Ari and Nid, live in rooms with tiles on the two walls and on the floor.  
 Ari wants to catch a flea from 3 tiles high,  
 while Nid wants to catch a beetle from 4 tiles high.  
 Whose web will be steeper?



Circle the best answer:

A. Ari's web to the flea is steeper.      C. Both webs are the same steepness.  
 B. Nid's web to the beetle is steeper.      D. You cannot tell which web is steeper.

Figure 1: Spider Web Steepness Survey Question 6

This question asked participants to determine which of the two spiders' webs was steeper, and there were four answer choices: Ari's, Nid's, both had the same steepness, or you cannot tell which is steeper. Visually, it was difficult to identify whether the webs had the same steepness by "eye-balling it," because the angles to be compared were close in value. Looking at the angles that the spiders' webs make with the floor, Ari's web is 59.0 degrees and Nid's web is 56.3 degrees. The slopes of the two webs are  $3/5$  and  $4/6$ , which are non-integral ratios.

Using the vertical wall as the reference line, the left and right angles created are 31.0 and 33.7 degrees respectively, and the slopes are  $5/3$  and  $6/4$ .

The frequencies of 256 urban and suburban public school participants' responses are recorded in Figure 3.

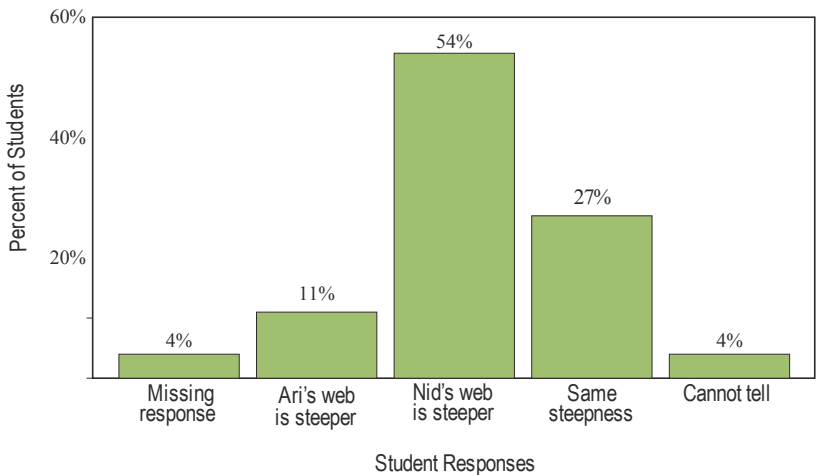


Figure 3: Seventh Grade participants' responses to Steepness Survey Question 6

There are two possible 'correct' answers depending upon the reference line used:

- Nid's web is steeper, using the bottom horizontal line or 'floor' as the reference line, which is reasonable from the flea's and beetle's perspectives.
- Ari's web is steeper, using the vertical line or the 'wall' as the reference line, which is reasonable from Ari's and Nid's perspectives.

Using the flea's and beetle's perspectives is reasonable from a traditional viewpoint of slope. Using Ari's and

Nid's perspectives is reasonable since Ari and Nid are shooting the webs.

Sixty-five percent (65%) of the surveyed participants were able to determine that the two webs do not have the same steepness, and selected either Ari's or Nid's web as steeper. Twenty-seven percent (27%) of the surveyed participants thought that the two webs were equally steep, and the remaining 8% either did not respond or answered that they couldn't tell which web was steeper.

#### **4. Observations of participants' reasoning regarding steepness**

To observe how participants might justify their answers to these questions, interviews of nineteen 7<sup>th</sup> graders were conducted. The participants were different students than those who had taken the survey and they had learned to compare fractions and find equivalent fractions in grades 5 and 6. In grade 7, they learned about scaling using proportional models, but had not yet been formally introduced to the idea of slope as a proportion.

During the interviews, groups of three or four participants discussed the same question. The participants used the horizontal floor as their reference line.

Upon first glance, some of the participants thought that the two lines might have the same steepness. In one group interview, one participant supported this claim because she thought that adding one tile to the horizontal and one tile to the vertical would "show more of the same angle." Then another participant in the group drew both lines on the same coordinate plane, "continued the lines" from the bottom and found that they "met." Using the reasoning that "any

unparallel lines are eventually going to cross," he correctly stated that the two lines were unparallel and therefore did not have the same steepness.

In another group interview, one participant challenged this first idea that the lines had the same steepness, because he extended the two lines from the top (not on the same coordinate plane) and the lines intersected. Another participant was confused because she extended these two lines from the bottom, and the lines did not intersect but appeared to go further and further apart. After much discussion, these participants concluded that they could determine that the two lines had the same steepness if they never intersected, by extending the lines from either the top or the bottom. The participants also reasoned that the lines did not have the same steepness if they appeared to get closer or further apart.

The participants used two general approaches to solve the problem: geometric and analytic. Participants using a geometric approach compared the two lines to determine whether or not they were parallel in one of two ways: 1) by seeing if the two lines drawn on the same coordinate axes would intersect beyond the page, resulting in the conclusion that two lines do not have the same steepness, 2) by seeing if the two lines not drawn on the same coordinate axes would come closer or further apart, resulting in the conclusion that the two lines do not have the same steepness. In addition, some participants tried to determine which of the angles between their reference lines and the webs was larger, where a larger angle would indicate a steeper line. This was difficult because the angles were visually so close together. A third geometric strategy was to determine which of the triangles underneath the webs had larger area, resulting in the conclusion that the line forming a triangle with larger area is steeper. This can be a problematic way of

generalizing steepness because the steepest line, a vertical line, will have zero area underneath it and two similar triangles may have different areas.

Participants using an analytic approach made several comparisons. One comparison was of the ratios  $\frac{3}{5}$  and  $\frac{4}{6}$  as the slopes of the lines, resulting in the correct line being identified as steeper. Another comparison was of the differences of the vertical and horizontal changes for each line:  $5 - 3 = 2$ ,  $6 - 4 = 2$ . Participants using this strategy incorrectly concluded that the lines have the same steepness. Other participants observed that there was a constant difference of one tile between the horizontal dimensions ( $3 + 1 = 4$ ) and the vertical dimensions ( $5 + 1 = 6$ ), resulting in their incorrectly concluding that the two lines had the same steepness. In the coordinate plane, having equal differences between the vertical and horizontal changes for each line will only result in the correct identification of parallel lines in the case that the lines have a slope of 1. This was not the case in Question 6, so using additive reasoning results in an erroneous conclusion.

## Discussion

Comparing extended lines may guide seventh graders to the use the ratio of the vertical and horizontal changes as a measure of steepness. Geometrically, lines which never intersect are parallel and lines which intersect at one point are never parallel. Analytically, these lines can be distinguished by their slopes, and a line whose slope has a higher magnitude is steeper.

Observing participants' discussions was interesting not only because the question had two possible correct solutions, but also because these grade 7 participants' geometric intuitions were often more accurate than their analytic explanations. Using visual cues can help

participants connect their geometric and analytic knowledge in situations involving proportional reasoning. Although participants should have numerous opportunities to work with both dimensions and build connections between them, the geometric dimension appears to be more intuitive for children and can begin to develop at an earlier age with the development of the concept of angle. This may be the case because children are generally more comfortable with reasoning involving solely one measurement than reasoning involving multiple measurements (Halford, 1993). In preparing middle school participants for the algebraic study of slope, it may be helpful to connect their understanding of steepness from its angular representation to its fractional representation.

The Common Core State Standards (2011) state that seventh grade students are expected to "*Explain what a point  $(x, y)$  on the graph of a proportional relationship means in terms of the situation, with special attention to the points  $(0, 0)$  and  $(1, r)$  where  $r$  is the unit rate.*" There is an emphasis on the idea of proportional relationships as a major type of linear function, i.e. they are linear functions that have a positive rate of change through the origin. This knowledge is then built upon in eighth grade, where students are expected to "*Understand the connections between proportional relationships, lines, and linear equations,*" particularly between constant of proportionality and slope. The CCSS seems to endorse this learning progression of starting with using graphical representations to explore the idea of proportionality in a simple linear graph prior to students learning formally the concept of slopes in a straight line. However, such connection may not be unveiled in teacher preparation programs and not explicitly be made in textbooks that are often the main source of teacher knowledge. Therefore, it may not be reasonable to expect teachers to be able to make that

connection between the two concepts for their students. We contend that the teacher educators play a crucial role in fostering these connections with preservice and in-service teachers.

The results of this study have implications for the teaching of preservice teachers, the design of curriculum in the middle grades, as well as for the choice of curriculum that may help students more fully understand proportional reasoning in light of connections between geometric and analytic representations.

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## **C**HAPTER 7

### **TEACHER ATTITUDES AND PEDAGOGY: CAUSE AND CURE OF MATH ANXIETY**

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#### **Abstract**

The problem of student performance in mathematics in the United States remains a national concern, despite the attempts to improve mathematics education. This is due in part to math anxiety. This chapter examines the literature regarding the teacher's role in causing and curing math anxiety and reflects on the results of a qualitative study using in-depth interviews of college students who overcame mathematics anxiety. Their perceptions were consistent with the literature and reinforced the fact that the demeanour of their instructors, the way they interacted with their students, and the pedagogical strategies that teachers used help to reduce, if not eliminate, mathematics anxiety.

## **Keywords**

Mathematics Anxiety/Phobia – Pedagogy – Self-efficacy

## **Introduction**

One of the greatest challenges facing education in the United States is the performance of students in mathematics and their avoidance of mathematics courses and related careers (Friedman, 2007; Else-Quest, et al., 2008; Warfield, 2008; Ed Source, 2008). Mathematics anxiety or phobia can be a disabling condition leading to humiliation, low self-esteem, and panic. International comparisons of mathematics attainment indicate that students from the United States perform poorer than students from other countries. Morris (2006) reported on the Trends in International Mathematics and Science Study (TIMSS), which showed a decline in the performance of students in the United States as they progressed from Grades 4 to 12. As students became older, their attitude and performance in mathematics declined. Chisolm (1980) noted that avoidance of mathematics is common in the American public including teachers. This avoidance has serious consequences. Additionally negative family attitudes towards mathematics had a strong effect on a student's attitude. Coupling inferior pedagogy along with a societal complacent attitude towards the value of mathematics was found to decrease student attainment and therefore subsequent studies and potential career choices. The purpose of this chapter is to understand curriculum and pedagogy issues that help to decrease mathematics anxiety. The perceptions of college students who overcame mathematics anxiety helped to reveal strategies that led to the phenomenon of decreasing mathematics anxiety. This chapter also intends to provide teachers and university/college professors of mathematics globally with an understanding of mathematics anxiety and provide them with a knowledge of effective

attitudes and pedagogy they might implement to lessen students' fears of mathematics and to increase mathematical attainment.

This chapter will review the literature as related to the historical perspective on mathematics anxiety providing the background on changes in mathematics curriculum in the United States. Definitions, causes, and effects of mathematics anxiety will be reviewed to provide the reader with an understanding of the necessity to overcome this damaging attitude. The chapter will continue by providing pedagogical and curriculum choices that may help to alleviate, if not diminish, mathematics anxiety. The culture of teacher education in mathematics will be examined to foster a reduction in mathematics anxiety and thus creating greater achievement and success.

## **1. Literature Review**

### ***1.1. Historical Background on Mathematics Anxiety***

The problem of student performance in mathematics remains a national concern for the United States. While past poor performance may have been acceptable, mathematics is no longer a subject that can be avoided in the professional world, and is a requirement for success (Noel-Levitz, 2005). Numerous reports and impetus for change in mathematics instruction have occurred over the past fifty years. Reports such as the National Commission on Excellence in Education's document *A Nation at Risk* (1983), the National Center for Education Statistics (NCES) reports on international testing comparisons, *Principles and Standards for School Mathematics* (National Council of Teachers of Mathematics, 2000) and the No Child Left Behind Act have documented the need for mathematics reform

and have provided necessary and relevant responses to this need. Few careers are available that lack basic mathematics skills, and the job market has increased demand for technical skills (Noel-Levitz, 2005; EdSource, 2008). Improving mathematics education in the United States remains a challenge. Education officials are rethinking the teaching of mathematics in American schools.

### **1.2. Definition of Mathematics Anxiety**

Mathematics anxiety has a powerful influence on one's attitude and abilities in mathematics. An understanding of mathematics anxiety is prerequisite to finding solutions and strategies to overcome its effects. There is an array of definitions of mathematics anxiety, with Tobias (1978) given credit for first defining mathematics anxiety as feelings of tension and anxiety that interfere with manipulation of numbers and solving math problems. The phobia was given its own diagnosis code from the American Psychiatric Association: 315.1 *and was defined as "Students with a mathematics disorder have problems with their math skills. . . significantly below normal considering the student's age, intelligence, and education"* (p. 53). A variety of different types of math phobia were also identified including global fears which occur all the time or subject specific such as towards algebra. Chisolm (1980) found that the fear of failing and avoidance of mathematics are also considered forms of mathematics anxiety. Other studies provided definitions that included a fear of manipulating numbers and mathematical concepts within an academic setting and in everyday activities (Buckley & Ribordy, 1982; Bursal & Paznokas, 2006; Tobias, 1978; Trujillo & Hadfield, 1999). Clearly mathematics anxiety is a real condition that students experience and feel. Educators need to recognize this

psychological condition and understand the origins of an aversion to the topic of mathematics.

### ***1.3. Causes of Mathematics Anxiety***

The literature review is replete with studies regarding the sources of math anxiety. Furner and Duffy (2002) recommended identifying the source of the anxiety, distinguishing the factors of how math anxiety came about in the first place. Knowing the source then would guide actions to overcome the anxiety. Varsho and Harrison (2009) concluded that students attributed feelings in math to five contributors: previous teachers, math ability, teaching styles, previous courses, and family experiences. This section of the chapter focuses primarily on the teacher's role in the cause.

#### ***1.3.1. Pedagogy and Environment***

Much of the literature points to dismal experiences in the classroom. Furner and Duffy (2002) identified teaching techniques that could cause math anxiety such as assigning the same work for everyone, teaching from the textbook, and insisting on only one correct way to complete a problem. Warfield (2008) found that traditional math instruction did not work for most students claiming that "It produces people who hate math, who can't connect the math they are doing with anything in their lives" (p. 16). Farrell (2006) found that professors taught mathematics with great use of large lecture halls and passive methods. Therefore a lack of variety in teaching-learning processes occurred, with an emphasis on memorization, speed and doing one's own work, and authoritarian teaching contributing to students' mathematics anxiety.



Studies related to solving word problems in mathematics have shown mathematical rigor and linguistic complexity as the two major areas of difficulty in solving word problems (Norgaard, 2005; Treacy, 2005). According to the secondary school longitudinal study conducted by the National Center for Education Statistics (2009), only 4% of the 2004 senior class exhibited a mastery of complex multi-step word problems in mathematics (Schroeder, 2005). Therefore, factors affecting the ability to solve mathematical word problems must be of utmost concern to all mathematics teachers.

Fraser and Taylor (2003) investigated the relationship that existed between the classroom environment and level of math anxiety from the perspective of high school students and determined that there was a strong relationship between the classroom environment and students' levels of math anxiety. Several studies showed that early experiences in elementary school and mathematics classrooms contributed to the development of mathematics anxiety (Bernero, 2000; Furner & Duffy, 2002; Warfield, 2008; White, 1997). Uusimaki and Nason (2004) investigated possible causes of math anxiety with eighteen Australian pre-service primary teachers. Their research determined that for the most part the participants attributed the cause of their math anxiety to primary school experiences.

Shields (2006) conducted a mixed method study of 91 students' perspectives on the causes of mathematics anxiety. Participants attributed their math anxiety to teachers, even though, society led them to believe that mathematics would be important in their future. This may have added to their level of anxiety since they felt they could not do what society would require. Being taught in small groups and working with a partner seemed to produce the least anxiety, whereas

individual and team competitive math activities made participants anxious. These global studies all point to the conclusion that mathematics anxiety is not just a problem found in the United States but a worldwide issue.

### *1.3.2. Disposition*

The causes of math anxiety related to disposition, motivation, and self efficacy have also received attention in the literature. According to Marzano (2003) feelings of competence and belief in the potential to solve new problems serve as powerful motivation. This shows a direct relationship between confidence in ability and achievement in mathematics. Ercikan, McCreith and Lapointe (2005) also found that confidence in mathematics was the strongest predictor of mathematics achievement. Therefore, in order to learn and achieve well, it is important that students have a positive concept of themselves and their ability to learn, and a positive attitude towards mathematics.

The teacher can be the catalyst in helping the students build the positive self confidence in their ability to learn mathematics and in developing their positive attitude towards mathematics. Higbee, Lundell, and Arendale (2005) suggested that learning about student experiences and perceptions might produce further insights into improving performance. It was their belief that improvement in student demeanor had to do with the process of learning mathematics. Zan and Di Martino (2007) found that students' emotional disposition, perception of success, and value of mathematics contributed to their overall attitude towards mathematics.

Self confidence in math, the perceived value of the subject, and enjoyment of mathematics have been shown to be related to the students' receptiveness to

learning math and ultimately their motivation to do well in the subject. Karimi and Venkatesan (2009) continued that a student's motivation and hardiness in mathematics directly related to their mathematics performance. Thus a student's beliefs in one's own ability are also good predictors of achievement. Knowing the nature of mathematics anxiety and its causes can help teacher education to understand its damaging influence on the individual and society as a whole.

#### ***1.4. Effects of Mathematics Anxiety***

Math phobia causes a phenomenon that may impair normal intellectual functioning. As a result, the basic skills necessary for learning become inaccessible as a form of panic takes hold. Students believe that they cannot do mathematics and so learn to avoid it with some students exhibiting physiological symptoms of a severe nature. Perry (2004) described a variety of symptoms and reactions that can occur such as sweaty palms, nausea, heart palpitations, and paralysis of thought.

Ruffins (2007) studied the relationship between math ability and anxiety, finding that people who fear math have a tendency to avoid math-related classes, which decreased their math competence. This avoidance of mathematics courses and a generalized avoidance of math-related careers were confirmed in other studies (Else-Quest et al., 2008; Warfield, 2008). College level students openly admitted their fear of math and subsequently did not complete assignments, avoided the teacher and the subject, and acted very nervous. Adult students exhibited avoidance behaviors such as not attending class, not participating, and even acting out. Karimi and Venkatesan (2009) found as students' levels of math anxiety increase, there was an increased level in the avoidance of mathematics.

Farrell (2006) cited the incidence of math anxiety among college students was evident as many students chose their major on the basis of how little math was required, with only about 2 percent of undergraduates majoring in mathematics. As a result of avoiding math related majors, these students are blocked from many careers. Scarpello (2007) found that 75% of Americans stop studying math before they complete the educational requirement for their career or job. Projections from the Bureau of Labor Statistics' (BLS) Occupational Outlook Handbook (2009) indicated that many jobs in today's labor market require a mathematics background, and that jobs requiring the most education and training will be the fastest growing and highest paying. The literature indicated that math anxiety has short and long term effects, and that providing solutions to remedy or lessen the levels of this anxiety are necessary.

### ***1.5. Best Pedagogical Practices for Reducing Mathematics Anxiety***

Numerous studies (Barnes; 2006; Farrell, 2006; Faryadi, 2007; Johnson, Johnson, & Smith, 2007; McCoy, 2006; Townsend & Wilton, 2003) researched strategies for overcoming math anxiety. While Tobias (1993) stated that ". . . math anxiety can never be eliminated"(p. 40), we believe that teachers who have positive attitudes towards their students learning of mathematics and provide strategies that build confidence as well as ability in mathematics, can greatly reduce if not eliminate mathematics anxiety. Tobias suggested that conquering math anxiety requires initiative and confidence about learning and one's own ability to learn. Perry (2004) explained that there was no simple solution to the problem of math anxiety; and suggested that a positive attitude was a first step.

Barnes (2006) investigated strategies to lessen math anxiety in the high school classroom. Ten students with the highest levels of math anxiety were selected to be interviewed. Barnes concluded that a positive and supportive learning environment aids students in overcoming math anxiety. McCoy (2006) revealed that high school students felt that teachers could be doing a lot more in the classroom to decrease math anxiety, including the following: discussing and writing about math, providing good math instruction, practicing study techniques, developing calming/positive ways to deal with fear, and experiencing success to build math confidence.

In the 21<sup>st</sup> century, emphasis has been placed on improving mathematics education. This requires high expectations with strong support for all students by accommodating to their differences. Farrell (2006) suggested that teaching methods at the college level should be re-examined with an emphasis on less lecture and more student directed classes. Cooperative learning groups, discussions, and manipulatives were suggested by Furner and Duffy (2002); Uusimaki and Nason (2004) also recommended exploring and communicating about mathematics in a supportive group environment. Dangel and Guyton (2004) ascribed to cooperative learning with the use of discourse and collaboration for learning to occur. Murray (2007) claimed the need for differentiated instruction as students learn at different rates, in different ways, with different successes and challenges. Instruction must be flexible enough to meet the needs of all students and to address the frustration that often leads to math phobia.

Brewer and Daane (2002) found that students in constructivist classrooms had greater understanding of mathematics and experienced more success than those in traditional classrooms. Cooperative groups

provide students with a chance to exchange ideas, ask questions, explain to one another, clarify ideas, and express feelings about their learning. Townsend and Wilton (2003) examined changes in attitudes towards mathematics. Their findings suggested that when cooperative learning is used, there is a significant positive change in mathematics self-concept. Uusimaki and Nason (2004) interviewed pre-service teachers, suggesting that the learning environment should allow free exploration and communication, a supportive group environment and application of mathematical knowledge. These constructivist practices in the college mathematics classroom are essential to breaking the cycle of mathematics anxiety in the American society.

A study conducted by Allen (2011) examined the experiences of college students who have had a significant reduction in mathematics anxiety; and what they perceived as effective strategies, activities, curriculum choices, and learning environments that helped lessen or resolve their fear of mathematics. Allen used a qualitative phenomenological design, with in-depth interviewing to collect data about students' perceptions of strategies that helped to reduce mathematics anxiety. Participants for this study were selected based upon students reporting a reduction in their level of mathematics anxiety. The major focus of the study was on the perceptions of the participants regarding their experiences in the reduction of mathematics anxiety.

During these interviews, students responded to a series of open ended questions regarding the strategies, attitudes, and teacher influences that they perceived had helped to reduce their level of mathematics anxiety. The analysis of the anecdotal stories that came out of the interviews concluded that there are specific instructional strategies that teachers

can employ to help reduce a student's fear of mathematics. These strategies included a slow and methodical explanation of the math material which helped students clarify and make sense of the mathematics; positive non-demeaning attitudes of caring teachers reduced the students' fear of mathematics; working in small groups on word problems helped the students' understanding; teachers working individually with students; and learning mathematics in a nonthreatening environment in which the students felt they could take a risk. The students also reflected on some of the negative experiences they had had with teachers. Teachers were described who hovered over students making them nervous; teachers who never had enough time to answer questions; and teachers who the students felt didn't care.

The participants in this study repeatedly shared that their development of mathematics anxiety and their reduced level of mathematics anxiety were results of pedagogical practices (Allen, 2011: 83-98). Some comments regarding the onset of math anxiety included:

My negative attitude towards math was caused by a teacher, who was not patient or caring. It made me feel insufficient.

During my sophomore year of high school, I had a math teacher who would keep teaching and moving forward, regardless if the class knew what they were doing or not. I would go in to this teacher before school started for extra help but he would only give me more problems instead of breaking it down and showing me how to go about the problems.

My elementary math teacher was the meanest teacher I have ever had, and she made it

impossible to ask questions. If you did ask her a question, she would give you this mean look and talk to you like you were not intelligent and make fun of you. She made me feel so bad about myself and uncomfortable that it came to the point where I would refuse to ask her a question or for any help.

However, there were many positive comments that indicated a turning point in the participants' mathematics anxiety.

My statistics professor related the math problems to everyday experiences in the outside world.

I had a teacher who was very patient and caring. This made all the difference in my learning math.

One math teacher I had in High School was so dedicated to the class and wanted nothing but for us to do well and understand what he was teaching.

The teacher that helped me get over my anxiety towards mathematics kept his students interested and excited about learning. It was not until my junior year in high school that I had a math teacher who actually broke down all the formulas and took her time explaining all the information.

The math games my teacher used in third-grade enhanced my mathematical success. The hands-on experiences with a variety of manipulatives helped me overcome my fear of math. I actually felt smart and confident.

I really enjoy working with a partner, and love the fact that my math teacher provided opportunities for us to work together.



My teacher would always give the students a star for everyone who answered a question correct in class. I was so excited each time I got a star.

My teacher presented the math in creative and inventive ways and always with a sense of humor.

The final comment that one participant made solidifies the concepts of curriculum and pedagogy on the attainment of mathematics discussed in this chapter.

As a pre-service teacher, I was required to tutor students in math. I was nervous. As a teacher candidate, I knew that I would have to teach math, but the thought terrified me. I worried that I would not be able to help the students I was supposed to tutor and that they would become as frustrated with math as I had when I was their age. My fears, however, were put to rest when one of the students I had been working with told me he loved coming to tutoring because I made math so fun and that he learned so much. This particular experience helped me to reduce my mathematics anxiety.

These findings serve as a reminder of teachers affect upon their students and their students' level of mathematics anxiety (Allen 2011: 83-98).

## **2. Implications**

The significance and implications culminate in a realization that mathematics anxiety need not be permanent; it is possible to overcome the fear of mathematics; and the cause of students' negative feelings was the result of pedagogical practices by teachers. Pedagogical suggestions for direct application in the classroom for effectively reducing mathematics anxiety included the use of instructional methods that provide succinct directions and steps;

the use of relevant and interesting curriculum choices; positive classroom environment; and positive teacher attitudes. Other helpful strategies for instructors to use include exhibiting enthusiasm for their subject, holding positive beliefs about their students' abilities to succeed, offering intrinsic and extrinsic rewards, and providing motivational activities such as games and hands-on experiences.

Teachers must become more informed about these suggestions through increased participation in professional development opportunities. These findings can be used to support educational leaders and professional organizations with recommendations for mathematics instruction to assist both pre-service teachers and teachers in the field with their mathematically anxious students. Educational leaders need to recognize the negative effect of mathematics anxiety and work to resolve this fear. Educational leaders and policy makers need to dedicate resources for mathematics teacher training. Best practices for professional development need further investigation to ensure quality implementation and lasting changes in mathematics education.

In the Twenty-First Century employers want their employees to be able to reason, work with technical equipment, and communicate their thoughts with other employees. Mathematical thinking deals with developing these skills (Marzano, 2004). Thus, helping students overcome their mathematics anxiety can help provide the workforce with competent workers with valued skills that can provide positive social change. All teaching and learning strategies need to be investigated if they embrace any potential benefits for learners to overcome mathematics anxiety.

## Conclusion

Although the study of math anxiety is not a new concern for American education and as the literature indicates for the world, it has a far reaching effect on society and on individuals themselves. Friedman (2007) noted, "How many times do we adults say to one another, I'm just not good at math? That may be true for some of us. But it won't be good enough in the new generation of jobs" (p. 302). Educators can no longer allow the perpetuation of math anxiety or anxiety in any area of learning.

The literature and a study on the perceptions of students who had reduced mathematics anxiety reinforced the fact that there are strategies that can be incorporated in the classroom to help math anxious students. More specifically, caring teachers in a supportive environment who use multiple teaching strategies to address the needs of all students is the best remedy for reducing math anxiety. These pedagogies used by teachers included clarity of step-by-step explanations, motivational activities such as games and hands-on experiences, and writing about mathematics helped students to grasp the mathematical concepts. These teachers had a philosophy that no student would be left behind. The strategical affects that teachers who helped reduce mathematics anxiety were caring dispositions, incentives, humor and creativity. These conclusions are not only true for mathematics but provide significant implications for the learning of all subjects.

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## **C**HAPTER 8

### **INTERACTIVE WEB-BASED SIMULATION FOR SUPPLY CHAIN EDUCATION**

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#### **Abstract**

Knowledge economies are based on the concept of knowledge transfer between education institutes and stakeholders. In response, the significant move away from traditional teaching methods to the emerging paradigm of eLearning has become increasingly in evidence across many academic disciplines. To assist in the transition from traditional learning to eLearning, more interactive and virtually orientated teaching aids are needed. This chapter introduces a simulation-based learning framework that integrates web-based simulation and a web content management hierarchy model. Using the complex subject of supply chain management as a case study, the new

framework allows users to examine various real-life strategic management scenarios, encourages group work and has remote access capabilities for distance learning. Interactive learning is facilitated using the web-based simulation portal, enabling instructors to demonstrate the complexity of decisions in multiple criteria environment and also show the users the impact of strategies on performance. Supply chain simulation creates an animated experience and better understanding of system dynamics including risk. The framework assists in the knowledge and skills transfer between third-level education institutes and their stakeholders, primarily industry partners and the wider community.

## **Keywords**

Knowledge Transfer – Web-based Simulation – Distributed Simulation – Supply Chain Management

## **Introduction**

The ability to learn has always been the foundations of any successful society. Learning can be defined as the acquisition of knowledge through cognitive processes that translate into new understandings, behaviors and skills (Moore, Green, & Gallis, 2009). In today's knowledge driven society, gaining such valuable understandings through education is a very important resource (Schleicher, 2003). The advances made in computer technology, coupled with education's drive to take advantage of such advances have given rise to eLearning.

The emerging paradigm of eLearning is becoming increasingly in evidence across many academic disciplines and provides further support for the concept that learning processes no longer support traditional teaching methods alone. It can be argued that today's third level education students are part of a new virtual generation, where the blackboard and refill pad have been replaced with an interactive white

board and laptop respectively. To assist in the transition from traditional learning to eLearning, more interactive, animated and virtually orientated teaching aids are needed.

The objective of this chapter is to develop an interactive web-based simulation portal using an integration of; simulation-based learning, web-based simulation and a web content management hierarchy model. The portal will create a medium that is easy to use and enables teachers to create a more interactive learning environment for students. Section 1 acknowledges the importance of third level institutes to Ireland's knowledge economy and education stakeholders and the challenges they face. Simulation-based learning frameworks are then discussed before a review of web-based simulation in Section 2. An overview of the complexities in supply chain management takes place in Section 3's case study which is used in the building and implementation of the distributed simulation portal in Section 4. Finally the results, findings and future work in the implementation of the portal are discussed in the conclusion.

## **1. Third Level Education in Ireland**

The quality of third-level educational (TLE) systems has a significant influence on the economic wellbeing of society (Prendergast, Saleh, Lynch, & Murphy, 2001). In Ireland, the effectiveness of TLE is extremely important when obtaining the necessary high levels of knowledge and skills required for sustainable competitiveness (Breena et al., (2009). Consequently, there has been an increased emphasis put on TLE by Irish governments in recent decades, culminating in a large increase in student numbers (Fig.1) (Department of Education and Skills, 2010). In particular, government incentives such as the abolition

of college fees in 1996 (Clancy & Kehoe, 1999) and the “Charting Our Education Future” white paper in 1995 (Department of Education, 1995) laid the foundations for the knowledge economy.

Although governments are a very important and strategic stakeholder to TLE institutes, there are other partners who have a lot to gain or lose from the knowledge transfer capabilities of TLE.

### **1.1. Third Level Education Stakeholders**

Stakeholder relationships are based on the transferring of knowledge between TLE institutes and industry and the wider community (R. Lambert, 2003)). The emphasis on knowledge transfer has been driven by high level policy makers in education, including governments and industry partners who believe education institutes should have a more direct role in regional and national economic development (Etzkowitz, 1998). In any organization, including education, there are internal and external stakeholders. Stakeholders are any “individuals or groups with an interest, claim, or stake in the organization, in what it does, and in how well it performs” (Hill and Jones, p.367, 2008). In education these include:

#### **External**

- Government
- Regional/National Development Agencies
- Local Communities
- Industry Partners
- Academic Content Providers
- 

#### **Internal**

- Students
- Educational Institute

- Academic Staff
- Non-academic Staff
- Student's Union
- Teacher Unions
- 

In relation to eLearning, Wagner et al. (2008) categorize stakeholders in terms of their motivations and concerns towards using eLearning tools. For example, students are categorized as the eLearner consumer, who is motivated to use eLearning tools to gain knowledge and skills and also to gain access to courses that would otherwise be obstructed by geographical or financial restraints. Although, this new learning process will also give students concerns such as difficulty understanding increased technological sophistication. Similarly, instructors and teachers are motivated by reaching broader audiences and including variation to their teaching process, but have concerns of the acceptance of eLearning tools by their students and the shift from being primary source of knowledge "...to being a manager of the students knowledge resources" (Wagner et al., p.29, 2008,). The institutes themselves see eLearning as a marketing tool to advertise advances in education such as distance learning and to create access to a larger pool of students. Industry employers want to hire potential graduates with the most up-to-date expertise in information technologies.

Although understanding the needs of key stakeholders is very important to TLE institutes, many other challenges in the learning process need to be discussed and understood to validate the need for eLearning tools integration.

### ***1.2. Challenges to Third Level Education Process***

While preparing students for a successful career in a knowledge-based economy, TLE processes require an integrated educational environment that will

encourage creativity and a commitment to lifelong learning (Brewer & Brewer, 2010). To achieve this transition into a more creative and long-term learning environment, TLE institutes have faced many challenges.

With such a high level of investment in Irish TLE by stakeholders, it is critical that the challenges within the teaching/learning relationship are understood and addressed to ensure that college graduates make a successful and optimized transition into the workplace (Tobail, Crowe, & Arisha, 2010b). Studies made by Cuban (1984) on teacher education in the USA suggest that teaching adapts to requirements of particular eras. However, sometimes these changes have not adapted sufficiently or been reviewed regularly, becoming ineffective and outdated (Hess, 2009). The primary example of this would be the use of traditional 'rote' learning techniques in TLE, which has been proven to discourage the transfer of core/key skills (Billing, 2007). This learning process consisted of a knowledgeable educator on a particular topic, who constructed and communicated knowledge on such topics to learners to memorize using the common instructional technologies of the day; books, articles and classroom lectures (Ruben, 1999).

During the past 30 years, TLE has been evolving steadily and the objectives of TLE institutes have changed. Memorizing facts and figures is now recognized to be less important than developing knowledge based skills for; problem-solving, interactive team work and life-long learning (Knight & Wood, 2005). The introduction of the learning pyramid has instilled a new focus on the way teachers interact with students in relation to the retention of what is being taught (DeKanter, 2004). Although there is only 5% retention rate given to the traditional class lecture when used alone, when all teaching methods of the

pyramid are used in continuum rather than hierarchal, the level of retention is up to 90% greater (Lalley & Miller, 2007). The theme of this chapter is centered on the concept of the learning pyramid in continuum, because to retain conceptual knowledge effectively using simulation, the class lecture and teacher instruction are still very important.

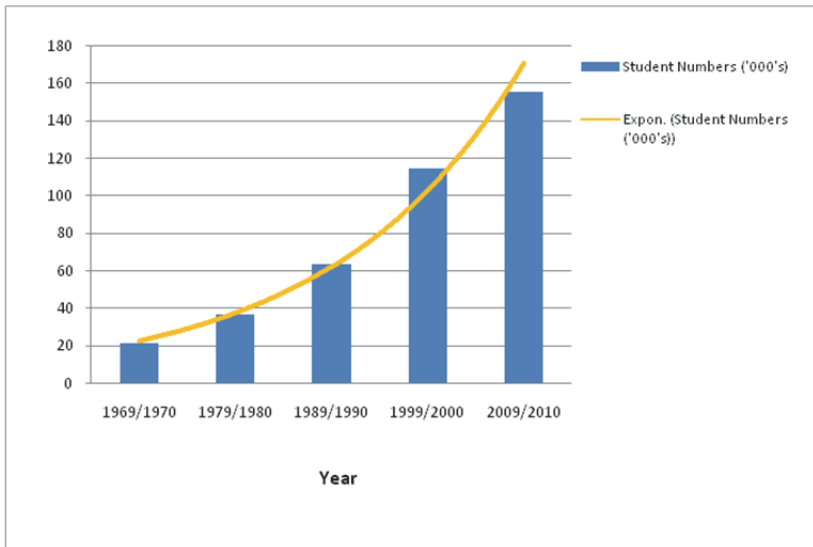


Figure 1: Full-Time Students in TLE Institutions in Ireland

### ***1.3. Simulation as an Education Solution***

Although using simulation as a method of teaching is not a new concept, particularly in medical, military and aviation education (Murphy, Hartigan, Walshe, Flynn, & O'Brien, 2010), it is growing rapidly in many other academic disciplines. The reasoning for such growth lies with simulations potential to create clinical experiences that closely mimic the real life scenarios of a system (Zhang, Thompson, & Miller, 2010). Whether simulating medical procedures without doing harm to a patient, or simulating a supply chain management concept without the costly change in



business strategy, simulation is a powerful learning aid.

Another important driver for the growth in using simulation technologies in TLE is the fact that today's TLE student is part of the digital generation. In this virtual age, online multi-player games, virtual reality and simulations are a part of everyday life, making gaming and simulation a very important catalyst in the TLE learning process (Ferdig, Coutts, DiPietro, & Lok, 2007; Proserpio & Gioia, 2007).

#### *1.3.1. Simulation-Based Learning Framework*

Simulation is not a technology; it is a technique to replicate the real world in a completely interactive way (Gaba, 2004). However to aid in its effectiveness, technologies such as computer software are often utilized. The technological foundations of the simulation portal developed in this chapter are based on Tobail et al's (2010a) simulation-based framework (Fig.2).

Using detailed conceptual models of a supply chain, the framework was developed to assist in the future creation of an actual simulation-based teaching aid to TLE SCM lecturers. The whole framework depended on modeling the basic concepts and theories of SCM and integrated them into a powerful simulation tool. Designing and implementation process of this project involved computer engineering and SCM experts to achieve the required aspects of the system. The implementation of the framework can be divided into two stages.

The first stage was the design and implementation of a simulation model for SCM using a powerful simulation tool. The second stage of web-enabling applications was developed using a communication protocol layer

and interactive graphical user interface. This chapter focuses on developing stage 2, the use of web-enabling technologies in the TLE learning process.

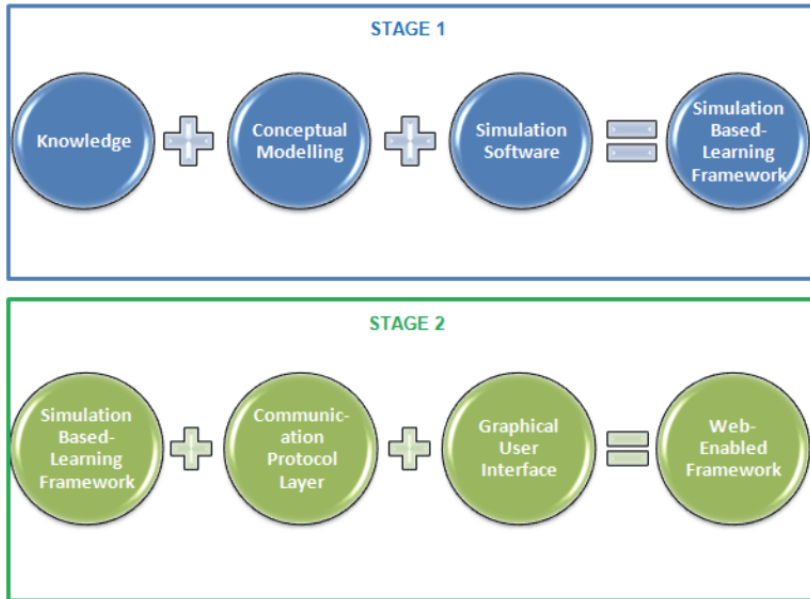


Figure 2: Simulation-Based Learning Framework

## 2. Web-Based Learning

The increase in demand for education, as stated in Section 1, coupled with the increase in the amount of information available are the main reasons for the integration of education and computers, primarily the internet (Bicen et al., 2010). This novel approach to education is commonly known as web-based learning and is an eLearning technique that has made the learning process more accessible by stretching spatial and temporal barriers (Khalifa & Lam, 2002). Web-based learning is the step in the learning/teaching relationship where the communication and interaction of students with a lecturer/teacher takes place with the use of computer science and network technologies.

A web-based learning field that has been growing steadily over the past number of years is that of web-based simulation (Yingping & Madey, 2005).

### **2.1. Web-Based Simulation**

Although the field of web-based simulation was first introduced by Fishwick (1996), the concept is said to be as old as the Web itself (Reichenthal, 2002). In his paper, Fishwick formed an introductory overview of web-based simulation, to be used as a backdrop to a more formal discussion, with the objective of potentially forming a new simulation track. This in turn, gave rise to a new era in simulation study and research into the field grew rapidly, but despite such a promising start, the number of real applications in the field is relatively small (Wiedemann, 2001).

According to a review made by Byrne et al. (2010), web-based simulation can be separated into 7 categories:

1. Local simulation and visualization
2. Remote simulation and visualization
3. Hybrid simulation and visualization
4. Web-based simulation documentation
5. Web-based simulation model repository
6. Component-based simulation in relation to Web-based simulation
7. Distributed simulation in relation to Web-based simulation

Incorporating web content management, the portal developed in this chapter lies in category number 7, distributed simulation in relation to web-based simulation. In theory, all web-based simulation to some degree can be regarded as distributed simulation (Page, Griffin, & Rother, 1998). In a distributed simulation system, the model designer should not have to have knowledge about technical details used

by the system creator to produce distributed simulations (Byrne et al., 2010). This is an important factor in the development of the distributed simulation portal in this chapter. The goal of which is to develop an accessible simulation portal for TLE which caters for technical and non-technical minded students.

## **2.2. Web Content Management**

Web content management (WCM) is defined as an organizational process, aided by computer software tools, for the management of content on the Web, encompassing a life-cycle that runs from formation to destruction (Vidgen, Goodwin, & Barnes, 2001). In basic terms, WCM is an infrastructural support management system for websites. There are three main roles that WCM must support; the writer, the reader and the collection manager (Rein, McCue, & Slein, 1997). To manage these roles in the simulation portal developed in this chapter, McKeever's (2003) four-layer hierarchical layer WCM has been used. The hierarchy consists of 4 layers (Fig.3), which reflect each of the interacting layers in WCM. They are; content, activity, outlet and audience.

## **3. Supply Chain Management Case Studies**

The introduction to this chapter highlighted that education is a very important resource in today's knowledge driven society. Similarly, knowledge is a very important resource in managing and understanding the supply chain (D. Lambert, Cooper, & Pagh, 1998). At its basic level a supply chain is made up of multiple partners (supplier, manufacturer, distribution centre etc.), multiple flows of items, information and finances and is sometimes described as looking like an uprooted tree (D. Lambert & Pohlen, 2001). Each network node has its own customers' and suppliers' management strategies, partnerships, inventory control policies and items mixture (Longo &

Mirabelli, 2008), with many challenges to overcome. Challenges to overcome at all strategic levels of SCM include; complexity, uncertainty, risk, resilience, visibility, and cost to name a few. The capabilities of simulation software to replicate uncertainty are high, mainly through discrete event simulation, as it is capable of manipulating the variability and uncertainty of a system (Mahfouz, Ali Hassan, & Arisha, 2010).

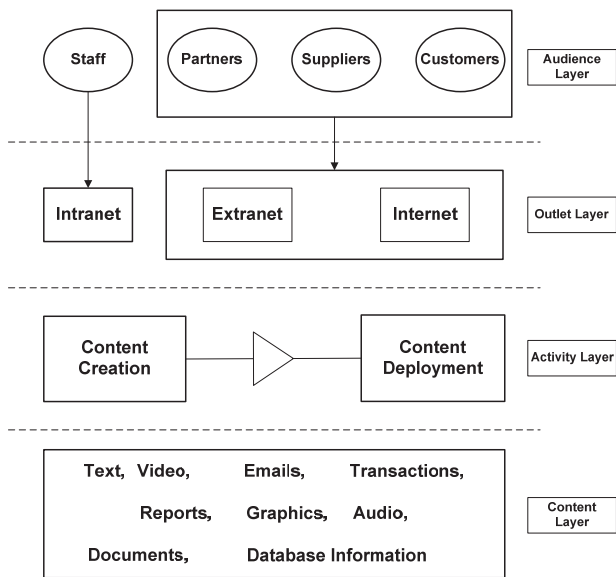


Figure 3. WCM Four-Layer Hierarchy

To illustrate how TLE students can visually and interactively learn the complexity of SCM, important network nodes; a distribution centre and a manufacturing plant were chosen as the case studies used to build the simulation portal.

**3.1. Distribution Centre/Manufacturer Relationship**

Up until recent years, the relationship between supply chain partners has been adverse in nature.

Relationships were traditionally transactional, focusing on; cost, delivery time and quality alone (Goffin, Lemke, & Szwejczewski, 2006). To demonstrate the effectiveness of the simulation-based learning framework in teaching SCM complexity, two key supply chain members; a first tier supplier distribution centre (Fig.4) and a manufacturer (Fig.5) were modeled, simulated and measured.

Using hypothetical, yet accurate input data, including; forecasted and actual sales figures, production process capacity, product specifications, lead-times and product costing, the relationship between the two supply chain members were studied. Equations, management strategies, statistical analysis and other management science techniques that SCM students will learn in their degree were integrated into the model results to illustrate the impact of input and process decisions on the model outputs, which include warehouse capacity utilization, cycle throughput time and queue lengths. The end objective is for the user to practically understand the complex relationship between the manufacturer and supplier, and how the impact of their management choices and input decisions affects the efficiency of the partnership.

### *3.1.1. The Distribution Centre*

Using integrated definition modeling language for functional process (IDEF0), the operational processes of a generic supplier distribution centre were studied and modeled (Fig.4). There are two main streams to the model; the order process (demand management) and the warehouse operations process. The main warehouse functions are; inbound planning, tipping, storing, order picking, dispatch planning and dispatch.

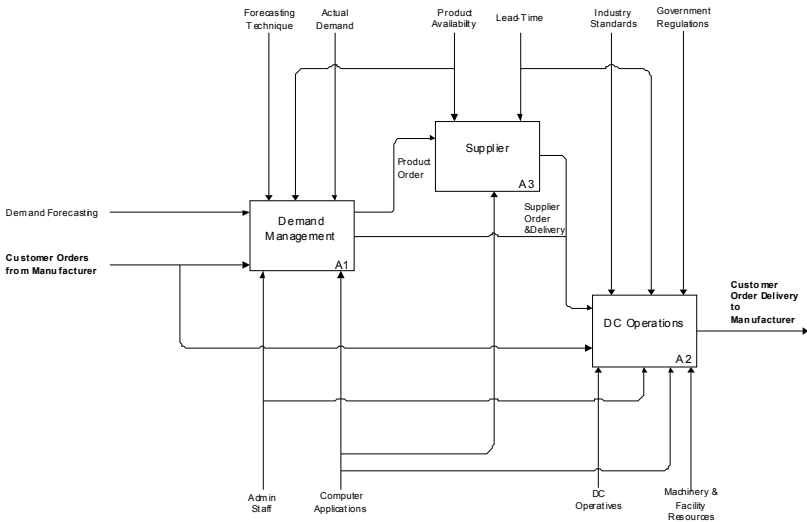


Figure 4: IDEF0 Conceptual Model of Distribution Centre Operations

### 3.1.1. The Manufacturing Plant

Studying a plastic bag manufacturer, IDEF0 was also used to create a detailed conceptual model of the manufacturing process (Fig.5). The production system begins with the arrival of orders from the customer (Distribution Centre), beginning a 'pull demand' strategy through the production plant. Items have a number of various routes possible, with all products having their own individual characteristics. Elements that make up these characteristics are attributes such as height, thickness, quantity needed and extrusion weight which lend themselves to the specific tailoring required for the production of individual items.

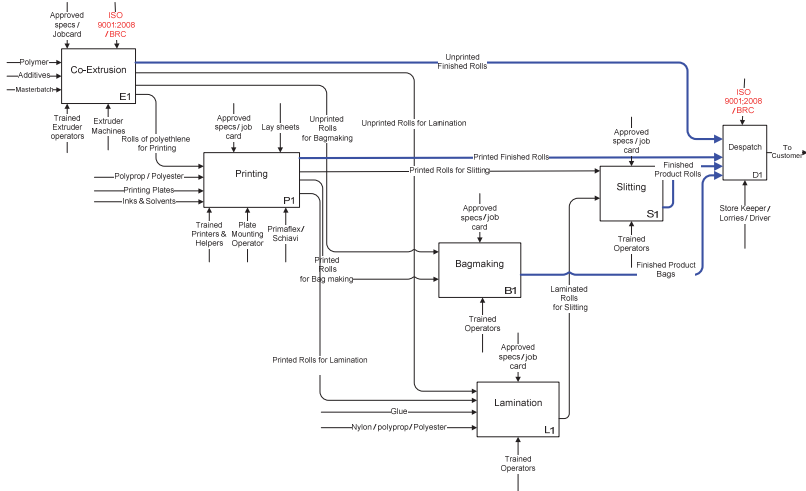


Figure 5: IDEF0 Conceptual Model of Manufacturing Plant Operations

## 4. Web-Based Simulation Portal System Structure

The proposed web-based simulation portal structure consists of a client site and a server site connected over the web by TCP/IP protocol.

### 4.1. Server Site

The main structure of the system has been built on the server. This part consists of web-server, simulation tool, content management system and database, controller and listener (Fig.6). Each area is described briefly below:

*Web server* — the web server's main objective is to host the main web sites responsible for the portal, manage the client requests and data storage. The most common managed requests are Hypertext Transfer Protocol (HTTP).



*Simulation Tool* — a professional simulation toolkit has been employed to serve the considerable simulation requirements. Using a professional simulation tool with all simulation capabilities is considered as one of the privileges for this framework over the other web-based simulation tools which run the simulation tool on the client machine. This leads to limitations in simulation capabilities in the client simulation tools. The main option of this tool is to run the required simulation model based on the client requirement (Fig. 4 & 5) and save the results to be transferred later to the client.

*Controller* — this is the part which is responsible for translating client requests to the simulation tool commands. The inputs to the simulation tool are applied from the client side through the controller and the output is then transferred back to the client using the web and TCP/IP protocol. The controller uses a shared communication space and two types of commands. The shared space is to exchange data and commands with the simulation tool. There are two types of commands; commands to exchange data by applying inputs and getting outputs to/from the simulation tool; and commands to execute options and services of the simulation tool.

*Content Management System and Database* — to control the accessibility of the system and simulation model, a content management system has been built using the four layer hierarchy method, as illustrated in figure 3. This system differs between the two main types of users; TLE instructors and students. Instructors have controlling options such as assigning models to users and modifying models. Students are able to run their assigned models and check the results. Login to this system is achieved through a username and password interface (Fig.7). A database system has been built to support the content

management system. The database management system stores the registered users, assigned simulation models and the privileges assigned to different types of users.

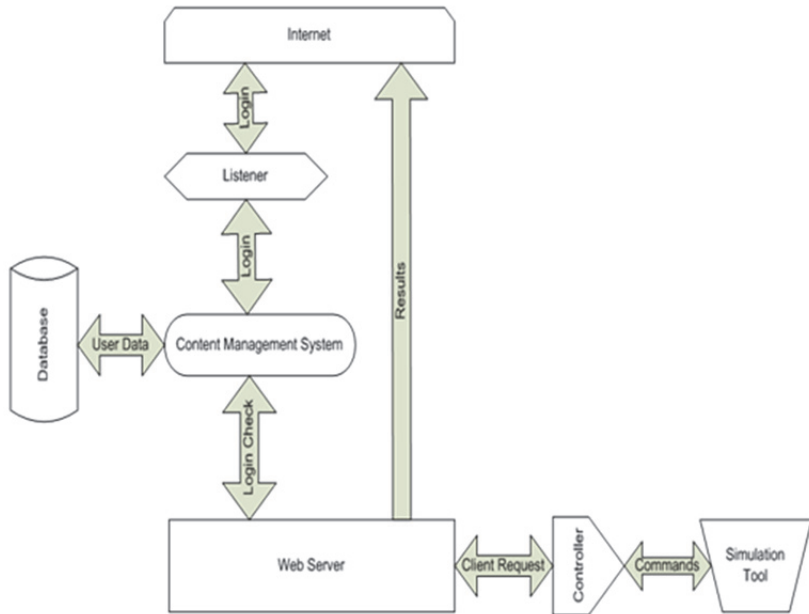


Figure 6: Server Site System Structure

*Listener* — the listener module is the interface between the client and the web server. It is running to wait and listen for client requests and pass them to the web server to be managed by the controller. The client uses a graphical user interface to apply requests which are encoded and sent over the web in TCP/IP protocol to the server.

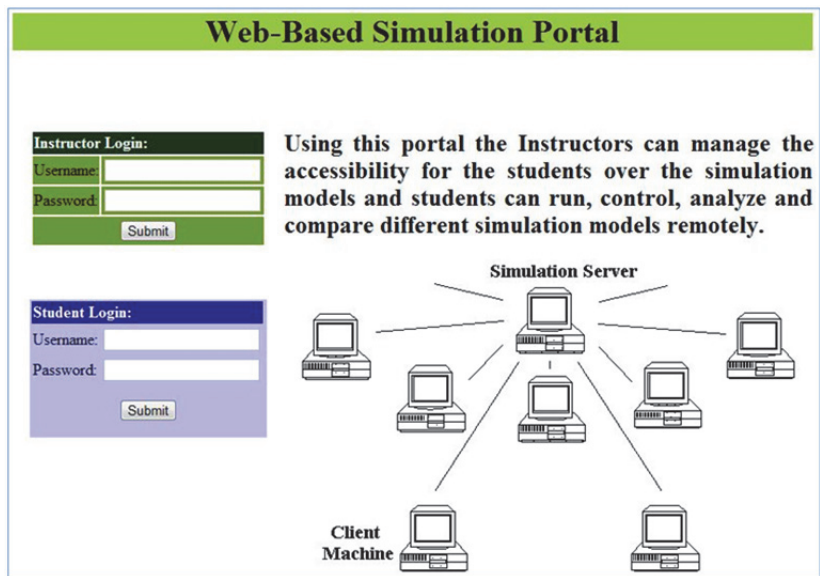


Figure 7: Client Graphical User Interface

4.2. Client Site

A client site represents the part of the system running on the client’s machine. The client site consists of two main parts; graphical user interface GUI and translator module (Fig.8). These two main parts are described as follows:

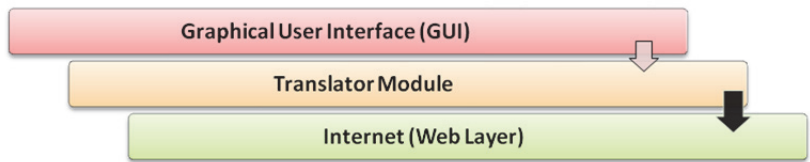


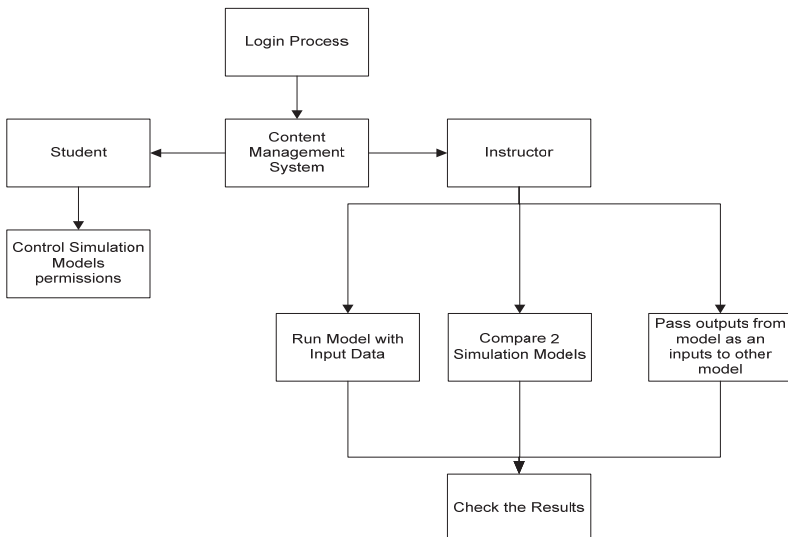
Figure 8: Client Site System Structure

*Client Graphical User Interface (GUI)* — this interface works to receive the client commands to be transferred to the server and display the results received from the server to the client. Main software engineering capabilities have been taken into account

while building this interface, including; usability, accessibility and reliability. Many operations can be achieved from the client side using this interface. They are; login to the system, controlling the simulation model; applying inputs and check the results, comparing two simulation models and passing results from one model to the other (Fig.9). One of the main benefits of this interface is to give easy access to distributed simulation systems while keeping the professional simulation tools capabilities.

*Translator* — the translator is a background running module which encodes the client commands in a way to be understood by the controller on the server site. When the client/student chooses to run a simulation model, the translator encodes these actions as a running command and the model name, and then sends them over the web. This translator encodes all actions from all types of users; students and instructors.

Figure 9: User's Operations Scheme



## **Conclusion**

The close relationship today's TLE students have with the technological world can no longer be ignored by educational institutions. In knowledge economies such as Ireland, education stakeholders want to see an effective transfer of knowledge from education into industry. The emergence of eLearning as a valid and effective educational process has never been more relevant. This chapter discussed the potential benefit of developing an interactive web portal that will validate the emergence of eLearning techniques. Using simulation-based learning, integrated with web-based simulation and a web content management hierarchy model, an easy to use web-based simulation portal was developed. The portal enables teachers/instructors of supply chain management to experience a more interactive eLearning environment for TLE students. This in turn encourages students to transfer theoretical knowledge into practical knowledge, assisting in their transition from TLE learner to industry practitioner.

Using a web-based platform has highlighted several advantages such as; (1) portals are less expensive than simulation software packages, (2) easy to access from anywhere (i.e. college or home), (3) authorization for teachers to manage the class, and (4) instructors can assign different models to be used by different students' groups and customize the input and outputs for the systems. The system is designed to enable students to work in groups and access different distributed models concurrently. It enables many users to get access into a single simulation model from different sites, and/or a single accessibility to distributed simulation models to upgrade the decision making capabilities. Students can apply various inputs and examine the outputs, compare simulation models, connect between distributed models by passing the output of one as an input to the

second. In the case study, supply chain simulation creates an animated experience and better understanding of the impact of uncertainty and risks within supply chains. The portal interface has a potential to be used in other subject areas that have high levels of multiple parameters and objective criteria in decision-making process.

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## **C**HAPTER 9

### **PARTNERSHIPS AND LEADERSHIP: TRANSFORMING CLASSROOMS THROUGH TECHNOLOGY**

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#### **Abstract**

This chapter reports on a four-year investigation<sup>1</sup> of the state of computer technology integration into classroom learning in public schools in one Canadian province. We recognized that schools function as a part of a complex adaptive learning system that is composed of multiple interrelated sources of leadership (internal and external). We employed both qualitative and quantitative research approaches to explore the sources and nature of leadership for the adoption and implementation of the new technologies, the perceptions of school and district personnel of best practices related to technology for classroom learning, and the challenges related to their

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<sup>1</sup>The research for this chapter was supported by the Canadian Social Sciences and Humanities Research Council.

implementation. We examined the interrelationships among formal leaders found in schools, school districts, and government, and focused on how these leaders interact with one another and with teachers, parents, and other community partners. We discovered that in spite of the extensive literature related to the implementation of innovation in education, it appeared to have had minimal impact on implementation practices in the schools and school systems that we studied. Rather, implementation appeared to be dependent on the distribution of leadership and systems alignment among key partners in respect to values, attitudes, and purposes.

## **Keywords**

Leadership – Partnerships - Technology - Classroom Learning

## **1. Introduction**

There is little doubt that technology has transformed the way children and youth live, communicate and learn. Unfortunately, the equivalent certainty of the impact of technology on classroom pedagogy does not exist. As a matter of fact, the most common perception is that classrooms have changed very little over the last century (Mayer, 2010; Tapscott& Williams, 2010). For instance, Tapscott and Williams (2010) observe that “in the current model of pedagogy...the teacher is essentially a broadcaster: the transmitter of information to an inert audience in a one way, linear fashion”. (Ch. 8, section 2, para. 1). They contend that through the use of technology education must be transformed from being teacher-focused to student-focused; from one-way and one size fits all, to multi-way and customized, and from student isolation to collaboration. They recognize, however, that “we can’t just throw technology in a classroom and expect good things....” (Tapscott as cited in ASCD, 2010). Similarly, Mayer (2010) observes “many strong claims are made for the

potential of new technologies to transform education and training around the world, but few of the claims have been substantiated by research evidence, or even tested in rigorous scientific research” (p. 180). As a matter of fact, the confluence of evidence indicates that despite huge investments by schools, school districts, and governments in the provision of computer technology for teacher and student use, the actual impact of this technology on teaching and learning has been less than impressive (Mayer, 2010; Penuel, 2006; Sheppard, Brown, & Dibbon, 2009; Tapscott & Williams, 2010; Zhao, Yan, & Lei, 2008). The research reported in this chapter, then, is focused on developing an understanding of the leadership required to bring about successful change in teaching and learning through technology in schools and school systems.

### ***1.1 Learning with technology***

Having distinguished between technology-centered and learner-centered approaches to learning with technology, Mayer (2010) offers an explanation for the slow rate of implementation of technology in public school classrooms. He observes that the primary change being sought over the last century has been technology-centered: “using technology in education through providing access to cutting-edge technology (p. 182); it includes learning from an encyclopaedia, a multimedia presentation, or a computer game” (p. 194). He contends that such an approach has faltered because “it fails to take the learner into account, and assumes that learners and teachers will adapt to the requirements of the new technology” (p. 183). He opines that a learner-centered approach represents a more laudable vision for learning with technology because it begins “with a focus on how people learn and view[s] technology as an aid to human learning” (p. 183). With this latter approach, the learner is an

“active sense maker and knowledge builder” (p.185) while both the teacher and the technology “guide the learner’s cognitive processing during learning” (p.185).

Although we share Mayer’s vision of learning with technology, the challenge of shifting from the most prevalent teacher-directed learning approach to a learner-centered approach is huge (Cuban, 2001; Parr, 1999; Rockman, 2003; Zhao, Yan, & Lei, 2008). As Fullan (1999) has observed, “it is one thing to see an innovation ‘up and running’; [but] it is entirely another matter to figure out the pathways of how to get there in your own [school]” (p. 14). Undoubtedly, making the transformation from traditional, technology-averse classrooms to learner-centered classrooms that are dependent on technology is representative of a complex, disruptive, bundle of innovations (Hall & Hord, 2006) that require dramatic changes to both the structure and culture of the organization (Schlechty, 2005).

### ***1.2. Leading complex innovation***

Given the aforementioned context, therefore, we contend that it is not that the emerging technologies lack the potential to transform teaching and learning, but rather that adequate attention has not been given to either the development of a vision of what change is being sought or to the leadership required to facilitate the envisioned change (Brown, Sheppard & Dibbon, 2009). Certainly, we found the previous to be the case in a study of one school’s attempt to implement a laptop program (Sheppard, Seifert & Kelly, 2008). After two years of following the initiative through structured classroom observations in both laptop and non-laptop classrooms in matching subject areas and grade level, we found no differences in instructional approach between laptop and non-laptop

classrooms. In fact, the structured observations revealed a slight tendency toward more student-centeredness in non-laptop classes. Follow-up interviews with students and teachers revealed similarly that neither students nor teachers recognized any observable shift in approaches to teaching and learning in laptop classes. This finding that there was no measurable shift in instructional approach in laptop classes was not surprising, however. We could find no articulated plan for either implementation or professional development, and beyond the school principal and a small number of lead teachers, few were even aware of the initiative. This apparent lack of teacher, parent, community and school district engagement in the initiative contributed to growing social justice concerns relating to students with and those without laptops. As a consequence, the program was terminated at the end of the second year.

It is apparent that the leadership of the initiative described above was limited to only a few, and that little consideration was given to either the change being sought or to the development of an implementation plan. The primary focus, it seems, was on the acquisition of technology that had the potential to facilitate student learning (a technology-centered approach), rather than on the learner and learning (a learner-centered approach) (Mayer, 2010). Undoubtedly, the narrow scope of leadership and the absence of either an articulated vision or an implementation plan contributed to a serious misalignment of values and purposes across various stakeholder groups that eventually forced the school board to terminate the laptop initiative in that school.

There is a strong and growing body of evidence that leading complex innovation in schools and school systems requires strong leadership beyond that which is likely to be provided by a single formal leadersuch



as a school principal (Dexter, 2008; Harris, 2009; Sheppard et al., 2009, Sheppard & Dibbon, 2011; Spillane, 2005). Dexter, for instance, has concluded that

effective leadership for information technology (IT) in a school is a significant predictor of its use by teachers and students.... [Within this context, it is important to recognize that], planning and operationalizing effective school-wide IT use is a complex leadership task, which usually results in distributing the responsibilities for the successful integration and implementation of technology across a team. (p. 543)

Similarly, Bennett (2008) opines that in "a school where the existing culture and structure facilitates distributed leadership, [it] will be an easier place in which to" (p. 610) develop and implement technology innovations.

Schools exist within "a complex adaptive learning system that is composed of multiple dynamic interrelated subsystems that interact to influence student learning" (Sheppard et al., 2009, p. 102). In such a system, there are multiple influences on classroom teaching and learning processes. Among those influences are government and school district leaders, policies, and practices; professional learning experiences of school administrators and teachers, and the beliefs, attitudes, and opinions of other constituent groups such as unions, professional associations, parents, community and business groups, and researchers (Sheppard & Dibbon, 2011). Leading change amidst such complexity is a challenge. While formal leaders are essential in dealing with such complexity, there is compelling evidence that leadership in support of innovation must be distributed to include not only formal leaders (district

administrators and school principals), but also informal leaders (teachers, parents and community) who have important, distinct, leadership roles to play (Crowther, Kaagen, Furguson, & Hann, 2009; Hallinger & Heck, 2009; Harris, Chapman, Muijs, Russ, & Stoll, 2006; Sheppard & Dibbon, 2011; Spillane, 2005). The existence of distributed leadership enables the development of a vision of teaching and learning with technology that is truly shared.

The importance of vision is well articulated by the Cheshire cat in Lewis Carroll's (1951) *Alice in Wonderland*. When Alice asked where she ought to go, the cat responded, "that depends a good deal on where you want to get to." When Alice replied that she didn't "much care where," the Cheshire cat advised, "then it doesn't matter which way you go" (p. 57). Organizations are composed of many individuals and diverse groups with multiple visions of "which way" it should go. Leading the development of an organizational vision that is truly shared in the context of such complexity is an essential challenge for those who seek change. Once developed, these visions

define outcomes that are valued and shape how energy and time are allocated.... They define what actions ought to occur; they motivate staff and students [and the larger community] by signalling what is important and what will be rewarded; they steer the allocation and distribution of resources, depending on what is considered important or valuable. (Deal and Peterson, 1999, p.26)

The evidence is compelling that both distributed leadership and the creation of a shared vision (the alignment of multiple and varied values, attitudes, and purposes) are important components of the change process in schools and school systems. It is toward further investigating the role of both

distributed leadership and the development of a shared vision in the facilitation of change in classroom pedagogy through technology that the research reported in this paper has been directed. Specifically, we report on three of our recent studies focused on distributed leadership (leadership sources and approach) for new and emerging technologies and its impact on shared vision, classroom practices and approaches to student learning.

## **2. Methodology**

Study One is a qualitative investigation of the sources and nature of leadership for the adoption and implementation of new and emerging technologies deemed by individual participants to have had the most impact on k-12 education in one province over the past 10 years. Initially, we sought to identify the technologies that senior leaders within the k-12 school system perceive to have had the most impact on k-12 education. Having identified these technologies, we sought to (1) identify those individuals in each of the school districts and/or the province that have been or are recognized as pioneers in leading the implementation of these identified technologies; (2) determine the extent to which the leadership was distributed; and (3) identify those stakeholder groups that were included as part of the distributed leadership team. We gathered data during winter 2009 through interviews of 38 selected individuals who have held senior level leadership positions in the department of education, teachers' association, school council federation, and all school districts (directors and assistant directors) in one Canadian province.

Study Two is a quantitative investigation (Sheppard, Seifert, & Brown, 2010) for which we collected data during autumn 2009 through the use of a survey of 1574 teachers across 91 schools (return rate 83%) in

a large public school district in a second Canadian province. For data analysis, we employed path analysis (Arbuckle, 2008) and maximum likelihood estimation to develop a best-fitting model in order to examine the relations among (a) district and school formal leaders and their support for teachers' professional learning; (b) the engagement of teachers in distributed leadership activities that included collaborative engagement, shared decision-making, systems thinking, and the development of a shared vision; (b) teachers' use of computer technology for their professional work, (c) teachers' use of technology in the classroom, and (d) the extent to which computer technology is impacting students' learning activities in the classroom (Table 1). Our initial theoretical model (Figure 1) is grounded in the relevant theory and research related to collaborative or distributed leadership in schools (Bass & Riggio, 2006; Kouzes & Posner, 2011; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Sheppard et al., 2009; Spillane, 2005). In this figure, the squares represent each of the leadership variables listed in Table 1 and the three outcome variables (teachers' use of computer technology for their professional work, teachers' use of technology in the classroom, and the extent to which computer technology is impacting students' learning activities in the classroom). The unidirectional arrows indicate our theoretical hypothesis of causation between the variables. It posits that the leadership approach of the formal leaders in school districts and schools set the stage for the collaborative engagement of others in leadership. Further, it theorizes that the various collaborative leadership processes impact teachers' professional practice and students' classroom learning activities. For the purposes of simplicity, the small circles that represent error measurement will be ignored in all discussions in this chapter.

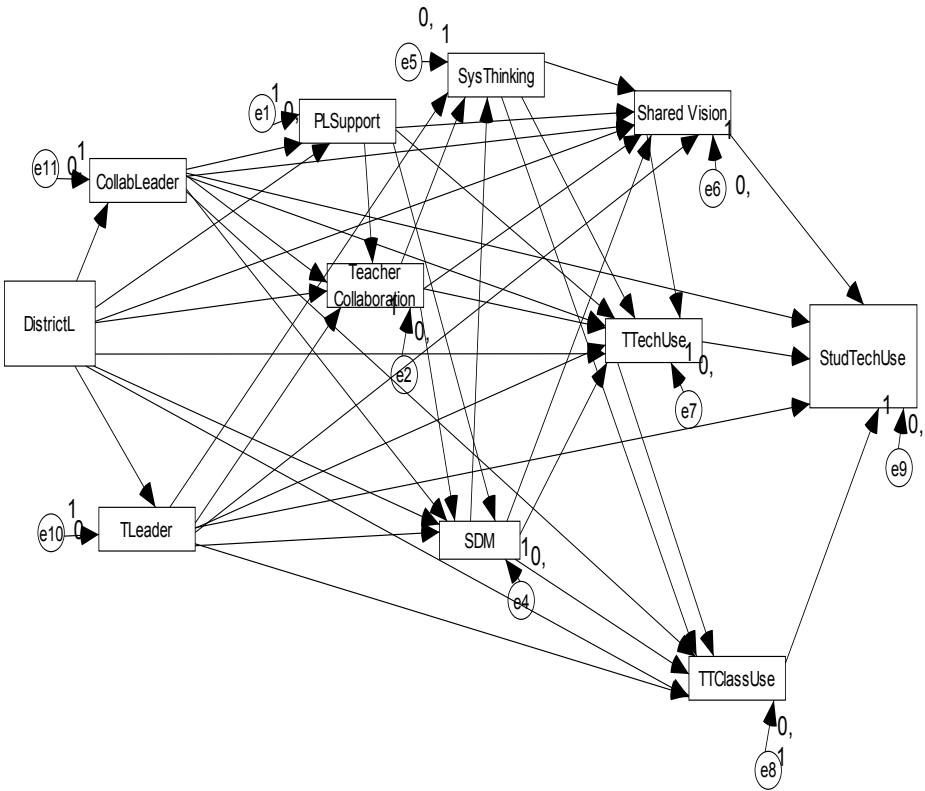


Figure 1. Theoretical Model

We tested our theoretical model through the application of the following model fit indices: Chi Square ( $\chi^2$ ), Standardized Root Mean Squared Residual (SRMR), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Akaike Information Criterion (AIC) (Garson, 2009; Hu & Bentler, 2000). We set the following cut-off values as evidence of a relatively good fitting model:

Table 1. Study Two Leadership and Technology Use

<b>Leadership</b>	<b>Description</b>	<b>Cronbach <math>\alpha</math></b>
District Leadership (DistrictL)	District personnel provide positive leadership	.88
Inclusive Leadership (CollabLeader)	School principal is democratic, collaborative, and supportive	.83
Transformational Leadership (TLeader)	School principal is visionary, change oriented and intellectually stimulating	.88
Professional Learning Resource Support (PLSupport)	School and district leaders provide sufficient professional learning support to teachers	.78
Teacher Collaboration	Teachers work with and learn from one another to improve their practice	.85
Shared Decision-Making (SDM)	Leadership is a team effort and teachers share in decision-making	.81
Systems Thinking (Sys Thinking)	School personnel work with parents and community members who are influential decision-makers in the school	.82
Shared Vision	The school has a shared vision that guides their work	.92
<b>Technology Use</b>		
Teacher Technology Use (TTechUse)	Teachers use computer technology for their professional work	Single Item

Teacher Technology Classroom Use (TTClassUse)	Teachers use technology in the classroom	Single Item
StudTechUse	Computer technology is impacting students' learning activities in the classroom	Single Item

SRMR<.08, TLI>=.95, RMSEA<=.06, and chi-square statistic ( $p>.05$ )<sup>2</sup> (Hu & Bentler, 2000). The AIC measure of our theoretical model was compared to the saturated and independence models with the lower value indicating the best fitting model.

The third study is a qualitative study of stakeholder perceptions designed to determine (a) the pervasiveness of technology integration in classrooms, (b) the nature and uses of the technology in schools that were recognized to be innovative by insider groups, (c) the local sources of leadership for the adoption and implementation of new technologies in schools, and (d) the extent to which their purposes were aligned. We conducted this study winter 2010 in all school boards located in the same province as Study One. We collected data through (1) semi-structured interviews with (a) school district-level technology leaders and (b) school principals of two schools deemed to be exemplary in their use of technology in support of classroom learning in each of four school districts; (2) focus group sessions with stratified samples of teachers and district office program professionals in each school district; and (3) semi-structured observations of "technology savvy classrooms" in the two designated exemplary schools in each district.

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<sup>2</sup> Even though a non-significant chi-square statistic ( $p>.05$ ) would be a good indicator of model fit, we did not set a non-significant chi-square statistic as an essential element for our determination of a good fitting model because a large sample size such as the case in this study ( $n=2029$ ) almost always results in a statistically significant chi-square statistic.

As noted above, both qualitative studies consisted of individual interviews and focus group sessions. For the first study, the authors and a research assistant shared data collection responsibilities. In the second qualitative study, we added classroom observations to our data collection process, and only the authors were involved in the data collection process. For both of those studies, our approach to data collection facilitated triangulation. Each of three researchers collected the data at different times, from different people and places, and by differing method. All interviews and focus group sessions were recorded electronically. Additionally, the researchers kept written notes as a means of keeping a record of the social context and encounter (Mishler, 1986). During the classroom observations, the researchers kept detailed notes that included rich contextual descriptions.

In order to facilitate the analysis, all recordings were transcribed and subsequently combined with the researchers' written notes from all sessions including the detailed notes of the open-ended ethnographic classroom observations (Meijer, Verloop, & Beijaard, 2002; Merriam, 2009; Huberman & Miles, 2002). Initially, we analyzed each individual case in terms of identifying the underlying themes regarding technology use at each site. Following the completion of the initial case-by-case analysis, we identified general themes and conclusions common to all schools and school districts in our study.



### **3. Findings**

#### ***3.1. Study One: Distributed leadership for the adoption and implementation of the new technologies***

##### *3.1.1. Impact of emerging technologies.*

The new technologies that were identified by our key informants to have had the most impact on k-12 education were varied and for the most part, quite general in nature. The list includes the telecommunication technologies generally; the Internet; web 2.0; computer hardware and software; instructional software; and school administrative software that supports scheduling, management of student data and reporting, management of school financial data, and communication with students, parents, teachers and staff. The one application that was perceived by all to have had a profound positive effect was the use of the Internet to deliver online courses to high school students in rural and remote regions of the study province. The following comment from a senior provincial leader is typical of such positive views in that respect:

Internet technology is extremely important in this province. We have seen first hand... that the Centre for Distance Learning and Innovation...is really needed. It is a great model of cooperation and collaboration. It needs to be expanded because without the technology in schooling in rural [regions of the province] equal educational opportunities will not be there.

Although, as indicated in the previous quotation, the Centre for Distance Learning (CDLI) is generally well accepted at this point in time, this was not always the case. Originally, parents and community leaders in

rural communities opposed it because they perceived it as a means of closing their community school. The teachers' union was apprehensive, as well, because their members were concerned that it would reduce job opportunities or lead to layoffs. However, as a result of cautious moderated implementation, routine communication among partners, and documented student success in the distance courses, support for CDLI has grown:

When CDLI began...parents, students, and in fact some distance education instructors were dubious as to whether it would result in success. However, all divisions of the Department of Education were onside and school district administrators gave it their full support. Both sides made operational decisions in support of CDLI independent of one another, each knowing the other side was doing the same. Ultimately the system succeeded.

Others recognized that the Internet technologies enabled collaboration among various stakeholders in education that had heretofore presented challenges. For instance, a district program specialist observed that the Internet technologies have contributed to improvements in communication across traditional boundaries: teachers with their colleagues within their own school and across-schools, and teachers with parents, other community members, and school district personnel:

We have [the technology]...that allows parents to log in and check their child's grades, homework, etc. This has increased communication: teachers with students, teachers with parents, teachers with their colleagues, etc. We can now share files and set up collaborative groups. As well, a significant advancement is that we have online software that provides teachers with the ability to

collaborate outside their schools. Teaching has been a lonely, isolated profession. Now they can share ideas and work. Internet access has provided whole new opportunities to learn and to access resources. It has made me, as a leader, more productive.

Even though the positive impacts of the Internet technologies on distance learning, data management and communications appear to be well recognized by our study participants, this was not the case in respect to the perceived impact of the emerging technologies on regular classrooms. As a matter of fact, the unequivocal response from all participants was that in terms of classroom practice, with few exceptions, the impact has been minimal. The following observations from two senior educational leaders are representative of the most common expressed view:

*Respondent One.* Classrooms haven't changed to the extent desirable because the monies devoted to classrooms come about as a result of decisions being made by people other than classroom practitioners. The lack of grassroots support for these decisions results in less overall buy-in.... An overall technology plan constructed with input from stakeholders at all levels would more likely result in initiatives of lasting benefit.... Also, overemphasis on external testing may have slowed change in the classroom.

*Respondent Two.* Classrooms have changed very little. Putting teachers in classrooms without technology training is akin to putting them on [a major highway] without a driver's license. Out dated policies and practices create challenges.... For instance, we have an out-dated school construction manual that defines classroom spaces without accounting for appropriate infrastructure for classroom technology. Also, we have a public tendering act

that practically prevents research and development partnerships, and often leads to the purchase of substandard equipment and/or service if the tender document is ill defined.

Unfortunately, the above representative comments reveal a bleak image of the impact of emerging technologies on classroom practices in our study context. Further, they reveal that little attention has been given to the change being sought or to what is required for implementation. Decision-making appears to have been top-down; there is no indication that leadership has been distributed, and if there is any vision beyond simply the acquisition of technology hardware for classrooms, classroom teachers who are key constituents have not been engaged in its development.

### *3.1.2. Influential sources of leadership.*

In our search to identify the most influential sources of leadership, we included those recognized as pioneers for the adoption and implementation of emerging technologies in schools. Having accepted the definition of pioneer as "someone who helps to open up a new line of...technology... [or] one who goes before ...; as, pioneers of ... reform" (Pioneer, 2003), we found that while our interviewees recognized the significant influence of the formal senior leaders (e.g., deputy ministers, CEOs, superintendents), they did not view them as technology pioneers. Interestingly, the majority of our interviewees quickly identified the director of the first province-wide Internet based network for all k-12 educators in the province to be a pioneer. A second pioneer, a vice-president of the local university and the original champion of the aforementioned initiative, was less well known, and was identified by only two of our interviewees (the original director of the first province-wide k-12

Internet-based network and a school board superintendent of education). In acknowledging the pioneer role of the vice-president, the original director explained his rationale as follows:

The vice-president asked me to take this on.... This is where the [province-wide school Internet project] came from. The best leaders are facilitators. [The vice-president] was a real leader in this way. He understood his role as leader better than anyone I know.

The school district superintendent, in recognizing the vice-president's pioneering role, described him as a visionary, driver and facilitator of the province-wide teachers' on-line network.

Similarly, only a few of our interviewees recognized the leadership role of two federal government agencies, the Atlantic Canada Opportunities Agency and Industry Canada. Even though these federal agencies held no responsibility for k-12 education, they and specific personnel within them played a significant leadership role in leading technology innovation in k-12 education through the provision of expertise and resources:

Without [federal government] support we would have been held back. Industry Canada also provided Broadband across the country. The federal government had to provide leadership through the backdoor because education is a provincial responsibility.

While there appears to be little doubt that the above noted pioneering individuals and personnel within the federal agencies were innovators and risk takers, it is apparent that they were also collaborative leaders who perceived the value of distributing leadership to others. The vice-president, for instance, collaborated with provincial and federal government agencies to initiate and implement an innovative project outside of

his field of expertise and for which there existed little infrastructure or known expertise, and practically no public awareness. He had confidence, however, that the person he selected to lead the project had the leadership ability to enable success. Similarly, the selected person who became the project director recognized that "leadership is about drawing on people's resources and creativity...and providing opportunity for people in the system to grow ideas". These leaders were risk-takers who recognized the merits of distributed leadership.

As a result of the documented successes of this province-wide school Internet project, government officials and several university researchers began to recognize the potential of the emerging technologies to address the challenges posed by sharply declining student populations in rural remote regions. Consequently, a government appointed panel on education, following widespread consultation, recommended the establishment of a centre for distance learning and innovation for the delivery of high school courses through the Internet. This centre (CDLI, previously referenced in this chapter) now provides high school courses to students in small rural schools throughout the entire province, and its success has been well documented (Kirby and Sharpe, 2011; Sheppard, 2009). As a result of this success, many interviewees identified the centre's senior leadership team as a key source of leadership for innovation in the instructional uses of emerging technologies.

In addition to the leadership role of the federal government in support of province-wide school Internet project as noted above, the Federal Human Resources Department (HRDC) played an important leadership role through their partnership work with various school boards throughout the province. HRDC wanted to offer retraining programs to local

unemployed citizens of small rural communities who desired to develop their information and communication skills capacity; however, in many of those communities the local school was the only facility that could accommodate the offering of such programs. School boards were pleased to be partners in such government initiatives in exchange for funding for improved technology infrastructure and additional technology personnel (the trainers) in each of the host schools for the duration of the program. The additional funds for the development of new technology infrastructure and the capacity building programs that enhanced the technology skills of parents, other community members and agencies, and school personnel contributed to increased use of the information and communication technologies in classrooms, homes, businesses, hospitals, and social organizations throughout the school district.

These partnerships in support of technology flourished because they grew from common purposes of multiple stakeholders. This did not occur in all school districts, however. Rather, these partnerships appeared to be largely dependent upon leadership within specific school districts. In districts where the director of education and the school board encouraged prudent risk taking and welcomed innovation in technology, the growth of the emerging technology infrastructure and its use grew exponentially. As a result, several school board directors of education became leaders and community champions in support of the development of proposals to access federal government funding in support of broadband infrastructure development in rural regions of their school districts. Having observed the leadership role of school districts in this respect, a former associate superintendent of education commented:

a casualty of the government mandated school board consolidation that resulted in the elimination of the regional presence of school boards was the loss of local leadership capacity, particularly in the adoption and implementation of new and emerging technologies.

It is apparent that school boards and senior district administrators had a huge leadership role in the adoption and implementation of new and emerging technologies in schools and the communities that they served.

Other identified influential sources of leadership for emerging technologies include a small number of innovative personnel in the schools (mostly teachers), school districts, the department of education, the teachers' association, and a local university. Although teachers, school principals, students, parents, and local school councils were identified as influential leaders by only a few interviewees, they provided a significant leadership role as volunteers in their local schools. Because there was no government budget allocation to school boards for the purchase, installation, and maintenance of technology in schools (Warren, Curtis, Sheppard, Hillier & Roberts, 2003), these groups volunteered to raise funds for what they collectively deemed to be an essential purpose. As a result, the acquisition of technology hardware and software, its installation, maintenance and repair were to a large extent dependent upon the leadership and ingenuity of those above-mentioned school-level groups.

Findings of this particular study illustrate that leadership for innovation in schools and school systems is not uniquely dependent on internal formal leadership sources or the development of a formal strategic plan. The identified pioneer leaders were from external agencies. They introduced the



innovation and worked with internal leaders to facilitate early adoption of the innovation and the creation of a shared vision for its potential. The success of actual implementation, though, remained dependent on formal and informal leaders who were members of multiple constituencies distributed throughout the public school system.

### **3.2. Study Two: Distributed leadership and student use of computer technology**

In this study, we examined teachers' perceptions of distributed leadership and the extent to which various leadership groups impacted students' use of technology in support of their in-school learning (Sheppard et al., 2010). Our best-fitting model (Figure 2) reveals that the identified sources of distributed leadership (teachers, school principals, school district leaders, parents and community) accounted for 40% of the variance of *Students' Use of Computer Technology* (StudTechUse) in support of their learning. It is somewhat surprising, however, that only two of the four formal leadership variables--*District Leadership* and the extent to which school districts provide *Resource Support for Teacher Professional Learning* (PLSupport)—were found to have a significant direct effect<sup>3</sup> (.08 and .07 respectively) on *Student Use of Computer Technology*, and both fall in the very small range. Similarly, in respect to teachers' engagement in distributed leadership activities, only two factors, *Teacher Collaboration* (.06) and *Shared Vision* (.07) have a direct effect (both very small) upon *Student Use of Computer Technology*. Not surprisingly, perhaps, the largest direct effects on

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<sup>3</sup>We employed the guidelines proposed by Kline (2005) for the interpretation of the effect size of standardized path coefficients: <.10, very small effect; <.30, small effect; >.30, a medium effect, and >.50, a large effect.

*Student Use of Computer Technology* relate to the teachers' use of computer technology: (1) *Teachers' Use of Technology in the Classroom* (TTClassUse) (.15) and (2) the extent to which *Computer Technology Impacts the Way Teachers Do Their Work* (TTechUse) (.46). Interestingly, the three leadership variablesthat have a direct effect on the latter impact variable, *Teachers' Use of Technology in the Classroom*, are among the variables noted above to have significant direct effects on *Student Use of Computer Technology: Teacher Collaboration, Shared Vision, and Resource Support for Teacher Professional Learning*.

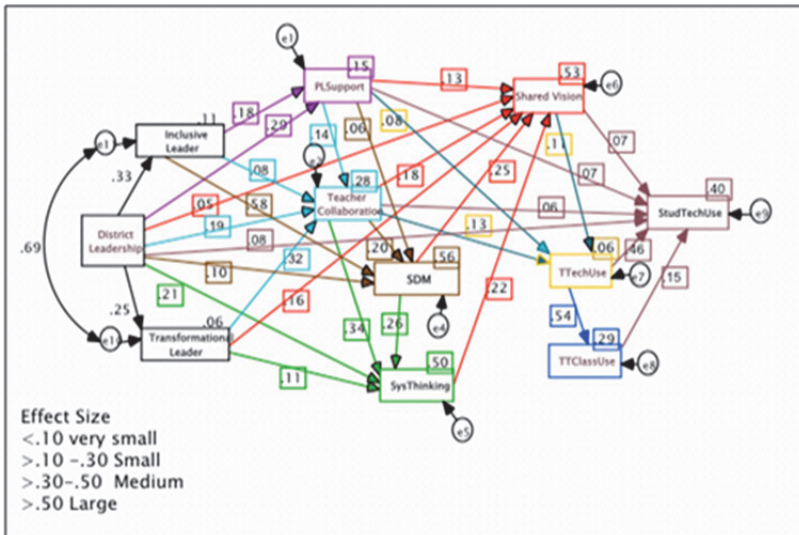


Figure 2: Best Fitting Model

Although we found that only four leadership variables in our model have a significant direct effect on *Students' Use of Computer Technology*, when total effects (both the direct and indirect effects) of each of the eight leadership variables upon *Students' Use of Computer Technology* are considered (Table 2), each variable has at least some effect, with effects ranging

from .03 to .21. As a matter of fact, four of the leadership variables, *School District Leadership*, the provision of *Professional Learning Resource*, *Shared Vision* (accompanied by articulated goals and strategies that guide decision-making and practice), and the existence of *Teacher Collaboration* that facilitates regular dialogue around teaching methods and strategies have small, but meaningful ( $>.10$ ), total effects on *Students' Use of Technology*.

Table 2: Table of Total Effects

	EFFECT VARIABLES									
	1 DistL	2 IL	3 TL	4 PL	5 TCol	6 SDM	7 SYST	8 SV	9 TTUUse	10 TTClass
TTUUse	.113	.053	.071	.119	.162	.033	.023	.106	.000	.000
TTClass	.061	.028	.038	.064	.087	.018	.012	.057	.536	.000
STUUse	.214	.065	.078	.158	.168	.041	.029	.132	.540	.145

Although our model contributes to understandings related to leadership effects on teachers' and students' use of computer technologies in the classroom, it is surprising to us that the total effects of all distributed leadership factors in our model accounts for only 6% of the variance of the impact of computer technology upon teachers' work (TTechUse). Equally astounding is that none of the distributed leadership factors had any measureable direct effect upon *Teachers' Use of Technology in the Classroom* (TTClassUse). Even when the total effects of each of the leadership factors on this later variable are considered, the effect is minimal. Further, it is striking and somewhat unexpected to us that neither the leadership approach of the school principal, shared decision making (SDM), or the engagement of community and parents (SYST) in the school--other than for their involvement in developing the school vision (SV)--had effect sizes that reveal any meaningful effect on either *Teachers' or Students' Use of Computer Technology*.

These findings were particularly unanticipated given our findings in two recent studies in which we employed similar distributed leadership variables. In our first study, a similar distributed leadership model accounted for 55% of the variance of the extent to which teachers perceived their school to be focused on student learning (Sheppard & Dibbon, 2011). In the second study, a similar model explained 42% of the variance of teacher morale and 54% of teacher enthusiasm for their work (Sheppard, Hurley & Dibbon, 2010). We had anticipated that, having found that distributed leadership had such positive effects on teachers and on schools' focus on student learning in those previous studies, it was reasonable to predict a somewhat similar effect on teachers' and students' use of technology. While there is nothing in our data that would help us to explain the findings in our current study, we speculate that it may be the result of an absence of a shared leadership focus placed on teachers' use of technology as a routine component of their work either inside or outside of the classroom. In our study context, in recent years there is an increasing emphasis placed on student outcomes in the form of test scores. It is highly probable, therefore, that the dominant leadership focus of parents and community, school district administrators, school principals, and teachers has moved from the improvement of classroom learning processes through the use of technology to student learning outcomes in the form of test scores.

As noted above, this model explains 40% of the variance of students' use of technology in the classroom. As well, it reveals that teachers' use of technology had by far the largest effect on that use. Unfortunately, our model accounts for only 6% of the variance of teachers' use of technology, thereby, leaving a large gap in our understanding of the sources and nature of leadership for the

implementation of technology in support of student learning in the classroom. Furthermore, the model reveals nothing about the nature of either the teachers' or students' use of technology or the pervasiveness of that use. It is toward addressing those gaps in our understanding that we conducted Study Three.

### ***3.3 Study Three: Emerging technologies and classroom learning***

#### *3.3.1. The nature and uses of technology in exemplary classrooms.*

The responses to our question regarding the nature and uses of the new technologies for teaching and learning were somewhat expansive and diverse (Table 3). All respondents recognized that there were varied and multiple technologies available to them. The most common first response was interactive white board technologies. Participants' perception of the actual uses of any of these technologies in classrooms throughout their district was somewhat guarded, however. In one school district, the assistant director responsible for programs and instruction observed:

placing money in technology has been a 'sinkhole'. While this is still the case to some degree, as a result of experience, schools and our school district have become more strategic in the acquisition of new technologies. The current focus is on the acquisition of interactive white board technologies and video conferencing.

#### *3.3.2. The pervasiveness of technology integration in classrooms.*

In response to our question, "Where are we now in the use of these technologies?" the responses were mixed. One senior district official opined that "many teachers

Table 3. New and Emerging Technologies for Teaching and Learning

Interactive white board technologies (e.g. SMART Board)	School administration software: scheduling, student data, grades, attendance, etc.
Communication software for all school and district personnel (e.g., OpenText First Class)	Various handheld devices (e.g., iPods, iPads, cell phones, clickers)
Web 2 tools (blogs, social networking, wikis, gradebooks, Noodle tools, etc.)	Webcasts
TeacherTube, YouTube	Cell phones
Corporate learning centres (e.g., Aliant Learning Centres)	Streaming video (e.g., Discovery Education, United Streaming Video)
Microsoft software including SharePoint and Office Groove	Video conferencing (e.g., Polycom, Skype, Bridges)
Assistive technologies for the visually and hearing challenged	Music and visual arts learning tools
Graphing calculators, word processing and presentation software	

are attempting more things because technology is more user friendly...but [as a district] we are struggling to keep up with our students!". There was general consensus within one district group that many senior teachers are still intimidated by technology use in the classroom. They lamented that a huge challenge to increased use of technology in classrooms has been inadequate infrastructure, limited access to teacher professional development and their district's inability to provide onsite classroom support to teachers. Similar views were expressed in other districts, as well:

Even access to projectors and power point is problematic, and that access depends a great deal on what is valued by the school administration. As well, computer centers in the classroom are certainly not the norm.... Computer lab access is often challenging and access to the Internet in classrooms is rare.

A common view in focus groups was that "some schools are flying along, but others are dragging their heels". Some respondents perceived that "newer teachers tend to be quicker on the uptake than veteran teachers." Others were sceptical of this view, however: "Beginning teachers are tech savvy, but they do not know how to employ the technology for lesson planning or how to integrate it into their actual lessons. As a matter of fact, they cannot use it as well as some seasoned teachers."

Participant responses related to their perceptions of use of interactive white boards in classrooms were equally tempered:

There is quite a range. Some schools have some, others have few.... Things have not changed much when it comes to implementation. French Immersion classes have interactive white

boards because they are funded through the Federal government; however, regular French programs have no access to them.

In order to obtain a more specific understanding of the pervasiveness of use, we asked individual interviewee and focus group participant to rank on a five-point scale the extent to which the use of technology in their school or district was having a significant impact on (1) students' learning activities, (2) teaching practice as a routine part of classroom instruction, and (3) teachers' lesson planning. The summary of those responses is recorded in Table 4. The broad range of responses ranging from 1 to 4 on the scale across all groups and districts for each of the three impacts appears somewhat consistent with participant responses to other questions. The mean scores of 3.4, 2.8, and 2.5 respectively, suggest that while technology in the study province has not been pervasively integrated as a routine part of teacher lesson planning, classroom instruction, or students' classroom learning experiences, implementation is occurring. It is noteworthy that of the three choices on which technology was perceived to be having a significant impact, participants ranked "student learning activities" the highest at 3.4.

Table 4: Participant Perceptions of Technology Impact

<b>Activity</b>	<b>Range*</b>	<b>Mean</b>
Student's Learning Activity	1-4	3.4
Teaching Practice as a Routine Part	1-4	2.8
Teachers' Lesson Planning	1-4	2.5

\*Scale: 1-5 (Low-High)



### *3.3.3. Sources and nature of leadership.*

There was general agreement across groups in all four districts that school principals had considerable influence on the big decisions connected to the adoption of technology in their schools. Most recognized, however, that senior-level district personnel (i.e. senior manager of technology, assistant director of programs, and the CEO/director of education) made most of the final decisions. In fact, the senior-level school district program officials in one school district confirmed that they made the big decisions regarding technology. They acknowledged, however, that while the district program personnel drove the ideas behind the administrative decisions, the ideas originated in the schools:

District people see what is happening in innovative schools then distribute it throughout the district. Decisions are then made on the basis of demand. The implementation of [Interactive white]boards, a large initiative within this district, has been driven this way as schools initiate it. It is action driven. Some are leaders, and some are followers.

Inherent in the preceding comment is that advancements in technology are driven by innovative schools—a viewpoint corroborated by focus group members in the same district: “School principals are making the big decisions for the schools. Sometimes a small group of teachers with a particular interest initiate it, but it remains largely dependent upon the principal to move it forward.” This particular focus group recognized the key leadership role of the e-learning specialist at the district level as well, noting, “our e-learning specialist is connected to innovation throughout the province and brings ideas forward to the district and links people from all programs. She is invaluable!”

Overall, the most commonly identified formal leaders of technology were the district managers of technology, school and district based technology support teachers, program specialists, assistant directors of programs, school principals (at least in innovative schools), and those who control the purse strings. Commonly identified informal leaders were individuals associated with specific schools: Teachers with special interests and/or expertise, department heads, lead teachers, library resource teachers, school councils and home and school associations (particularly in respect to fundraising in support of technology acquisition). At one school, the principal recounted an instance when a former principal had not provided leadership for technology. In that particular case the school council exerted leadership influence by approving fundraising only on the condition that it was directed toward the acquisition of technology to support student learning. With the exception of this latter school where the technology plan is updated each year to meet school council requirements, neither of the school districts nor their designated innovative schools had a formal plan related to technology for either administrative or classroom use. It is important to note, however, that senior district personnel and school principals in all districts indicated that planning for technology was subsumed under other goals in both the school development plan (e.g., under the goal of developing critical learners) and in the school district's general strategic plan (e.g., student learning, enriched learning environments, and organizational effectiveness).

In one school district, there was general consensus in the focus group session that "students and new curriculum from the Department of Education are key drivers of technology use in schools." It is interesting that in this same district, senior district personnel expressed concern that curriculum development at the

provincial level did not reflect the reality of many schools in the rural context where neither the building infrastructure (e.g., electrical) nor the level of technology support personnel is adequate to support the technology uses anticipated.

Additionally, there was a widespread recognition that the reality of the digital age is the most significant driver of technology in the school system. For instance, a senior technology team in one school district agreed that the demands for instant information necessitated the adoption of new technologies: "Reports are asked for and expected to be provided in a few minutes. This cannot be accommodated without keeping up with the emerging technologies." Several focus group participants commented that expectations of meeting individual student needs through a differentiated learning approach within the classroom setting had grown to such an extent over the last several years that it could only be accomplished through the adoption of the emerging computer technologies. Finally, most acknowledged that a growing source of leadership emanated from student expectations: "Students are living in a technology world and we as teachers are driven to keep up".

## **Conclusion**

All three studies reveal that the distribution of leadership among multiple stakeholders of public education affects the level of success of adoption and implementation of the emerging technologies in schools. For instance, in Study One, we found that the leadership for the emerging technologies in schools was distributed over various constituencies, and was composed of both insiders and outsiders. In respect to outsider leaders, their role as pioneers had a huge impact upon the adoption of innovative

technologies that has transformed education in rural and remote regions of our study province. Our findings in this study reveal that distributed leadership is not about seeking consensus of all stakeholders before initiating implementation of an innovation. Rather, we found that while all stakeholders shared a similar goal in respect to the provision of equality of educational opportunity in all schools, at the outset there was considerable resistance from parents, teachers, and other stakeholders to the use of distance technologies for course delivery. They believed that the technology-enabled distance education would be inferior to face-to-face classes. However, as a result of cautious, adaptive implementation and an inclusive leadership approach, the leadership of this initiative became increasingly distributed throughout the various stakeholder groups as they began to recognize an alignment of purpose that was centered on the provision of quality education.

Similarly, in Study Three we found that dependence upon only the insider formal leaders would have inhibited the pace of innovation. While formal insider leaders played an important role, multiple individuals and groups--both insiders and outsiders--contributed significantly to the growing use of the emerging technologies in k-12 classrooms. In Study Two, also, we found that the combined direct and indirect effects of various sources of leadership accounted for a large portion of the variance of both teachers' and students' use of technology. Although this study was of teacher perceptions, it is interesting that they perceived school district leadership and the districts provision of resources to impact both their own and their students' use of technology more so than parent and community engagement or even the existence of a shared vision. This might suggest that parents and the school community do not place priority on the use of technology in classrooms in support of learning, and

that if a shared vision exists it is not likely focused on the use of technology in support of student learning. Given the general acceptance of the almost single minded focus on test scores in many jurisdictions throughout the globe in the last decade or so, it is indeed plausible that the schools' visions may reflect that priority, rather than learning with technology.

Our assessment of the impact of emerging technology on traditional classrooms confirms that while there are pockets of innovation, the majority of classrooms remain teacher-centered and unfriendly to learner-centered technology applications. Even those classrooms deemed to be innovative did not reveal a meaningful shift toward learner-centered approaches to learning. Teachers, for instance, largely employed interactive white boards as a presentation tool. Evidence from all three studies left little doubt that while emerging technologies exist in many schools in our study context, these technologies are not readily available to most teachers within their classrooms, and few teachers have had adequate training or support that would enable a pedagogical shift to learner-centered approaches. Our Study Three findings, however, leave us with optimism that although technology has not been pervasively integrated as a routine part of students' classroom learning experience; implementation appears to be gaining momentum. The emerging technologies are increasingly permeating personal and work lives, and our current 21<sup>st</sup> century learners (the Net Generation/Digital Natives) are beginning to assume leadership roles; therefore, there is little doubt that classroom teaching and learning will be transformed.

A particularly encouraging finding is the huge impact that technology has had on the delivery of online programs to high school students in rural-remote regions of one of our study provinces. Students who

otherwise would have had to relocate to complete their high school programs are now able to stay in their home communities and avail of a full range of course options including the most advanced. Also, it is particularly promising that the confluence of evidence confirms the equality of distance learning and in-class learning in respect to student achievement (Seifert, Sheppard & Vaughan, 2009; Sheppard, 2009). If online courses were developed further, and were to become less dependent on teacher delivery, they could transform k-12 schooling from its current dependence upon time and space. Of course, the wisdom and feasibility of the latter transformation require further exploration.

Undoubtedly, shifting to a distributed leadership approach is challenging in schools and school districts where the dominant organizational mindscape is hierarchy. Nevertheless, a growing evidence base—including the research reported in this chapter—suggests that distributed leadership is an essential component of leading the complex adaptive change journey that is required to transform classrooms from being traditional, technology-averse spaces to technology-enhanced learner-centered environments.

Our findings and conclusions are based on only three studies that we have conducted in two Canadian provinces. We recognize that two of the studies are qualitative and restricted to defined populations. We acknowledge, as well, that our quantitative study was conducted in only one school district where we were invited to work as partners. We accept, therefore, that the generalizability of the findings from these studies may be limited to the defined populations and locations where we conducted our work. However, our original intent was not to seek a gold standard of generalizability across diverse populations over time. Rather, we sought to provide adequate detail that will

allow others to make informed decisions about the “fittingness” of our findings to their own contexts (Guba& Lincoln, 1982; Huberman& Miles, 2002).

The research reported in this chapter has given voice to many constituents across several public school systems. Consequently, we anticipate that others will recognize a level of “fittingness” of our findings to their particular circumstance. Although we acknowledge the challenges related to leadership and implementation of classroom innovation, we underscore the importance of distributed leadership in cultivating an alignment of values, attitudes and purposes, and the development of shared visions that enable innovation.

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## PART 2

### COMPARATIVE CULTURAL ISSUES ACROSS THE ARTS CURRICULUM

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## **C**HAPTER 10

### **STAKEHOLDERS VALUES, ATTITUDES AND PURPOSES TOWARDS THE TEACHING AND LEARNING OF A FOREIGN LANGUAGE THROUGH DRAMA**

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#### **Abstract**

This research aims to explore teacher practices regarding the integration of drama in the Teaching and Learning English as a Foreign Language (TEFL) in Early Childhood Education. A particular focus will be placed on exploring teachers knowledge, attitudes and values related to the effects of drama in children's cognitive and personal development, and on exploring different ways in which teachers overcome barriers in order to implement drama skills in their EFL Classroom. Two qualified Early Childhood



Education teachers were invited to participate in this research. Hence, we are proposing a series of interviews to explore the teacher's perceptions of using drama skills and to discover which factors influence its use in the classroom. In-depth interviews, peer observations, data analysis and teacher diaries provided us with the necessary information to gain an insight into how drama is used in the classroom as well as to suggest new and improved ways of developing drama to its full potential in the EFL Classroom.

## **Keywords**

TEFL, Values, Attitudes, Teaching-Learning, Drama

## **Introduction**

The fact that children learn English as a Foreign Language by means of integrating drama in the classroom has been proved as many research studies have demonstrated. Not only it is useful to improve the linguistic competency in a FL but it is also helpful to develop positive attitudes towards the English Language and the cultures of the English Speaking countries. According to Piaget (1962), Vygotsky (1978) and Bruner (1990) who claim that children are active explorers of their world, we can comprehend and assume the increasing value of using play and drama skills applied to a EFL Classroom. Thanks to each new interaction, children discover new meanings and develop more complex understandings and skills. Therefore, it enables children to control what happens, and to use what they already know to enrich their understanding and development. Taking this into account, it can be assumed that using dramatic plays can be an important part of the process of constructing knowledge in the EFL Classroom for Early Childhood learners.

However, we have to wonder whether this is always the case or not, as it often occurs that learning English

as a subject is frequently implemented at schools as a means of external promotion. In that case, the objective is the end in itself: the performance of a school play in English language to be delivered to the families, rather than focusing on teaching and learning throughout the drama process and promoting creativity through the learning of a Foreign Language. The above mentioned are some of the main reasons why Early Childhood teachers are uncertain about the idea of using or not drama skills in the classroom, even when they are conscious of its value and purpose. It is not very often that stakeholders can analyse this type of experiences and take advantage from them to their full potential.

## **1. Material sources**

An interesting introduction to the teaching and learning of a FL can be considered through storybooks. They can provide a lot of information because they are presented in such an specific context which becomes familiar to the children. Using storybooks and storytelling is an effective way to create an acquisition, rich environment and ideal learning conditions which provide "comprehensible input" or "language a little beyond child's current level of competence" (Brewster, Ellis and Girard, 2003; Krashen, 1981). Storybooks can also develop children's learning strategies such as listening for general meaning; predicting, guessing, and hypothesising (Brewster, Ellis and Girard, 2003) as well as they contribute to the development of the main basic competencies established by the European Framework of Reference for Languages.

The storybook we have chosen for this research is *Mourek* written by the Czech author Nezval. We have chosen this storybook for a variety of reasons: it is a story of a cat which goes on a day trip around the

forest, and it contains beautiful pictures which illustrate the story. As it deals with animals and nature in general, a topic which children consider interesting and easy to relate to, it fosters student's motivation in the classroom. It also fits in very well with all vocabulary and grammatical structures children learn in English at this level. In addition, it is a short story which can be easily transposed by the teacher into a short drama play in the EFL classroom.

This storybook has been translated into English from Spanish, already translated once from Czech by A. Rodríguez López-Vázquez. In its translation, we have been very meticulous about following the author's original idea of rhyme and metaphor, as we believe it is one of the factors that make this story so endearing to the readers.

## **2. Curriculum and EFL**

There are many studies in Spain which address issues relating to the integration of drama and the teaching of English as a Foreign Language, but mainly within the contexts of Primary, Secondary or even Tertiary Education. But few studies have been carried out about the techniques, not just in relation to drama, used in the teaching and learning of English in Early Childhood Education.

The reason for this may be that a few years ago English was not taught at school in Early Childhood Education. However, it has since been introduced at this level, mainly from ages 3 to 6, although to a lesser degree ages 0 to 3. As a result, educators which used to teach English only in Primary Education now teach younger students without the adequate training necessary for this purpose. Thus, we must know which techniques teachers are using, and whether these techniques fill the cognitive needs of students learning

English as a foreign language. One of the few studies on the techniques used in the Teaching and Learning English as a Foreign Language in Early Childhood Education was carried out by Rodríguez López (2004), in three rural schools in the area of Baixo Miño, in Galicia, North-Western Spain and this research will be used as a starting point for our hypothesis.

### ***2.1. Positive and negative attitudes towards implementing drama in the Curriculum***

In regards to the EFL Teaching and Learning through drama, Lou Furman (2002), in his article "In Support of Drama in Early Childhood Education, Again", tells us about the "unending battle" early childhood teachers seem to be in to "legitimize the use of the dramatic arts in the classroom". Furman states that even the early childhood educators who accept the value of dramatic play, seldom use its full potential in the classroom. In his article, Furman aims to reinforce the value of drama in the development of young children.

The choice of appropriate techniques in Early Childhood Education determines the success or failure of children's learning. According to Ashworth and Wakefield (1994): "children learn best through play, games, make-believe, story-telling and songs. Both the context and the content of the activity need to be varied, holding the children's interest and giving them the opportunity to participate at their own level". This early stage in their education is essential for the development of the comprehension and production of language, and foreign languages in particular, as it is a topic far removed from their everyday lives (Dunn, 1985). Using storybooks is a very efficient way to introduce cultural topics to the children as they are very familiar items in their everyday lives, as well as being visually attractive and stimulating for the children.

Moreover, as Tragante & Muñoz (2000) state, the fact that students have a good start in the learning of EFL is related, but not restricted, to the acquisition of knowledge of a Foreign Language. Their personal development is also an important value to take into account, showing positive attitudes towards the use of language, empathy for people from other cultures, etc. It is not only interaction among learners and attitudes and values they may share what is interesting at this point, but also interaction among students and teachers and interaction among teachers themselves. Even though stakeholders belong to different socio-cultural levels and even though they may present different behaviours the real interesting issue is to share the same values, attitudes and purposes implied by their behaviours.

Regarding the educational benefits of learning and participating in drama activities and according to Williams and Burden's (1997) it can be assumed that Drama fosters and sustains learners' motivation as it is fun and entertaining. Implementing Drama is also a process in itself so that it is Learner Centred and it can only function through active cooperation, that is to say, Collaborative Learning methodologies must be used to reach targets. As a consequence of that a collaborative and participatory teaching approach contributes positively to the development of the learners' self-esteem and self-efficacy, especially to those in low levels. Finally, the created situations emphasize social interaction and therefore facilitate knowledge transfer from the classroom to the outside world. Apart from that, dramatizing storybooks fosters students' creative thought and asserts language education as a creative process. Creative expression depends not on talent alone, but also on motivation, interest, effort and opportunity. Therefore, thanks to these creative thoughts, processes and cultures of education teachers and learners can achieve the same

values through different behaviours and they can also transfer different values in spite of using common behaviours.

Even though the benefits of implementing drama have been demonstrated, there is a wide range of misconceptions about the use of drama as a technique in language teaching in the Early Childhood Classroom. Kagan (1990) identifies three types of barriers which hinder the teaching of drama in the early years. First, attitudinal barriers, which are originated from the way teachers value dramatic play and the way they justify implementing it as part of the curriculum; second, structural barriers, which involve all difficulties for teachers in dealing with time limits and lack of space or materials; and third, functional barriers, which arise from the fact that teachers are not adequately trained to teach drama skills or who do not have the confidence to do so in the classroom.

### **3. Research project, design and data collection**

This qualitative research followed an interpretive perspective, which was focused on the idea that reality is constructed and subjective (Latther, 1987) and people derive meaning from it. A holistic and systematic approach in this study was taken as it provided us with a global and integral perspective of the topic. We are interested in gaining an understanding of teachers' decisions and practices in regards to the use of drama in their EFL Early Childhood Classrooms. Therefore, our main objective was to build a proposal from a drama point of view in order to enable teachers to understand its value and develop alternatives which supposed a benefit for the process of Teaching and Learning English as a Foreign Language in Early Childhood Education.

Apart from the main target above mentioned, other objectives consisted of gaining an understanding of the whole learning process in which students went throughout the experience of participating in a drama play in English, not only in regards to the language in itself, but also in regards to the basic competencies stated by the National Curriculum. It was also one of our aims to gain an understanding of the expectations English teachers have in relation to the learning process that children experience when involved in drama plays and to gain an understanding of the factors which influence teachers' decisions concerning the implementation of drama in their classrooms. Finally, all improvements in the TEFL in Early Childhood Education were collected and analysed.

This research took place in a state-assisted private school in Galicia. It is a school in which teaching in Early Childhood Education occurs in three languages: Spanish, Galician and English. English classes make up about 40% of the total teaching time. The participants are two early childhood qualified teachers currently teaching children aged 3 to 6 at this school. These two teachers were invited to participate in this study because they differed in the way they taught drama in their respective programmes, and they have also different teacher training: one is a North-American trained teacher and the other is a Spanish trained teacher. Both teachers are bilingual in Spanish and English.

Each teacher is in charge of a classroom of 25 students aged three years. The children are mostly white and middle-class, and their mother tongue is Spanish, although they can also speak Galician. These children are in their second year of schooling and they have been taught English as a Foreign Language for the same amount of time. The students are typical cases for which, according to Flick (1979), "success or

failure are very characteristic for the average or the majority of cases". The English teachers which have been chosen are not the average teachers, as one is a bilingual north-American trained teacher and the other is also a bilingual teacher but New Zealand trained. Both teachers have ample experience teaching early childhood students in Spain. They have been selected because they are deeply concerned teachers who reflect their attitudes and values on their own practices, and who have the knowledge and the experience needed to answer during interviews, to produce diaries, and to become involved in interesting tasks, as well as being active participants throughout the whole process.

Data collection was made through various sources of information to obtain different perspectives. Document analysis and Thematic Units teachers use in an ordinary classroom were followed as they are compulsory but most data were collected through interviews, peer observation, and teacher diaries. Concerning interviews both teachers were interviewed once before the start of the Teaching and Learning Unit, to gather information about their background, expectations, purposes and values. Further interviews took place during the process to obtain information about their reflections and possible changes. In order to do that, Patton's (1980) question structures were followed because they are simple, open and non-dichotomous.

Peer observation helps teachers to gather information about their own practices and their colleagues, thanks to it they can take action to change and develop. It can be used whenever teachers want feedback, for example, on teaching approaches, on learner behaviour, on classroom management issues, or as part of classroom-action research projects. It involves a teacher sitting in on a lesson given by a teaching



colleague and making notes or completing a form which will be used to give feedback. It is intended to provide a supportive framework where teachers can explore and share ideas about teaching and learning. It is a two-way learning process: the teacher and the observer learn from the same experience. Therefore, a number of classes for both teachers were observed and video-recorded. These observations were open and non-specific, participants were aware they were being filmed and they knew the aim of the observations. The observations were holistic and their duration depended on the data collected.

As we have mentioned before, teacher diaries were also used as a tool to obtain information about purposes, values, attitudes and feelings throughout the whole process. On a first approach, one may think that teacher diaries seem to be a very simple and non scientific item to carry out a piece of research, but we do believe that this is only apparently. On the contrary, in this particular research we thought it would become one of our best sources of information because of the object of study we were analysing. The fact that they devoted part of their time on writing a diary during the six weeks process where they registered all information about their experiences, ideas, mistakes, fears and attitudes which arose during fieldwork was very useful to the researchers and we were very grateful for that indeed.

The direct interpretation method was used according to Flick (2004), in regards to the criteria to assess the procedures and analyse qualitative data in a research of this kind. And criteria such as reliability, validity and usefulness were applied. The synchronic reliability was used in terms of measuring the uniformity and the constancy of the information obtained at the same time but using different instruments (Kirk and Miller (1986), quoted in Flick, 2004. All data, as well as

description and explanation of every step in the research were registered. Communication validity lies in the validation of the information. As we mentioned above, for this construct to be valid, we guaranteed that the interpretations offered had empirical support (Kirt and Miller, 1986). Besides, it was also necessary to provide the participants with all data obtained in this research so that they could corroborate or reformulate them. This guarantees the information was conscientiously supported by the participants. To obtain reliability and validity a triangulation approach was performed thanks to the methodological procedures via interviews, peer observations and document analyses already mentioned.

#### **4. Stakeholders values, attitudes and purposes**

It can be assumed that our perception about the stakeholders involved all along the process of implementing drama in TEFL in Early Childhood Education classrooms was positive one hundred per cent. Through this research it has been far demonstrated that the stakeholder's perceptions, values and attitudes in relation to the issue were commonly shared. Interaction and cooperative learning were key words to fulfil our objectives as they were wishing to take action to solve problems, exploring new ideas to improve, change and develop. There were also a big amount of reflection thanks to peer observation and we were all benefited from this process. This last sentence is directly connected to the Lifelong Learning Programmes established not only within the framework of the European Community but also throughout any Government Policy interested in keeping stakeholders, teachers and researchers constantly improving in the teaching and learning languages process.

## **Conclusion**

The results obtained enabled us to gain an understanding of the learning and personal processes students went through during the time they were involved in a drama play in English. These were mainly that they increased motivation, self-efficacy and self-esteem; creativity was also increased through Cooperative Learning and better developed language was acquired. In addition, teachers and stakeholders interested on these issues demonstrated to suffer a moderate level of anxiety in regards to the performance of a drama play, due partly to external pressure as it was an integral part of the promotion for the school. Solutions, strategies and techniques to obtain the resources needed to develop this project were facilitated and shared with teachers thanks to collaborative work among school teachers and university researchers.

Thanks to this research, an understanding of the specific factors that influence teachers' decisions concerning the implementation of drama in their classrooms has been gained. Some of those factors were time constraints, lack of resources and material, difficulty on finding and adapting adequate picture-books, and also problems with the management of behaviour in the classroom. A proposal with the authors/stakeholders suggestions which can help to improve the way they implement English in the classroom using drama activities would be available on request. Thus, researchers and teachers will be able to value and develop strategies to overcome the barriers they may discover concerning drama teaching and using drama techniques, which will benefit the processes of Teaching and Learning English as a Foreign Language in Early Childhood Education.

As it was stated before, the two invited teachers reached the same targets even though their

backgrounds were totally different. Being the first one a North-American trained teacher and a New Zealand trained teacher the second one, they both demonstrated their wish to cooperate trying to explain and analyse any problem emerged throughout the whole process and showing a positive attitude in order to find solutions. As a consequence of that, values, attitudes and purposes presented by the stakeholders involved in this project could be summarised through the following words: friendliness, informality, empathy and encouragement. On the contrary, adverse criticism was avoided, not imposition but reflective discussion instead, no preaching, no pressing for results and always taking into account each student's and stakeholder's personality and behaviour.

As we were conscious on the fact that this article may encourage teachers to use drama skills in the classroom with fewer reservations and feel more confident about its appropriateness and benefits for language learners, and due to the limited space and restricted formal aspects in which this book is constrained we have decided not to include all data collected as excerpts of teacher's interviews, diary entries, etc. Nevertheless, and according to the editors suggestions, we would like to inform that all those supplementary reports would be available on request contacting the authors.

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## **C**HAPTER 11

### **COGNITIVE IMPACT OF READING AND LISTENING ON LEARNING ENGLISH AS A FOREIGN LANGUAGE**

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#### **Abstract**

The consequences of simultaneously reading and listening when learning English as a foreign language was explored. Native Arabic-speaking students were either exposed to written English only (single modality) or written and spoken English (dual modality). The findings indicated that participants exposed to reading alone performed better on listening tests than participants exposed to the read and listen condition despite the reading alone participants having had less experience with listening than the participants exposed to reading and listening. The results suggest that at least some categories of learners will enhance their listening skills by reading only rather than by reading and listening. Implications for teachers and educational designers of foreign languages are put forth.



## **Keywords**

Cognitive load theory – reading – listening.

### **1. Introduction**

Cognitive load theory has helped develop various instructional procedures and identified a number of phenomena, which interfere with learning, such as the split attention effect (see Ayres & Sweller, 2005) and the redundancy effect-to name a few. The redundancy effect has been demonstrated in a variety of studies (e.g. Sweller & Chandler 1994; Kalyuga, Chandler & Sweller 2000). Redundancy occurs when multiple sources of information are presented to the learner, containing repeated information (Sweller, 1999). For instance if the presentation of a text and a diagram, depicts the same information, this may cause a redundancy effect, if the learner can learn from either format alone. Similarly, the same effect can be induced by simultaneous audio and visual presentations. In a redundant scenario the learner's working memory resources can be taken up by trying to unnecessarily integrate the two sources of information.

The redundancy effect is particularly relevant to learning a language, including learning English as a foreign language because it is commonly assumed that when it comes to teaching students spoken English, it is more effective when both spoken and written versions of the material to be taught are introduced together. For this reason, learners of a second/foreign language are often assigned audio material along with written material in order to develop their skills in areas like listening (Ur, 1984). The redundancy effect states that if learning material consists of more than one part (e.g. written and spoken) and each part is identical to the other, this material will be redundant and so reduce the learner's

cognitive capacity hence hinder learning. This outcome has been demonstrated in several studies related to learning English as a foreign language (e.g. Craig, Gholson, & Driscoll, 2002). Contrary to the evidence that suggests a dual modality approach is not beneficial; a considerable amount of research has stressed the importance of providing learners with multiple versions of instructional resources. Borrás and Lafayette (1994) for example investigated the effects of subtitling on speaking performance using multimedia courseware. The main findings of their research revealed that learners in a subtitled condition demonstrated significantly higher performance scores as opposed to those in the no subtitled condition. This study is similar to that conducted by Vanderplank (1988) in that the effects of subtitles on learning will largely depend on the learner's level of expertise. Vanderplank's (1988) research suggested that not all language learners benefited from subtitled programs. Vanderplank showed that such programs may be of limited value to low-level learners only. More recently, Moreno and Mayer (2002) examined whether the addition of on-screen text would facilitate multimedia learning. This research revealed that non-redundant presentations were superior to redundant presentations. Students better understood multimedia presentations when no on-screen text was added. Albeit the Moreno and Mayer (2002) study corresponds with this field of research, the text sections presented were somewhat minute and so may have not imposed an intrinsically high cognitive load. A more recent research by Mayer and Johnson (2008) revealed that adding short and redundant on-screen text did not increase extraneous load, suggesting that the redundancy effect may be moderated by the amount of redundant information displayed. Diao and Sweller's (2007) research focused on whether the redundancy effect applied to reading comprehension in second/foreign language learning. The study put forth

was designed as an extension to this line of research and attempted to test the consequences of learning to listen to English as a foreign language with and without the presentation of spoken English. It was hypothesized that learners of English will be disadvantaged by receiving a mixed learning mode of reading and listening due to redundancy. In contrast, learners who receive only a reading mode of instruction will benefit more as extraneous cognitive load is reduced.

## **2. Experiment**

### **2.1. Method**

**Participants and design:** The participants were 38 students ranging in age from 16 to 22, from an undergraduate English as a foreign language class at the University of Balamand, Northern Lebanon. The participant's native language was Arabic, although most of the students also spoke French and had had some learning experience with English as a foreign language during their middle and high school years. Nineteen students were randomly assigned to the Read only (R) group and the Read + Listen (RL) group.

**Materials: Acquisition Phase.** The experiment consisted of an acquisition phase (six activities) and a testing phase (two listening tests). For each activity in the acquisition phase both reading and auditory materials were required. All reading materials were presented on individual sheets of A4 paper and all auditory materials were presented via a tape recorder, narrated by a female voice. It should be noted that no data was collected in this study on the learner prior knowledge, because the students' samples were predicted to be fairly homogeneous in their English competency levels. As the experiment was completed, statistically

significant results occurred, suggesting that prior knowledge was not a confounding variable in this study under the specific design conditions. Furthermore, the materials in this experiment were carefully chosen based on the findings reported in the literature review. Firstly, it was decided that the participants in the study would be relative novices in learning English as a second language as many of the predicted CLT effects are more prominent with novices. Consequently, fairly homogeneous samples of students were chosen to avoid expertise reversal effects (see Kalyuga, Ayres, Chandler, & Sweller, 2003). Secondly it was decided to use mainly lower level processing skills as the learning environment, as inexperienced learners may experience very high cognitive loads if deficiencies exist such as word recognition (Stanovich, 1982). Still, it was anticipated that the materials would still be high enough in element interactivity to avoid ceiling effects (see Chandler & Sweller 1991). In the first acquisition activity (A1), participants were required to learn thirty-eight English words (including two brief (season with and set over) expressions). These words, presented in a randomly determined but identical order for each participant, were paired with their Arabic meaning. For example, the word salty was presented in English with its Arabic meaning (malih) on the same line. These words, as was the case for all words (and sentences) used during the course of the experiment, were taken from a recipe to cook spaghetti (Stickley, 1994). The English instruction —Learn the list of words and phrases in English with their meaning in Arabic below— was positioned at the top of the sheet before the paired words were presented. The auditory materials for this activity consisted of a female voice reading the same instructions in English followed by both English and Arabic pronunciations of the 38 pairs. Each word or

expression was separated by a gap of 4 seconds. The recording ran for a total of 4 minutes.

For the second activity (A2) participants were required to translate Arabic words into English. The Arabic words used in A1, but in a different, random order, were written on separate lines on a sheet with a space on each line for the English translation to be written. The English instruction —Read the Arabic words below, then write the words and phrases in English— was positioned at the top of the page before the Arabic words were presented. For the auditory materials, the written English instruction ‘Read and listen to the Arabic words below then write the words and phrases in English’ was presented followed by the 38 Arabic expressions. Each spoken word was separated by a gap of 7 seconds, allowing sufficient time to write the English translations. The recording ran for a total of 5 minutes.

For the third activity (A3), participants had to learn eight sentences in English that contained words specified in A1. The sentences did not include any Arabic words and were placed horizontally under each other on a sheet of paper. Each sentence was taken from the cooking recipe. The English instruction ‘Read and learn the list of sentences in English’ was positioned at the top of the sheet before the sentences commenced. For the auditory material the English written instruction ‘Learn the list of sentences in English’ was presented first followed by a reading of the same 8 sentences. Each sentence was separated by a gap of 8 seconds and the recording ran for 3 minutes in total.

In the fourth activity (A4) students were required to translate Arabic sentences into English. Eight Arabic sentences were presented horizontally under each other, followed by sufficient space for the translations

to be written. The Arabic sentences were the translations of the same English sentences that were presented in A3, but in a different, random order. The English instruction —Read the Arabic sentences below and then write the sentences in English— was positioned at the top of the page before the Arabic words were presented. For the auditory materials, the English instruction 'Read and listen to the Arabic sentences below then write them in English in the space provided' was spoken to the students first, followed by a reading of the eight sentences. A gap of 20 seconds separated each sentence and the whole recording ran for 5 minutes.

For the fifth activity (A5) a passage titled Cooking Marco Polo Spaghetti was presented which contained 21 blank spaces. The instructions written in English on the top of the sheet were 'Fill in the blanks with a correct word or phrase to complete the passage'. The same instruction in English was given for the auditory material followed by a reading of the same passage. But there was a silent pause for 4 seconds at every blank space, to allow the participants to write their answers. The whole recording ran for 2 minutes.

For the final activity (A6) participants were required to construct English sentences from a list of words. The 38 English words specified in A1 were numbered and placed vertically under each other in four columns taking up half the page. Above this list were the instructions 'Write a sentence in English for each of the words and phrases below. You may use two or more words and phrases in one sentence. Number your sentences.' The remaining empty space under the given words was allocated for the participants to write their sentences. For the auditory material the same instruction in English was given followed by a reading of the 38 words and phrases. Each word and phrase

was separated by a gap of 6 seconds, and the total recording was 8 minutes.

**Testing Phase.** The testing phase consisted of two listening tasks. The first task (T1) consisted of the 38 words used in A1 and was presented by tape-recorder. On the recording the presenter stated in English 'Write down the words and phrases you hear'. Each word or phrase was then read out in English in the same order as in the first activity (A1). There was a gap of 5 seconds between each word. In addition to the audio materials, an answer sheet was constructed. At the top of the sheet, the same instructions as in the audio-recording were written, followed by numbered spaces from 1 to 38, where participants were required to write their answers. For the second listening test (T2), the same 8 sentences used in the second activity (A3) were used. A recording was made in which the presenter read out the instruction 'Write down the sentences you hear' followed by a reading of the 8 sentences in a different order to A3. A gap of 8 seconds separated the sentences allowing additional writing time. All written and spoken materials in this phase were in English only. A corresponding answer sheet was constructed, with the same instructions as the audio recording followed by numbered spaces from 1 to 8, where participants were required to write their answers.

**Procedure:** The study was conducted in separate rooms for each group, and all participants were tested at the same time but were seated approximately 1 meter apart to ensure no collaboration. The Read Only group received only the written materials, whereas the Read + Listen group received both the written and auditory materials simultaneously. Both groups received the written materials faced down and were required to turn the page over when the order was given and the timing started. The Read + Listen group

were asked to turn their handouts over when the taped version of the same learning material had begun playing. The recordings were played on a portable stereo in the classroom. Consequently, the Read + Listen group students listened to the tape-recording, while having simultaneous access to the written materials. For each task the paper materials were handed out and then collected by the researcher at the end of the allotted time. The time allowed for each task was determined by each individual audio-recording time; namely, A1 (4 minutes); A2 (5 minutes); A3 (3 minutes); A4 (5 minutes); A5 (2 minutes); A6 (8 minutes); T1 (4 minutes); and T2 (5 minutes). The complete experiment ran for 40 minutes. Both groups received exactly the same amount of time for each task. Scoring : Participants were required to complete four tasks (A2, A4, A5, & A6) without access to the learning materials in the acquisition phase and two in the test phase (T1 & T2). The same scoring procedure was completed for both groups. For tasks (A2, A5 & T1) that required only single word answers or simple phrases from the list in A1, 1 mark was given for each correctly written answer, zero for an incorrect answer. For A5, 1 mark was also given if an equivalent answer was provided which was not contained in the original list. For tasks that required sentences to be written (A4, A6 & T2), 1 mark was given for each correctly written sentence. If however, a sentence was not exactly correct, but had less than 3 words incorrectly used, a half mark was given. If a sentence contained 3 or more incorrectly used words, it was then considered as incorrect and not given any marks. The maximum score possible on each task was 38 (A2); 8 (A4); 21 (A5); 38 (A6); 38 (T1) and 8 (T2).



### **3. Results and Discussion**

Mean scores and standard deviations were calculated for each group on each of the six tasks (see Table 1 below). For the acquisition tasks a 2 (Group) x 4 (Acquisition tasks) ANOVA with repeated measures on the second factor was conducted giving a significant group effect  $F(1, 36) = 12.21, p < 0.01, \eta^2 = 0.25$ ; but no significant interaction. It should be noted that a between-tasks main effect was not reported here, or in any of the remaining experiments, because the maximum scores for each task vary considerably and therefore are of no interest. As can be seen from Table 1, the Read only group (R) performed significantly higher than the Read + Listen group (RL) over the four tasks. However, for acquisition tasks, the same conditions were not present, as the Read + Listen group received both modes, whereas the Read only group received only written materials. Nevertheless the results suggest that the additional auditory mode hindered learning and test performance in translating and writing during acquisition.

For the two tasks in the testing phase, all students received the same conditions, an English listening task in which students had to write the English words and sentences heard. A 2 (Group) x 2 (Test tasks) ANOVA with repeated measures on the second factor was conducted giving a significant group effect  $F(1, 36) = 9.37, p < 0.01, \eta^2 = 0.21$ ; but no significant interaction. It can be seen from Table 1 that the Read Only Group scored higher than the Read + Listen Group on both tasks, confirming the stated hypothesis. The additional auditory mode interfered with learning to write English without compensating by assisting students to listen to English.

Table 1: Means and standard deviations for acquisition and test results

	<i>Acquisition Phase</i>				<i>Test Phase</i>	
	A2	A4	A5	A6	T1	T2
<i>Read Only</i>	29.6 (5.33)	3.7 (1.35)	8.4 (5.01)	19.3 (9.23)	34.4 (3.55)	6.9 (1.09)
<i>Read + Listen</i>	23.7 (5.16)	2.4 (1.46)	5.4 (3.74)	13.6 (6.18)	30.2 (6.38)	5.3 (1.69)

#### 4. Educational Implications

The findings of this experiment may be used to suggest some guidelines for the design of foreign language learning environments that contain more than one learning mode of instruction (e.g. written and auditory). A possible consideration is to opt for a single mode of instruction with written text only and not auditory materials only or opt for mixed modes of learning on the condition that the materials presented do not contain identical information. The overall results of this study suggest that foreign language instructors and educational designers need to consider the possible effects varying modes of instruction may have on student learning.

#### Conclusion

These results corresponds with previous findings of the research on simultaneous presentations of multiple versions of learning material, suggesting that the auditory component was redundant information and so imposed an extraneous cognitive load, resulting in lower achievement, consistent with the redundancy effect (Sweller& Chandler, 1994). These findings suggest that if the purpose is to have good listeners of a foreign language, we should not expose them to both the audio and visual forms of the language simultaneously at certain points during learning. It

should be noted that the students in this study had already had some exposure to listening to English, through school and it is a reasonable assumption that they have gained further exposure through the media. Consequently having some prior knowledge of spoken English has assisted students in listening to new English words having only been exposed to them through the written medium. Perhaps it is only the dual presentation of auditory and visual information that reduces listening performance. Furthermore, even though the research presented in this chapter has suggested that under certain circumstances, providing reading only materials seems to improve listening skills, it would be quite difficult to teach foreign language learners how to listen to the foreign language without providing auditory materials because acquiring a foreign language would require not only the ability to read and write this foreign language, but also to recognize it once it is spoken. With cognitive load theory in mind, the question that comes to mind is what instructional materials would be most resourceful to assist foreign language learners in acquiring enhanced listening skills? Even though the reading tasks were somewhat limited, the general finding would suggest that reading alone is a better option when learning English as a foreign language.

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## Appendix 1

Instructional material used during section 1 of the acquisition task of the experiment.

Salty: مالح  
Bowl: جاط  
Drain: صرّف الماء  
Pour: اسكب  
Olives: زيتون  
Stir: حرك  
Platter: طبق كبير  
Combined: يمتزج  
Olive oil: زيت زيتون  
Moderate: معتدل  
Salt: ملح  
Mix: إخلط  
Serve: قدم  
Immediately: حالاً  
Peeled: مقشور  
Empty: فارغ  
Brown: بني  
Continuously: باستمرار  
Minutes: دقائق

Hot: حار  
Crushed: مسحوق  
Set over: ضع على  
Garlic: ثوم  
Basil: حبق  
Sprinkle: رش  
Toss: إرم  
Kettle: قدر

Add: ضيف  
Season with: تبّل مع  
Boiling: تغلي  
Parsley: بقدونس  
Spaghetti: معكرونة  
Rapidly: بسرعة  
Cook: أطبخ  
Pepper: بهار  
Nuts: بندق  
Heat: حرارة  
Fresh: طازج

## **C**HAPTER 12

### **IMPACT OF REDUCTION RECASTS ON IMPROVEMENT OF EFL LEARNERS' SPEAKING ABILITY**

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#### **Abstract**

The present study attempted to discover the impact of reduction recasts on the improvement of the speaking ability and on the repaired grammatical uptakes rate of EFL learners. After administering a language proficiency test, 52 homogeneous students were randomly assigned to the experimental and the control group respectively. The comparison of the two groups on the speaking pretest confirmed the homogeneity of the subjects before the instruction. During 12 sessions of instruction, the experimental group received reduction recasts and the control group received non-reduction recasts. After the treatment, both groups took part on the speaking posttest. The results indicated that the performance of the subjects in

the experimental group was significantly better than that of the control group. Furthermore, the comparison of the repaired grammatical uptake means between the experimental and control groups revealed that the former group had outperformed the latter to a great extent.

## **Keywords**

Reduction recasts – Non-reduction recasts – Speaking ability

## **Introduction**

Today the need for communication taps on the social aspect of human being realized in two channels of oral or written, but the emphasis is on oral communication as the best manifestation of language abilities (Celce-Murcia, 2001). From the teaching point of view, speaking in a second or foreign language has often been looked at as the most demanding of all four skills (Baily & Savage, 1994). Speaking as an important element of communication needs special attention and instruction in the domain of Teaching English as a Foreign Language (TEFL). In order to provide effective instruction, it is necessary to examine the factors, conditions, and components underlying speaking effectiveness. Thus, away from respectful approaches to improving speaking skill, like finding a way to treat low status students and/or high status students who might take over the group (Cohen, 1996), or how to provide enough opportunities for students to become involved in different oral activities, the need for investigation in some areas like the types of the teacher's corrective feedback in the classroom remains important.

Over the past two decades, corrective feedback and learner uptake have been targets of investigation for researchers working in the field of classroom second language acquisition. One of the researchers

examining the effects of such teacher-student interactional moves is Lyster, who worked extensively on the observational classroom research in French immersion programs in Quebec, Canada (Lyster, 1994, 1998a, 1998b, 1999; Lyster & Ranta, 1997). Of particular interest is a study by Lyster and Ranta (1997), in which they identified different types of corrective feedback and student uptake. In their study, corrective feedback is described as the provision of negative evidence or positive evidence upon erroneous utterances, which encourages learners' repair involving accuracy and precision, and not merely comprehensibility. Also, learner uptake is defined as a student's utterance that immediately follows the teacher's feedback, and that constitutes a reaction in some way to the teacher's intention to draw attention to some aspects of the student's initial utterance (Lyster & Ranta, 1997).

Lyster and Ranta's study is significant in that it offered a systematic picture of patterns of interactional moves between teachers and students, such as the type of feedback arising from different types of errors, and the type of feedback that leads to more uptakes. In addition, their findings can serve as a basis for SLA research that investigates whether feedback-uptake sequences indeed contribute to language learning.

Lyster and Ranta (1997) defined recasts as "the teacher's reformulation of all or part of a student's utterance, minus the error" (p. 46). This definition points to the fact that the reformulation can involve either the entirety or a part of the original erroneous utterance. The latter is what Roberts (1995) calls 'partial recasts', when the teacher only models the segment of the utterance in which the error occurs. Lyster (1998a) calls this type 'reduction recasts'. According to Sheen (2006), in reduction recasts the reformulation is shorter than the learner's erroneous



utterance. This is opposite to 'non-reduction recasts' in which the reformulation repeats the learner's entire utterance.

Another controversial issue in the study of recasts is the significance of uptake and its role in acquisition. For the purposes of their study of corrective feedback, Lyster and Ranta (1997) defined uptake as "a student utterance that immediately follows the teacher's feedback and that constitutes a reaction in some way to the teacher's intention to draw attention to some aspect of the student's initial utterance" (p. 48). Uptake can constitute 'repair' (i.e., the uptake move corrects the initial error) or be characterized as 'needs repair' (i.e., the uptake move does not correct the initial error). Controversy centers on whether the learner's uptake does or does not contribute to acquisition.

A few studies have examined the relationship between different types of recast and uptake with repair. Sheen (2006) found that mode, linguistic focus, and type of change influenced repair. Philip (2003) examined learners' ability to recall recasts immediately after hearing them. She found that short recasts were recalled better than long recasts, especially by less proficient learners, and recasts with just one or two changes were recalled more accurately by all learners, irrespective of proficiency.

However, no study has yet been conducted on the impact of different types of teacher recasts on the language learners' speaking ability. Moreover, the effect of recast types on the learners' uptakes rate has not been investigated. Accordingly, the present study attempted to discover the impact of reduction recasts on the speaking ability and on the repaired grammatical uptakes rate of EFL learners. To fulfill the

purpose of the study the following research questions were formulated:

1. Is there any significant difference between English speaking ability of EFL learners corrected by reduction recasts and those corrected by non-reduction recasts?
2. Do reduction recasts result in greater amount of repaired grammatical uptakes than non-reduction recasts among EFL learners?

## **1. Method**

### ***1.1. Participants***

In order to conduct this study, 63 Iranian female adults were selected among intermediate level students of an English language school in Tehran. They were between 17 and 27 years of age. To ensure the homogeneity of the participants, a language proficiency test was administered to them. After analyzing the results, 52 students who scored nearly within one standard deviation above and below the mean were included in the study. Later, the participants were randomly assigned to two experimental and control groups. The experimental group included 27 students, while the control group contained 25 participants.

It is worth mentioning that 41 other intermediate students, who were similar to the actual participants of the research, took part in the pilot study of the above-mentioned language proficiency test.

### ***1.2. Instrumentation***

#### ***1.2.1. Language proficiency test***

A Preliminary English Test (PET) was used for homogenizing the subjects of this study in terms of

their general English proficiency. The PET test consisted of four sections: reading (35 items), writing (8 items), listening comprehension (25 items), and speaking (four sub-parts).

The writing section of the PET consisted of three sub-parts. The first sub-part of writing section included four items which were scored objectively. However, the other two sub-parts were scored utilizing the analytic scale for rating writing tasks (2006).

### *1.2.2. Speaking pretest*

To make sure the participants in the two groups belonged to the same population in terms of speaking ability, the researchers utilized the speaking section of the PET as the pretest.

This section consisted of four sub-parts (a two-minute interaction on a general topic, a two-minute interaction on a visual stimulus, a three-minute speech on a verbal prompt, and a three-minute general discussion) which were scored by two raters using the analytic scale of the PET speaking test (2006). Based on this scale, the students were assessed on their appropriate use of grammatical forms and vocabulary, discourse management, pronunciation, and interactive communication.

### *1.2.3. Speaking posttest*

At the end of the instruction period, the speaking section of the PET was administered to the subjects of the study. To avoid practice effect, the speaking posttest was administered 75 days after the pretest exactly with the same procedure.

### **1.3. Procedure**

Since the researchers needed to select and homogenize the participants of the study, they first embarked on piloting the PET with 41 students at the intermediate level. Once the test was modified following the piloting, it was administered to the 63 target participants described above. Then, the homogeneous students were randomly assigned to the experimental and control groups.

To ensure that the two groups were homogeneous in terms of their speaking ability, the scores of the speaking section of the language proficiency test were used as the pretest scores of the subjects. As mentioned earlier, the speaking section of the PET consisted of four sub-parts. It started with a two-minute interaction of candidates with the interlocutor. Each interviewee had to respond to general questions about herself on topics such as job, family, sport, hobby, etc. during this part. Next, there was another two minute interaction, during which the testees had to interact on a visual stimulus. They had to use functional language to make and respond to suggestions, to make recommendations, and to negotiate agreements. By the end of Part Two, a photograph was given to each of the candidates in turn as a verbal prompt to talk about a particular topic. During these three minutes, the subjects' speaking ability was assessed through describing photographs, managing discourse, and using appropriate vocabulary in a longer turn. All photographs used in this part were related to the same topic. The last three-minute discussion of the speaking part was a general conversation. The students interacted with each other in this phase on the topic established on the theme of Part Three. Their discussion was about their opinions, likes/dislikes, preferences, experiences, habits, etc. The subjects'

speaking performance on all parts of the pretest was recorded and subsequently rated by two raters.

The instructional intervention consisted of 12 sessions of 75 minutes each. Both groups were taught based on the same teaching method and activities. At the beginning of each session, 30-45 minutes were allocated to the students' news. In each session, the students were required to prepare a piece of short news (2-3 minutes long). When one student was giving her report, others listened to her carefully and benefited from the teacher's recasts. After a student was finished, others exchanged their opinions about what they had heard, and they added their information related to the topic. The teacher provided comments on the erroneous utterances of the students through reduction recasts in the experimental group and non-reduction recasts in the control group during the treatment.

The teacher's reduction recasts included reformulated phrases shorter than the erroneous utterances produced by the learners. They were usually made up of a verb and a content word or a combination of two words in length. The teacher used non-reduction recasts through repetition of the reformulated error in the form of a statement, a tag question, a clarification request, a wh-question, or a confirmation check. In case, there was more than one error in a sentence and the teacher could not focus to correct them all, it was the first one which received a recast. It is worth mentioning that all the 12 sessions of instruction were video-recorded for further analysis of the students' erroneous utterances, the teacher's corrective feedback in reduction form for the experimental group and in non-reduction form in the control group in response to the students' errors, and the subjects' linguistic reactions to teacher's feedback (uptakes) in each class.

After the news, the teacher started to teach a structural point based on the related lesson plan; and finally an assigned part of the story book was retold by the students. While a student was speaking, the teacher tried to act as a listener mostly; she interrupted when there was a need for correction, which took place with the same procedure explained above.

At the end of the instruction period, the speaking posttest was administered to both groups to track any possible improvement in their speaking ability and in the rate of their grammatical uptakes with respect to the kind of correction they received throughout the treatment period.

## **2. Results**

### ***2.1. Piloting the Language Proficiency Test (PET)***

At first, the objective sections of the PET were piloted to 41 intermediate level students, whose language proficiency was similar to that of the participants of the study. Then, NRT item analysis including item facility and item discrimination was conducted for each item. After omitting 11 malfunctioning items, the reliability of the test was estimated using the KR-21 formula; and it came out to be satisfactory with an index of 0.78 (Table 1).

Table 1: Reliability of the objective sections of the PET

KR-21 r	K
0.78	54

**2.2. Administering the PET**

Following the piloting phase, the PET consisting of four sections (reading, writing, listening, and speaking) was administered to 63 intermediate level students, the descriptive statistics of which are presented in Table 2. The students whose scores were within one standard deviation above and below the mean were included in the study. Out of 63 subjects, 52, who met the aforementioned criterion, were randomly assigned to two experimental and control groups.

Table 2: Descriptive statistics of the PET

N	Mean	V	SD	Range	Minimum	Maximum
63	64.21	118.97	10.90	47	41	88

**2.2.1. Intra-rater reliability of scoring the PET writing section**

The writings were assessed twice, once right after the administration of the PET, and once again sometime later after the first scoring prior to the instruction. The assessments were done utilizing the PET rating scale (ESOL, 2006). The intra-rater reliability of the writing part was 0.90, showing a high degree of consistency between the two scorings (Table 3).

Table 3: Intra-rater reliability of scoring the PET writing section

Ratings	Mean	SD	V	Pearson Correlation
Rating 1	12.90	3.26	10.66	0.90
Rating 2	12.65	3.15	9.97	

### 2.2.2. Inter-rater reliability of scoring the PET speaking section

In this phase, each subject was assessed by two raters, the interlocutor and the assessor, utilizing the analytic scale of PET speaking test (2006). The inter-rater reliability of the speaking pretest was 0.76, showing an acceptable degree of consistency between the two sets of scores (Table 4).

Table 4: Inter-rater reliability of scoring the PET speaking section

Raters	Mean	SD	V	Pearson Correlation
Interlocutor	12.92	2.58	6.66	0.76
Assessor	11.25	2.20	4.85	

### 2.3. Checking the homogeneity of the two groups

In the next phase of the study, the scores of the subjects on the PET speaking section were analyzed in isolation in order to make sure that the participants of the two groups bore no significant difference in terms of their speaking ability before the treatment. Table 5 below demonstrates the descriptive statistics of the speaking section.

Table 5: Descriptive statistics of the scores of both groups on the speaking pretest

Groups	N	Mean	V	SD	Range	Min	Max
Expt	27	14.48	10.02	3.17	13.00	7.00	20.00
Control	25	14.48	4.01	2.00	9.00	11.00	20.00

As indicated in the table, the two groups' mean scores were nearly the same. Thus, it could be concluded that



both groups belonged to the same population in terms of their speaking ability at the outset of the instruction.

The following figure represents the above mean scores of the two groups in a more readily understandable visual modality.

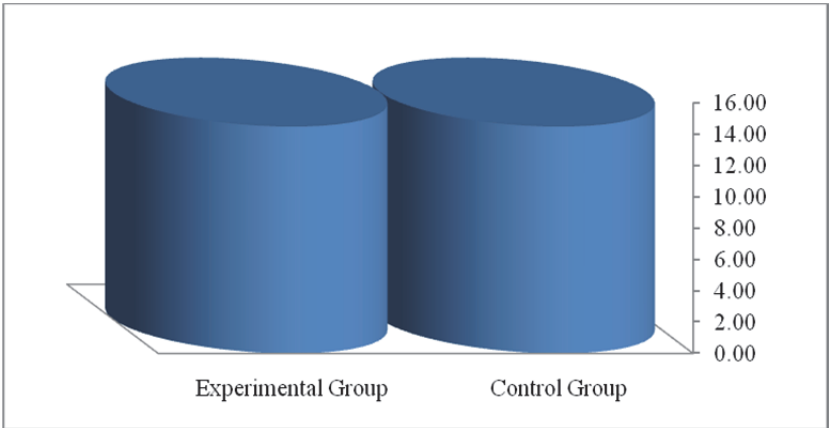


Figure 1: Mean scores of the groups on the speaking pre-test

**2.4. Speaking posttest**

Following the 12-session instruction, the speaking posttest was administered to both groups. Table 6 demonstrates the descriptive statistics of the posttest of the two groups separately.

Table 6: Descriptive statistics of the scores of both groups on the speaking posttest

Groups	N	Mean	V	SD	Range	Min	Max
Expt	27	16.81	4.77	2.18	7	14	21
Control	25	15.44	5.84	2.42	11	10	21

Figure 2 below shows the mean differences of the experimental and control groups on the speaking posttest.

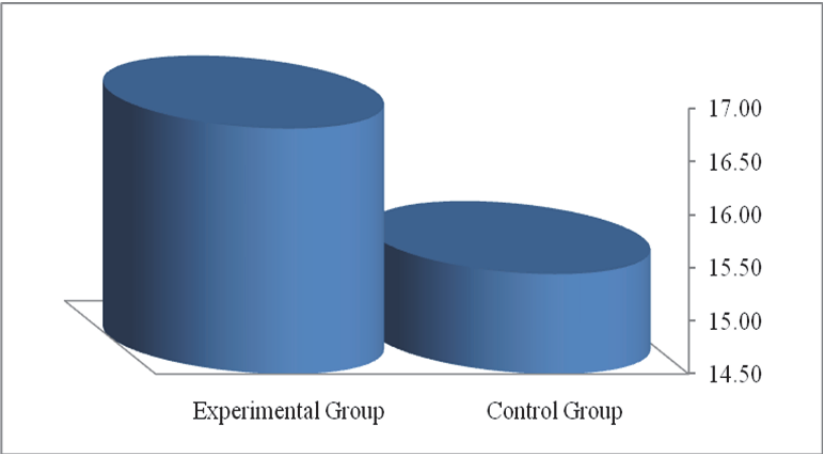


Figure 2. Mean scores of the two groups on the speaking posttest

*2.4.1. Inter-rater reliability of scoring the speaking posttest*

Since each subject was assessed by two raters, the interlocutor and the assessor, the inter-rater reliability was computed after the speaking posttest. The result ( $r = 0.77$ ) indicated a relatively high agreement between the two scorings (Table 7).

Table 7: Inter-rater reliability of the scores of the speaking posttest

Raters	Mean	SD	V	Pearson Correlation
Interlocutor	14.00	2.44	5.96	0.77
Assessor	12.65	1.95	3.79	

2.4.2. T-test analysis of the speaking posttest

To answer the first research question, the scores of the two groups on the speaking posttest were used for the analysis. However, in order to legitimize running a t-test, the normality of the distributions of the scores for the two groups were checked (Table 8).

Table 8: The results of the normality check

Groups	Skew	Standard Error of Skew	Significance
Expt	0.327	0.448	0.729
Control	0.378	0.464	0.814

As demonstrated in Table 8, the significant values for the groups fell within the range of -1.96 and +1.96; therefore, it was concluded that both distributions were normal and running the independent samples t-test was legitimized (Table 9).

Table 9: Independent Samples t-test of the means of the two groups on the speaking posttest

	Levene's Test for Equality of Variances		t -test for Equality of Means			
	F	F	t	t	df	Mean
	observed	critical	observed	critical		Diff
Equal variances assumed	0.01	4.03	2.15	2.02	50	1.37

As indicated in Table 9, the F-observed value was 0.01, which was lower than F-critical value (4.03) at 0.05 level of significance for 50 degrees of freedom. This meant that the variances of the two groups could be assumed equal. The t-observed value was 2.15 at 50 degrees of freedom. It exceeded the t-critical value of 2.02.

This revealed that the treatment was effective enough to make a significant difference between the means of

the experimental and control groups and that using reduction recasts did bring about significantly positive effect on EFL intermediate level students' speaking ability.

### ***2.5. Repaired grammatical uptakes of the two groups***

In order to answer the second research question, the recorded tapes of 12 instructional sessions were watched by the researchers to analyze the amount of recasts and repaired uptakes. As mentioned earlier, repaired grammatical uptakes were the successfully repeated grammatical reformulations produced by the subjects. An example may help clarify this point:

S: You should go see doctor. (Grammatical error)  
 T: The doctor. (Reduction recast)  
 S: The doctor. (Repaired grammatical uptake)

The results are summarized in Table 10.

Table 10: Rate of the two groups' repaired grammatical uptakes

Session	Number of repaired Grammatical uptakes	
	Expt	Control
1	3	2
2	14	1
3	50	8
4	41	5
5	39	5
6	25	5
7	48	1
8	33	7
9	51	13
10	72	16
11	91	21
12	76	24
Total	543	108
Mean	45.25	9.00

As indicated in the table, the average number of the repaired grammatical uptakes in the experimental group was 45.25, which was much higher than that of the control group (9.00). This revealed that reduction recasts resulted in greater amount of repaired grammatical uptakes in comparison to non-reduction recasts.

Figure 3 below shows the mean difference of the experimental and control groups on their repaired grammatical uptakes rate during 12 sessions of instruction.

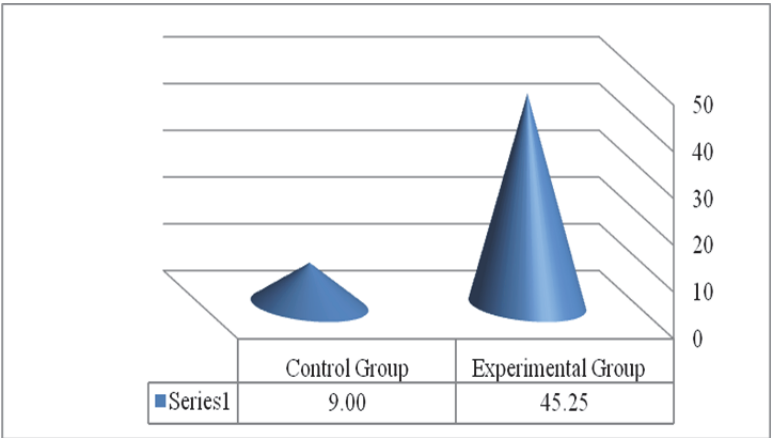


Figure 3. The mean difference of the groups on the repaired grammatical uptakes rate

### Conclusion

There has recently been a proliferation of studies investigating recasts in different shapes and forms (see for example, Ellis & Sheen, 2006; Leeman, 2003; Lyster, 2004, Hauser, 2005).

In this study, the impact of reduction recasts, as one type of corrective feedback, on speaking ability was

investigated. The results indicated that reduction recasts did significantly improve the speaking ability of the experimental group. This is in line with the findings of a study conducted by Iwashita (2003) who found that recasts are more salient to second language learners than other types of positive evidence from native-speaker interactional moves.

The two groups were also compared on the amount of their repaired grammatical uptakes. The results revealed that reduction recasts were effective on the rate of the repaired grammatical uptakes. This may be due to the fact that much of the pleasure of speaking lies in distinguishing our own errors and repeating the correct forms, which reduction recasts seek to establish.

Reduction recasts are advantageous since they build up communication and provide a rich environment for the learners in the classroom. They are mediums of increasing reflection in students although using them is not without drawbacks.

The characteristics of recasts, as meaningful and indirect repetition of the students' performances, make them good instruments for teachers to check the students' spoken errors in the classroom. They can also provide the students with a critical eye to find out the difference between their own speaking and their teacher's; and this makes them sensitive to their errors (Long, 2006). Such characteristics lead the recasts, especially reduction recasts, to become important tools for the correction of the spoken errors. However, the successful integration of the reduction recasts into EFL classes is mainly dependant on the teacher's method. Furthermore, learner's needs, attitudes, and proficiency levels should be considered in this regard.

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## **C**HAPTER 13

### **HOW CULTURE AND SOCIO-AFFECTIVE FACTORS INFLUENCED ESL UNIVERSITY STUDENTS' PROGRESS IN LISTENING COMPREHENSION**

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#### **Abstract**

This study explores the progress in L2 listening comprehension skills of a group of male Haitian university students in Trinidad and Tobago. The influence of the acculturation process and some socio-affective factors on their selection of learning strategies and progress in listening comprehension is examined. Participants (N=6) were at the low-Intermediate and mid-Intermediate levels of proficiency in English. They were enrolled in the Faculty of Agriculture, University of the West Indies, and attended content classes delivered in English. This research used a predominantly qualitative mixed-methods approach, in a naturalistic setting where students received strategy

instruction over a course of six months (out-of-class interaction with ESL volunteer teachers). TOEFL listening pre-test and post-test scores were compared to assess their progress in listening comprehension. At the end of the study participants were interviewed. A qualitative analysis of the semi-structured interviews highlighted the important roles of socio-affective learning strategies and the new culture. Findings were examined from the perspective of sociocultural theory. Improvement in L2 listening for one participant was not associated with his degree of acculturation. Evidence from this study supports the argument that learning strategy instruction can help students develop L2 listening skills. Results indicated that all of the participants drew on socio-affective strategies in order to cope with their L2 demands.

## **Keywords**

Cultural impact – second language listening – socio-affective factors

## **Introduction**

Trinidad and Tobago, located in the Caribbean, has English as its official language while Trinidad Creole (an English-based creole) is the main spoken language. This complex language situation in Trinidad makes it difficult to learn English as a Second Language (ESL). ESL learners would have to interact on a regular basis with different varieties of English (British and American English) and Trinidad Creole, hence the challenge for them to understand English in both the classroom setting and the informal context.

Few studies on second language learning and teaching have focused on the teaching of listening. Second language (L2) listening is one of the least taught skills, although in the last three decades there has been an increasing number of studies on listening. In the last 15 years strategy-based instruction (SBI) has gained

greater popularity in ESL teaching. Results coming from SBI research provide a promising overall evaluation of strategy use in L2 teaching and in L2 listening in particular.

Most of the studies on strategy use in L2 teaching and learning have highlighted the importance of metacognition in raising L2 learners' awareness of their own L2 learning process and much of this research has taken place in the classroom setting. Few studies on L2 strategy use have investigated the influence of socio-affective strategies on the teaching of L2 listening comprehension and very few have been conducted in naturalistic communication settings.

This paper reports on a mixed-method study of the impact of culture and socio-affective learning strategies on the progress in L2 listening comprehension of a group of Haitian university students living in Trinidad and Tobago. The group of students attended their content classes in the Faculty of Agriculture, The University of the West Indies, and received one month of formal ESL instruction and six months of ESL informal instruction.

## **1. Background**

### ***1.1 Listening comprehension and learning strategies***

Recently, as a result of the application of learning and communication strategies in L2 teaching, has emerged Strategy-Based Instruction (SBI) which works within the socio-cognitive paradigm and tries to raise metacognitive awareness by encouraging learners "to use a whole range of strategies which might underpin all four language skills as well as developing vocabulary and even possibly grammatical knowledge" (Macaro 2010: 294). The emphasis of the SBI

approach to listening is on developing an awareness of listening skills by first, guiding learners in the knowledge of their individual learning styles, then instructing them in the use of metacognitive, cognitive and socio-affective learning strategies. The goal is for learners to use a variety of strategies effectively in achieving more control over their L2 listening development, leading them to become autonomous listeners (Goh 2008; Wenden 1998).

Presently, the approach that most teachers use in the classroom is a more integrated one which draws from all of the other approaches to teaching language. The goals of this integrated approach with regard to listening are to develop listening as part of interactive and cooperative communication, and to promote critical listening and thinking, and effective speaking. However, despite the well-recognised importance of teaching listening comprehension in the L2 classroom, teaching listening skills and how to listen effectively continue to be poorly taught; in many instances the needs or purposes of learners are not met. (Flowerdew and Miller 2005; Osada 2004; Rubin 1994; Vandergrift 2007, 2010).

The main goal of research on learning strategies has been to find ways of helping L2 learners become skilled and effective language learners. In recent years an increasing number of studies has suggested interesting issues related to strategy instruction such as the influence of metacognition on progress in L2 learning, the relationship between motivation and metacognitive strategies, and the well orchestration of learning strategies and its impact on L2 development (Chamot 2004, 2005; Goh 2008; Graham and Macaro 2008; Vandergrift 2003, 2007; Vandergrift and Tafaghodtari 2010). A lesser volume of research has focused on strategy intervention and socio-affective strategies. As Oxford points out "the affective side of

the learner is probably one of the very biggest influences on language learning success or failure" (1990: 140). Vandergrift (2005) found positive correlation between motivation, use of metacognitive learning strategies and progress in listening comprehension.

### ***1.2 Sociocultural Theory – Acculturation model***

Sociocultural theory, as an SLA theory, postulates that L2 learning takes place in a social context, and that language learning is a complex activity and goes beyond the paradigms of psycholinguistics. It also emphasises the learner's goals and motives for learning L2 as well as learners' perceptions of themselves within the social context. Therefore, the sociocultural tradition argues that learning is a mediated process in which language is a primary tool (Lantolf 2000; Macaro, Vanderplank and Murphy 2010; Rost 2011). Social context could be either natural settings, which are usually associated with informal L2 learning, or educational settings generally associated with formal L2 learning.

Acculturation is expressed in terms of the social and psychological distance that learners perceive between themselves and L2 interlocutors. L2 acquisition is seen as one aspect of acculturation (Schumann 1986). Therefore, L2 acquisition and development depend on the degree to which learners acculturate to the new culture, the target language and the social structure (Barkhuizen 2004; Littlewood 2004). When learners' social and psychological distance from the target language is minimal they will learn it more efficiently, more easily and more enjoyably (Rost 2011; Schumann 1986).

On the other hand, Barkhuizen (2004) considers that the acculturation model is viewed more as a socio-

psychological model rather than a cognitive model because it does not offer explanations of the internal process of acquiring an L2. He also claims that it does not consider the L2 learner but rather the differences between the L2 learner group and the group associated with the target language.

## **2. The present study**

This study focuses on a group's development of L2 listening skills with the purpose of gaining a better understanding of the influence of the cultural context and of socio-affective learning strategy use on their L2 learning. In the course of this investigation, the researcher explored the learning strategies used by a group of Haitian university students who were forced by the January 12th 2010 earthquake to complete their university degrees at the University of the West Indies (UWI), St Augustine Campus.<sup>1</sup>

### **2.1 Research design**

The researcher chose to use a mixed methods approach which was a flexible approach that allowed him to choose the best strategies to address the research questions as it placed more emphasis on finding answers to these questions than on the methods utilised. The main reason for choosing a mixed methods approach is that it also makes the

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<sup>1</sup>On September 16<sup>th</sup> 2010, a group of 53 Haitian university students arrived in Trinidad at the invitation of UWI to complete their degrees at the St Augustine Campus. A few days after the group's arrival, the students began attending regular content classes in their respective faculties. Clement Sankat (Campus Principal), "Press Conference – 'UWI for Haiti'," 3, pp. 1-5. September 2nd 2010.

<[http://sta.uwi.edu/resources/speeches/2010/September2\\_UWI%20for%20Haiti%20Press%20Conference%202010%20-%20Final.pdf](http://sta.uwi.edu/resources/speeches/2010/September2_UWI%20for%20Haiti%20Press%20Conference%202010%20-%20Final.pdf)>

study less vulnerable to error as each different piece of data can help to:

- validate other pieces of data,
- examine the phenomenon from different perspectives, and
- allow the researcher to gain a richer understanding of the participants' practice of learning strategies in their progress in listening comprehension ability (Ivankova and Creswell 2009).

Participants reported that they were experiencing difficulty in understanding their lectures which were conducted in English and expressed the urgent need for support in listening comprehension. They were highly motivated to learn English and in need of support due to the trauma suffered after the earthquake.

The results reported here are answers to these two research questions:

- What is the impact of the new culture in the selection of learning strategies?
- What kind of socio-affective strategies contribute to the development of listening comprehension?

### *2.1.1 Needs analysis*

Two weeks after the participants' arrival in Trinidad, they were asked to fill out a bio-data and language self-assessment questionnaire. They identified L2 listening as the skill most in need of improvement in order for them to cope with the rigours of their academic endeavours.

Firstly for speaking well and listening in order to complete my academic programme. (**BS**)



I am learning English to improve my skill to understand the courses at UWI. (LV)

### *2.1.2 Intervention Programme<sup>2</sup>*

The researcher, moved by the urgent need that the entire group of Haitian university students were experiencing in L2 listening, designed a programme aimed at offering L2 support in an out-of-class setting (ESL informal teaching). He coordinated a group of volunteer ESL teachers for six months (during the first three months there were eight ESL teachers and in the final three months, four ESL teachers). The intervention programme focused on strategy instruction and was aimed at raising participants' L2 learning awareness. They were encouraged to use metacognitive, cognitive and socio-affective strategies that would best fit their individual learning styles and L2 needs (Figure 1). The programme took place in a common room at the students' hall of residence every Saturday for two hours. The listening tests of the Test of English as a Foreign Language (TOEFL) were intended to assess participants' development of listening comprehension.

### **2.1. Participants**

The sample was chosen from the entire group of 53 Haitian university students (41 students of engineering and 12 students of agriculture). The group of students of agriculture was chosen for the following reasons:

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<sup>2</sup> A group of 8 volunteer ESL teachers came together to assist the group of Haitian university students. They designed an intervention programme which emphasised out-of-class interaction with the students. The main focus of this programme was instruction and training in learning strategies as they were encouraged to incorporate metacognitive, cognitive and socio-affective learning strategies into their L2 learning.

- Their level of proficiency in English was lower than that of the engineering students.
- They intended to finish the final year of their degrees. Therefore, they had to attend regular classes, submit coursework projects and write examinations. These classes were conducted in English.
- The researcher had a personal desire to offer solidarity and support to the entire group of Haitian university students.
- This was a manageable number of students, as this study was not concerned with generalising its findings for a larger population but with interpreting the group's L2 learning process (Mackey and Gass 2005).

Initially the whole group of agriculture students wished to take part in the study but, because of constraints imposed by their efforts to cope with their studies, only six students (Table 1) were able to participate from the beginning to the end.<sup>3</sup>

Table 1: Participants' proficiency levels

Participant	Age	Proficiency in English	Listening ability
RM	25	Pre-Int.	Poor
CW	26	Mid-Int.	Poor
NF	30	Pre-Int.	Very Poor
DL	24	Pre-Int.	Poor
BS	27	Mid-Int.	Poor
LV	27	Pre-Int.	Poor

Note on Table 1: Levels of proficiency were determined by the Centre for language Learning, UWI, utilizing the Oxford Placement Test. A language self-assessment questionnaire

<sup>3</sup>The individual participants received a consent form specifying the commitment and confidentiality involved with their voluntary participation. Therefore, it was clarified that they were completely free to withdraw from the study at any moment without affecting their relationship with UWI.

prepared by the researcher was used to rate their listening ability. Pre-Int. = Pre-Intermediate; Mid-Int. = Mid-Intermediate.

## **2.2. Procedure**

The interviews of participants were transcribed verbatim and errors were not corrected. The qualitative analysis was carried out in order to shed light on and interpret the participants' improvement in listening skills and the contribution of the strategy intervention programme to this improvement, and to strengthen the results obtained from the quantitative analysis.

### *2.2.1 Self-check questionnaires*

The researcher looked at learning styles and learning strategies using the book *Strategies for Success: A practical Guide to Learning English* (Brown 2002) which provided information about successful language learning styles and strategies in the form of 12 self-check questionnaires. Seven questionnaires were selected for the purpose of quantitative analysis; these were those on levels of motivation, self-confidence, risk taking, influence of native language (L1), cultural differences, strategy use, and extroversion-introversion. Every questionnaire presented questions on a four-point or five-point scale (1 = I strongly disagree).

The researcher discussed every chapter of the book with the students and provided support in completing questionnaires. These self-check questionnaires were given to students in 12 different weeks over a period of five months. They helped students get to know their learning styles, to choose appropriate strategies to succeed in L2 learning, and specifically to improve their listening comprehension skills. Since the self-

check questionnaires are copyrighted material, samples of items are quoted (Brown 2002).

- *Motivation*

I want to learn English well so that I can talk with native speakers of English.

English will help me to get a good job someday

- *Self-confidence*

I am understand my own personality

I am optimistic about the future

- *Cultural differences*

This questionnaire presents items that best describe "My country" (participants' country) and the "English-speaking country", e.g.:

Smoking

MC	many do it	4 3 2 1	Few do it
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ESC	many do it	4 3 2 1	Few do it
Difference Score: .....			

### *2.2.2 The TOEFL listening comprehension tests*

The TOEFL listening comprehension tests from the 'Longman Complete Course for the TOEFL Test: Preparation Course for the TOEFL Test', were used to measure any improvement achieved by students as a result of the intervention programme. Each test took 35 minutes and participants were instructed about the TOEFL format prior to taking the test. Reliability of the TOEFL test was calculated by administering this test to another group of Haitian university students

(N=11).<sup>4</sup> The result of alpha obtained from the Cronbach's test was 0.948 which represents a high index of reliability.

These TOEFL tests were given in the following sequence: Test 1 (pre-test), Test 2, and Test 1 (post-test). This instrument allowed the researcher to have an idea of students' L2 listening comprehension progress over the period of research. The pre-test was administered on October 2, 2010, and Test 2 on December 23, 2010. The post-test was scheduled for February 2011 but, because of the students' increasing level of anxiety due to their academic work load, final examinations and research project; it was eventually administered on March 19, 2011.

### *2.2.3 Interviews*

This instrument helped to collect data on those aspects that would not have been easily captured by the self-check questionnaires. A first draft of the interview was shared with participants. Some participants said that they were not comfortable answering some of the questions related to the impact of the second culture (C2). Both parties agreed to remove those questions in which there was a direct reference to C2.

The interview was semi-structured which allowed not only more flexibility but also the possibility of following up participants' answers with the purpose of drawing out the various perceptions of students' progress in the listening comprehension skill. The researcher administered the interviews in a friendly and relaxed atmosphere at the participants' hall of residence at the end of the intervention programme. The participants

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<sup>4</sup>The group of Haitian university students who were attending classes at the Faculty of Engineering.

were at ease while they were interviewed. All the interviews were audio recorded to prevent loss of information and then transcribed verbatim. The same procedure was employed for all of the interviewees. The interview transcripts were sent to participants for validation and to try to elicit further reflections. The interviewee had the opportunity then to raise any issues which he may have felt to be more relevant.

The' length of the interviews varied because some participants were more inclined to talk than others. As a result, the shortest interview was about 15 minutes and the longest lasted for about 45 minutes. The interviews were coded using an open-code approach. After a first coding process was done, the researcher recoded all the interviews in order to ensure greater intra-coder reliability in the coding process. To improve reliability the coding of the interviews was reviewed by a colleague. The interview design process took into consideration aspects such as participants' stay in Trinidad, their assessment of learning strategy use and L2 listening development. Some of the questions were:

- When did you first come to Trinidad?
- Have you enjoyed your stay in Trinidad?
- During your stay in Trinidad, what difficulties did you encounter in understanding spoken English in your lectures?
- Which was the most difficult skill for you?
- Which strategies did you use in order to overcome such difficulties? Which do you consider the most useful/beneficial?
- Which strategies could have contributed most to the improvement of your listening?

Figure 1: offers an overview of all the procedures followed during this investigation.

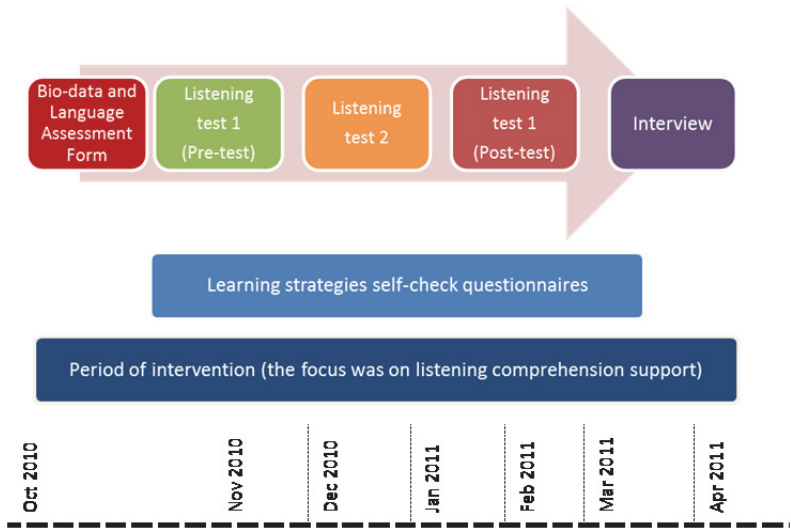


Figure 1 illustrates a summary of the procedures followed. The TOEFL listening tests were administered sequentially as follows: Pre-test on October 29, 2010; test 2 on December 23, 2010, and Post-test on March 19, 2011. Instruction on learning strategy use and the completion of the self-check questionnaires were concurrent processes and part of the intervention programme.

### 3. Results

For the analysis of the quantitative data, seven self-check questionnaires were selected (numbers 4, 5, 6, 8, 9, 10 and 11) because of their relevance to this study. The scores obtained from each of the selected self-check questionnaires were then converted to a linear scale in the form of a percentage to facilitate their analysis. The results obtained from the TOEFL listening tests helped to measure the development in listening comprehension during the intervention period. Table 5 shows both the number of socio-

affective strategies used and the reported positive or negative impact of C2. The analysis of the qualitative data focused on the exploration of participants' answers in the interviews.

### **3.1 Self-check questionnaires**

Table 2 provides an overview of the socio-cultural and affective factors assessed by the self-check questionnaires. Although these quantitative data provide insights on a set of characteristics shared by all of the participants and associated with more-skilled learners, these characteristics were investigated more thoroughly in the semi-structured interview. These characteristics were motivation, self-confidence, risk taking, individuals' strategy use, and extroversion. They can be seen as positive factors in the development of the listening skill (Brown 2006, Vandergrift 2005, 2007).

Table 2: Descriptive statistics for the self-check questionnaires

	Range		Mean	Std. Error	Std. Dev	Var
	Min	Max				
Age	24	30	26.50	.847	2.074	4.300
Int. mot.	.53	.93	.8000	.057	.1398	.020
Ext. mot.	.20	.47	.2778	.049	.1223	.015
Self-	.75	.88	.7917	.018	.0456	.002
Risk-	.52	.90	.7460	.062	.1525	.023
L1	.25	.50	.3438	.036	.0891	.008
Cult. dif.	.10	.50	.2722	.059	.1451	.021
Ind.strat.	.53	.69	.5938	.021	.0522	.003
Introvers	.00	.78	.3148	.123	.3015	.091
Extrover	.10	.78	.3852	.115	.2833	.080

Note. Int. mot. = Internal motivation; Ext. mot. = External motivation; Self-conf.= Level of self-confidence; L1 Influence = First language influence; Cult. dif.= Cultural differences; Ind. strat. = Individual strategy use.



**3.2 The TOEFL listening comprehension tests**

For all of the participants, post-test results were higher than those for the pre-test (Table 3). Table 4 shows the overall improvement (0.37) which indicates that all of the participants progressed in listening comprehension as illustrated in Figure 2. RM and CW were the participants who obtained the biggest improvement in L2 listening comprehension. BS was the participant with the least improvement although he obtained the highest score in the pre-test.

Table 3: Participants’ scores for the TOEFL pre-test and post-test

Participant	Pre-test score	Post-test score	Improvement
NF	6	13	7
LV	17	24	7
DL	16	25	9
BS	24	26	2
CW	17	30	13
RM	14	28	14

Table 4: Participants’ performance in the TOEFL listening tests

	Min	Max	Mean	Std. Error	Std. Dev	Var
Age	24	30	26.50	0.847	2.074	4.300
Pre-test	6	24	15.67	2.376	5.820	33.867
Test 2	16	28	22.50	1.648	4.037	16.300
Post-test	13	30	24.33	2.431	5.955	35.467
Overall improvement	.08	.54	.3667	0.0686	0.168	0.028

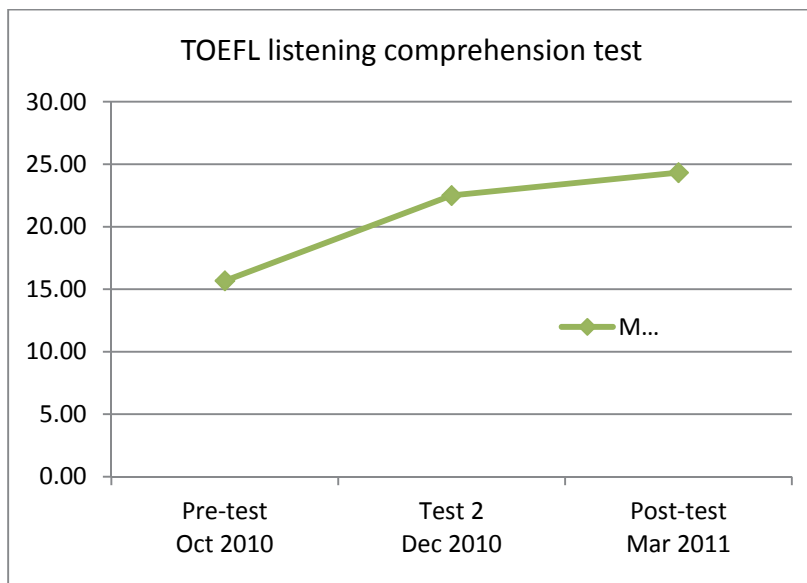


Figure 2: Participants' performance in the TOEFL listening test

### 3.3 Interviews

As mentioned earlier the quantitative analysis showed that participants improved their listening ability, however it did not provide any evidence of the contribution of the socio-affective learning strategies used to this improvement. The same can be said in relation to the impact on C2 and socio-affective strategy use; the quantitative analysis suggested a minimal influence of C2 on participants' L2 improvement and strategy use. Table 5 shows that LV, NF, RM and CW were the participants who used more socio-affective strategies.

Table 5: Participants' use of socio-affective strategies reported in the interview

Socio-affective strategy use	Participants					
	<i>BS</i>	<i>DL</i>	<i>LV</i>	<i>NF</i>	<i>RM</i>	<i>CW</i>
1) Interaction	✓	✓	✓	✓	✓	✓
2) Request Cooperation	✓		✓	✓	✓	✓
3) Ask questions-Clarification			✓	✓	✓	✓
4) Empathising with Others		✓	✓			✓
5) Self-Confidence	✓	✓	✓	✓	✓	✓
6) Self-encouragement						✓
Total number of strategies reported	3	3	5	4	4	6
Impact of C2	+	+	-		-	+

Note. Positive impact of C2 = +; Negative impact of C2 = -.

### *3.3.1 Impact of C2 on the selection of learning strategies*

In the quantitative analysis, the statistical mean values drawn from the self-check questionnaires for level of influence of their first language (L1) and C2 suggest a relatively minor impact of these two factors. In order to know to what extent C2 influenced the participants' choice of learning strategies, this study relied on the qualitative analysis of the interviews with participants. This analysis suggests that they had both positive and negative attitudes towards C2.

Participant NF reported very little interaction with C2; therefore it was difficult to identify any influence of C2. NF's social interaction appeared to be limited by his proficiency in L2, which could have been the reason why he responded in the interview with short and simple answers. BS, DL and CW reported a very positive impact of C2 on the listening strategies they utilised.

RM mainly listened to the BBC and eventually to Trinidadian radio channels. His response indicated that he chose to learn the British accent and, therefore, to maintain a certain distance from the Trinidadian register:

*I listen to BBC to practise my listening, and sometimes I listened to Trinidadian radio but most BBC. (RM)*

**Interviewer:** Why? Was it easier for you to understand the BBC than any of the Trinidadian radio channels?

*Yes, I think I wanted to be closer to the Standard English so I think that the British radio (BBC) could help me better. (RM)*

There was a significant impact of C2 on RM's listening strategies as he opted to learn a variety of Standard English rather than Trinidad English. This is reflected in the selection of material he chose to listen to.

On the other hand, RM considered the experience of living in an English-speaking country to be a positive one. He highlighted the contribution of this experience to the development of his listening skills but did not provide further insights.

*The experience of being in an English-speaking country is a good thing because the effort you could do to learn English. [...] when you are in the English speaking country you have possibility to hear the normal accent but in the French speaking country most of the time it is the French people who are teaching you English, and you just hear your lecturer. You don't have enough people to practice it. (RM)*

In the case of LV, because of his perceptions of Trinidad Creole, the impact of C2 is more noticeable. He opted to learn Standard English:

*I think the American accent is better for me to understand because in Haiti when professor in high school taught us English they used American accent [...]*

*But sometimes in Trinidad you have the Creole Trinidadian, but until now I don't understand the Creole, because I didn't want to learn the Creole until I understand the proper English, because the Standard English is the proper English. Standard, universal, but the Creole English is spoken only Trinidad. (LV)*

One of LV's strategies was to not learn Trinidad Creole English. This then had a direct influence on his selection of other strategies as well as on the material he listened to.

LV's goal contrasted with that of CW who was very much immersed in the culture of Trinidad and who acknowledged the extent of this impact and closeness to C2:

*As I am in the country I have the Trinidadian impact and how I pronounce words. (CW)*

### *3.3.2 Socio-affective strategies used*

RM did not avoid interaction with other speakers but he utilised them in order to improve his listening and other skills by requesting cooperation:

*I talked to more English-speaking people so that they could train me. (RM)*

CW was the participant most engaged in social interactions with other Trinidad English speakers; this allowed him not to only get closer to C2 but also, in accordance with sociocultural theory, to make considerable improvement in L2 listening comprehension:

*I've enjoyed a lot Trinidad. I have been in Tobago, in some places. I have made a lot of friends in Trinidad.*  
(CW)

CW obtained the highest score in the TOEFL listening comprehension test. It can be seen that C2 impacted on the way he combined the use of socio-affective strategies and other strategies in order to improve his pronunciation:

*What I did sometimes I ask some people to correct me when I made some mistakes, and I use a dictionary in English, I use some programs to pronounce well, and I repeat so that can get the good pronunciation, and I have some friends also who help me in English.* (CW)

It can also be observed that there is a slight degree of distance from C2 in the phrase "I repeat so that I can get the good pronunciation" but at the same time CW looked forward to his friends' cooperation.

*I used Word in English to write. After, I split it in too many parts, and I gave at least to five people to correct (proofreading) any mistake for me.* (CW)

The attitude of DL towards learning Trinidad Creole incited him to use socio-affective strategies (self-confidence, empathising with others, social interaction) to improve his listening skills:

*It should be noted that I try to have conversation sometimes with Trini in order to have a good listening when the Trini talk.* (DL)

## 4. Discussion

The impact of C2, viewed as the degree of participants' closeness to C2, appeared to be moderating participants' selection of learning strategies. The most used socio-affective strategies were interaction, self-confidence, requesting cooperation and asking questions/clarification.

Most of the participants (BS, DL and CW) tried to overcome difficulties in their understanding of Trinidad Creole English by engaging in meaningful interaction with Trinidadians. They viewed this interaction as a means for them to improve their L2 listening skills. According to sociocultural theory and in the case of these participants, this attitude would have been a contributing factor to their progress in L2 listening (Lantolf 2000; Rost 2011; Schumann 1986). These participants modified their strategic behaviour to facilitate L2 improvement; it can be noted in DL's earlier reflection. For instance, BS's determination to improve was reflected in his self-confidence, risk-taking attitude, strong motivation to learn L2, and the socio-affective strategies used:

*I have to do everything in English. I knew before that I have to write my final report. I think that I'll be able to do in English. I'll be able to do anything that, even though I have to speak in front of people and make mistakes, I do that to improve basically.*

**(BS)**

The acculturation model does not account for RM's progress in L2 listening. RM did not have a positive attitude to C2, although he made the biggest improvement in the TOEFL listening test. He did not show closeness to C2; his strategic behaviour led him to use British or American English listening material and not to use material from local radio stations (Lantolf 2000; Rost 2011; Schumann 1986). Most

interestingly, he did not avoid interaction with Trinidadian speakers, but looked forward to interacting with them and requesting cooperation as he reported above. These social interactions agree with sociocultural theory which I infer accounts for his improvement in L2 listening comprehension skills.

It is also important to note that the mixture of, and exposure to, both naturalistic and formal contexts in which participants learned L2 might have contributed to their closeness to C2 and improvement in L2 listening. Therefore, such sociocultural interactions can be seen as conducive to participants' goal of mastering L2 listening. For instance, they were receptive to feedback offered by peers and on most occasions looked forward to it, as CW and DL reported in their interviews.

## **Conclusion**

The impact of C2 differed from participant to participant. That is, some participants were closer to C2 than others. This fact influenced their learning strategy use. From the interviews of participants it was also noted that both more-skilled and less-skilled participants benefited from the different C2 contexts in which they were immersed. The previous quantitative and qualitative analyses also suggest that all participants improved their L2 listening comprehension skills. It was shown that acculturation model does not account for the L2 listening comprehension progress of participant (RM) who made the biggest improvement.

As was illustrated, the acculturation process seems to have influenced participant CW's improvement in L2 listening comprehension and strategy use. He made the second biggest improvement in L2 listening and reported the highest amount of socio-affective strategy use. These findings agree with the



acculturation model as this participant reported to be quite close to C2.

The findings of this study confirm that the informal interaction to which participants were exposed in a real-life context and in the intervention programme contributed to the use of socio-affective strategies. I argue that the employment of these strategies was conducive to their improvement in L2 listening comprehension and to their overall L2 progress as it allowed participants to engage in meaningful interaction with other English speakers which is in line with sociocultural theory.

However, the findings also suggest that participants' motivation and other socio-affective factors might have made it possible for them to get closer to C2 and to select learning strategies conducive to overcoming their difficulties in L2 listening. I recommend further more in-depth research on these socio-affective factors with a larger sample. Such research could also contribute significantly to creating more awareness of, or sensitisation to, the impact of motivation and anxiety in raising learners' socio-affective and metacognitive awareness of their own learning process.

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## **C**HAPTER 14

### **UNDERSTANDING STUDENT MOTIVATION DURING FOREIGN LANGUAGE INSTRUCTION: A QUALITATIVE STUDY**

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#### **Abstract**

While scholars claim that motivation is a key factor in determining success or failure in language learning, student motivation remains a challenging issue for many foreign language (FL) instructors. Second language motivation research offers numerous theoretical constructs that conceptualize and correlate motivation and achievement. Yet, from the FL teachers' practical sense, what is responsible for encouraging students' engagement and motivation during FL instruction? What is responsible for students' attitudes, behaviors, and thoughts? This article examines and reports on how qualitative research can be used to seek a better understanding of student motivation as it is manifested during FL instruction. In order to reveal different empirical realities, the study is grounded in FL classroom observations, individual interviews, and focus

groups which allowed to: 1) bring out participants' lived experiences as language learners during instruction, 2) gain insights into the process responsible for creating a classroom environment which encourages students' engagement and motivation. This inquiry is grounded in a basic interpretive approach (Merriam, 2002) after Denzin (2001) and Geertz (1973) interpretivist paradigm. Findings emerging from participants' testimonies revealed various factors, whether linked to the teacher or to the student, affected students' levels of interest, enthusiasm, engagement and motivation. Consequently, these findings<sup>1</sup> point to teachers as the primary actors in FL instruction in that they shape most aspects of the instruction itself.

## Keywords

Student motivation – Foreign language - Qualitative research

## Introduction

The most salient challenge commonly identified by teachers is the need to motivate the learner. Ellis (2004; 1994) noted that foreign language (FL) teachers recognize the importance of motivation "both with regard to the motivation that students *bring* to the language classroom ... and the motivation that is generated *inside* the classroom through the choice of instructional activities ..." (p.536). Foreign language teachers believe that motivation plays an essential role in determining success or failure in language learning (Dornyei, 2003; 2001; Dornyei & Csizer, 1998; van Lier, 1996) since it seems "only sensible to assume that learning is most likely to occur when we *want* to learn" (Williams & Burden, 1997, p. 111).

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<sup>1</sup>This article is a shorter version of a more comprehensive study that also examined students' learning to order to establish links between motivation and learning (Hicks, 2008).

This article describes how qualitative research can be used to seek a better understanding of student motivation as a manifestation during FL instruction, in addition to providing the rationale, the research design, and the findings of the study.

## **Review of related Literature**

Through the study of motivational determinants of second language acquisition (SLA), second language (L2) researchers have developed a variety of theories and constructs. From the late 1950' to the current time, L2 motivation research can be organized into four distinct but nonetheless linked phases, as briefly described below:

- The *socio- psychological period* (1959-1990), characterized by Gardner and his associates who conceptualized L2 motivation through a social psychological framework and established the social-education model (Gardner, 1985; Gardner & Lambert, 1972). The key tenet of this approach is that the individual's attitudes towards the language and the community of speakers of that language are of great importance "(primarily) as support for motivation" (Gardner, 1985, p. 14).
- The *cognitive-situated period* (during the 1990's) was grounded in cognitive theories in educational psychology and focused on motivation in L2 instructional contexts. Dörnyei (1990; 1994) viewed L2 motivation as an eclectic, multifaceted construct that includes components specific to language learning, situational factors, and individual characteristics brought by the learner to the learning task. Marion Williams (1994) argued the need to focus on the learners themselves and to include "the factors that are inside the learner: self-esteem, feelings of worth, self-efficacy, control, interest..."
- (p.80).



- The *process-oriented period* (turn of the century) is characterized by a focus on motivational change. In creating a process model of L2 motivation, Dörnyei and Otto (1998) described the complexity of the motivational process as a "broad array of mental processes and motivational conditions" that "play essential roles in determining why students behave as they do" (1998, p. 25). The researchers further defined motivation, in a general sense, as "the dynamically changing cumulative arousal in a person that initiates, directs, coordinates, amplifies, terminates, and evaluates the cognitive and motor processes whereby initial wishes and desires are selected, prioritized, operationalized and (successfully or unsuccessfully) acted out" (p. 65).
- The *socio-dynamic period* (current), characterized by a concern with dynamic systems and contextual interactions, led to the emergence of a new paradigm in L2 motivation research (Dörnyei, 2005; 2009).

Finally, it is important to point out that, within the field of L2 motivation research, quantitative methodology remains the dominant research paradigm. At the turn of the century, a number of scholars suggested the importance of a qualitative approach to the examination of the nature of motivation in L2 learners (Syed, 2001; Ushioda, 2001; William et al., 2001). Van Lier (1996) suggested breaking away from the traditional paradigm and including ethnographic research, case studies, and action research, that is, different research designs employed in qualitative inquiry. Ushioda (2001) believed in the value of qualitative approach to provide the opportunity to "cast a different light on the phenomena ... and to raise a different set of issues" (p. 96) and explored "aspects of motivation that are not easily accommodated within the dominant research paradigm" (p. 96). Furthermore, Ushioda chose to approach motivation as a qualitative variable which is not viewed in terms of "observable and measurable activity" (p. 96) but is viewed, in terms of "what

patterns of thinking and belief underlie such activity and shape students' engagement in the learning process" (p. 96).

Recently, Ushioda and Dörnyei (2012) revisited the conversation about the choice of method of inquiry by underlining the limitations of current quantitative methods which "are not sensitive to the particularities of evolving motivational experiences or individual-contextual interactions" (p.401). Pointing to the growing number of qualitative studies conducted within the last decade, they explained how motivation is not defined in terms of "measurable attitudes, effort or behavior, but in terms of how learners' thinking affects their motivation and engagement in learning" (p.403). In complete agreement with these L2 scholars, I chose to conduct a qualitative interpretive and descriptive study.

## **2. The present study**

### ***2.1. Goals of the study and approach***

As much as second language (L2) scholars have emphasized the importance of the role of motivation in language learning, only a few studies (Noels, 2003; 2001; Noels, K. A., Pelletier, L.G., Clement, R., & Vallerand, R. J. , 2000) directly addressed student motivation as it occurs during FL instruction. Thus, the aim of the present study is not to generate a new model of language learning motivation but rather to gain insight into the process responsible for creating a classroom environment, which allows for student engagement, representing and illustrating student motivation during FL instruction. Especially, what is responsible for students' attitudes, behaviors, and thoughts during FL instruction? In other words, what affects their motivation and how? To this end, student motivation is examined as it is lived out in a 'real'

language classroom, too often neglected as a place to conduct research (Van Lier, 1988).

Additionally, because motivation is an internal state, it is not easily observable in educational settings. Motivated behavior, however, can be examined through engagement, which refers to the behavioral intensity and emotional quality of students' involvement during learning. It develops from experiences in which individuals' psychological needs for self-determination, competence, and relatedness are met (Connell & Wellborn, 1991; Skinner & Belmont, 1993). Engaged students express high effort, attention, and persistence, as well as positive emotions such as interest, enthusiasm, and enjoyment. Thus, engagement illustrates the observable manifestation of the quality of a student's motivation and represents a useful concept for teachers (Reeve, 2002). Since engagement has been clearly linked to motivation, studying engaged behavior represents a pertinent and compelling way to examine students' motivation and students' learning outcomes in the language learning context.

## ***2.2. Interpretive and Descriptive Approach***

This study employed a basic interpretative and descriptive qualitative research approach (Merriam, 2002). The inquiry was not framed within a separate theoretical perspective but rather, by the meaning of experiences of the persons who experience them. Taking the role of the study's instrument and using an inductive data analysis, the researcher sought to discover and understand FL students' learning experiences in terms of their motivation as lived during instruction. Furthermore, the rich and descriptive account of the findings brings out the lived experiences of the participants while using 'thick description' (Geertz, 1973), in order to extract the

essence of their experiences and understand its meaning.

### **2.3. Research questions**

The inquiry of the study focused on two separate but complementary questions:

What do foreign language students report in the instructional approach as well as in teacher's use of textbook and other teaching aids, which engage and motivate them during instruction?

What is it that foreign language teachers say and do (i.e., specific instructional approach) in order to motivate students, and in turn promote student's engagement during the course of formal instruction?

## **3. Methodology**

One principal characteristic of qualitative research, as opposed to quantitative research, is the role of the researcher. Positioned as an observer, as a listener, and as the person who analyzes and interprets the data, the researcher is often seen as the person who brings in his own biases and judgments. My numerous experiences as a language learner and a language teacher triggered my interest in FL students' motivation during instruction and led to my own motivation to conduct this study.

### **3.1. Participants**

The study was conducted for one semester in a large Midwestern urban university in the United States. In an attempt to obtain a representation of French learners best fitting the purposes of the study, a purposeful sampling (Patton, 2002) led the selection of 3 French teachers and 12 undergraduate students. The three teacher-participants were graduate teaching assistants (TA) enrolled in the second year of a Masters program in Foreign Language and Literature

and taught either 2<sup>nd</sup>, 3<sup>rd</sup>, or 4<sup>th</sup> semester French. Each of the participants had at least one year of experience in teaching French at the post-secondary level. Four students from each of the semesters willingly made the choice to become participants in the study.

### **3.2. Data collection**

In order to collect descriptive, extensive, and insightful data, the study was grounded in three means of data collection allowing for a data triangulation that provided "cross data validity checks" (Patton, 2002, p. 248). This process insured that "each method reveals different aspects of empirical reality" (Denzin, 1989, p. 25).

#### **3.2.1 Observations**

The goal of the inquiry was to uncover and understand a specific phenomenon experienced by French students. Therefore, it was essential to discover the context in which these students behaved and interacted in their natural setting by means of naturalistic or direct observations (Lincoln & Guba, 1985; Patton, 2002). The observations took place during regular periods of French instruction as it naturally occurred and unfolded in the classroom.

#### **3.2.2. Individual interviews**

As valuable as observations in natural settings are, they do not reveal what participants feel, intend to do, and think. Conducting individual in-depth interview allowed for the researcher to "find out what is on someone else's mind, to gather their stories" (Patton, 2002, p. 341). The interviews took place during the second part of the semester once the researcher had 1) a feel for the teaching and learning environment, 2) a good representation of the interactions between

teacher and students as well as among students, and 3) a good illustration of specific behaviors portrayed by student. An interview guide was used to conduct the interviews which were recorded with participant consent.

Participants demonstrated a positive attitude, showed signs of enthusiasm and were willing to share their stories. Nine of the interviews were approximately an hour in length, one lasted 45 minutes and two lasted an hour and fifteen minutes.

### *3.2.3. Focus groups*

The main source of strength for focus group relies on the interactions in the group known as the 'group effect' (Carey, 1994). Under the guidance of the researcher, the group discussions generated stories and opinions by participants, which in return, elicited additional reactions and comments from the participants. Due to the number of student-participants, two focus groups were conducted.

### **3.3. Data analysis**

The data from the interviews and focus groups was analyzed first before moving to the analysis of data of the observations. The rationale was to discover, understand, and take into account the participants' perspectives prior to examining data from the researcher's observations. Adopting Miles and Huberman's (1994, p. 56) viewpoint that "coding is analysis", a sequence of specific steps was carefully executed. This process included the creation of two lists of codes (one for the interviews & focus groups and one for the observations), the identification of themes and patterns, commonalities and differences, and the realization of several types of visual representations (e.g., maps, tables, and flow charts).

This inductive analysis treated each event documented as a unique entity with its own meaning and its own set of relationships within the context explored and yet, at the same time, each event was “thought of as a window into the whole” (Patton, 2002, p.60).

## **4.Results<sup>2</sup>**

It is important to emphasize that, participants’ testimonies together with the field observations allowed, after analysis, to bring out the lived experiences of the participants as L2 learners. The findings revealed that various factors, whether linked to the teacher or to the student, affected participants’ levels of interest, enthusiasm, engagement, and motivation during FL instruction. In addition, the data analysis revealed that the responses to both research questions were very similar and intersected to become an overarching statement: What FL reported in the instructional approach as engaging and motivating corresponded with what FL teachers said and did during formal instruction. This statement pointed to the importance of the role played by the teacher.

### ***4.1. Factors affecting student level of motivation during Instruction***

From the classroom atmosphere and the relationships within the classroom to the choice of activities and topics discussed and the delivery of comments and encouragements, the teacher affects students’ behaviors and actions during instruction. Participants collectively explained how the teacher’s personality, attitude, and behaviors influence, to varying degrees, the instruction. That is, factors displayed in figure 1, such as teacher’s personal characteristics, teaching

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<sup>2</sup> Only a brief summary of the results is reported. That is, the excerpts of field observations as well as participants’ comments are reduced to fit the format of this publication.

style and teacher's approach, classroom atmosphere and classroom set-up, and delivery of the instruction directly affected students' level of interest, enthusiasm, engagement and motivation. The following section introduces a detailed series of participants' testimonies that validate this statement. It also illustrates specific situations that occurred during instruction within the three different classrooms in order to bring out the lived experiences of these students.

Factors & elements related to the teacher	Factors & variables linked to students' personal characteristics
<ul style="list-style-type: none"> <li>▪ <u>Personal characteristics:</u> <ul style="list-style-type: none"> <li>- Attitude/demeanor/ behaviors</li> <li>- Level of patience/ availability/</li> <li>- Accept mistakes/ choice of wording</li> </ul> </li> <li>▪ <u>Atmosphere in the classroom:</u> <ul style="list-style-type: none"> <li>- level of comfort/ being a fun class</li> <li>- classroom set-up</li> </ul> </li> <li>▪ <u>Relationships within the classroom:</u> <ul style="list-style-type: none"> <li>- How T* relates &amp; connects with STs*</li> <li>- How T facilitates the involvement among STs</li> </ul> </li> <li>▪ <u>Delivery of the instruction:</u> <ul style="list-style-type: none"> <li>- Organization of the class</li> <li>- Feedback &amp; corrections</li> <li>- Comments &amp; encouragements</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Personality &amp; attitude</li> <li>▪ Daily mood</li> <li>▪ Impact of previous experiences as French learner</li> <li>▪ Level of language comprehension: having the option to use English or only French spoken at all time</li> <li>▪ Perception of feeling stupid, foolish, or ridiculous?</li> <li>▪ Perception of how the others will judge &amp; think of their performance</li> <li>▪ Accomplishment during activities &amp; ability to speak</li> <li>▪ Intrinsic motivation</li> <li>▪ Outside classroom practice of the language</li> <li>▪ Grades received during the</li> </ul>



- Type of activities proposed		semester
- Choice of topics discussed		

\* T= teacher; STs= students

Figure 1: Factors affecting students’ level of motivation, interest, enthusiasm, and engagement during instruction

4.1.1. *Teaching Style and Teacher’s Approach*

Without exception, participants were receptive to their teachers’ personal characteristics. Demeanor, attitude, the levels of enthusiasm, energy, availability, and openness, all affected the level of learners’ motivation in varying degrees during instruction. Hanging on to the wonderful memories of her “fabulous, great French teacher” in high school, Cécile was frequently discouraged during the semester by her teacher’s personality and teaching style. She struggled with the lack of organization during class but mostly, with her teacher’s demeanor: “the teacher’s attitude does affect me. Because, I’ve answered a question wrong in class before and I felt like my answer was ignored”. Her classmate, Sybille, did not approve of her teacher’s choice of activities and to a greater extent, his approach to implementing these activities even though, she was aware of the constraints imposed by the syllabus. She further disapproved of how the teacher would “just kind of like I’m gonna lecture you, put up this overhead, you can discuss it for a few minutes. And then, we’re going to move on”. Not only did Sybille not feel connected to her teacher, she also did “not like the class. It’s no fun”, and claimed that “it really depends on the teacher’s enthusiasm and the teacher’s personal attitude towards the class”.

Conversely, Elaine particularly valued her teacher's approach and behaviors during teacher-centered activities:

She encourages us to speak as much as we can; that's a good thing. One of the things I've learned is, if she doesn't give you an immediate reaction to what you say, you continue to talk. That can sometimes be uncomfortable at first, because you thought you finished saying your idea, but then it's like she's expecting more, so you continue to babble on. Sometimes that can be good or sometimes it can be bad if you have nothing to say; that forces you to elaborate more on what you're saying, and it forces you to kind of make it up as you go along, which is a skill I'd like to be better at.

Marguerite reported a similar practice by her teacher when students were facing a challenging situation: "she'll kind of ease it out of us. She's encouraging us to keep thinking". Marguerite greatly appreciated that her teacher provided suggestions and encouragement and did not "make us feel stupid".

#### *4.1.2. Delivery of instruction*

The teacher's instructional delivery is an important element that was extensively discussed by participants. It comprises the organization of the class including the choice of activities and topics discussed as well as feedback, corrections, comments and encouragements given by the teacher. Taken together, this description corresponds to what I call *teaching*.

For example, Pierre explained his issues with the teacher's actual role when it comes to teaching: "she doesn't teach you. You just have to come to class and know it". He expressed some frustration about the way the homework schedule was organized. Students

were expected to come prepared to class having read assigned sections of the textbook in order for them to learn or just review (depending on students' prior knowledge) grammatical structures. Pierre did the reading. However, he needed to have the explanations in a different language that is, "in a different form of English somehow to walk me through it because (he) is not a big English grammar person and was never good at that". This approach to learning material affected his level of engagement and interest in class because "we just go into different examples, more examples ... but, that doesn't really explain it. That's just another use of it. It doesn't really clarify it and it gets kind of frustrating". Marie shared a similar viewpoint about her teacher's approach. She liked her teacher as a person because "she is entertaining". However, Marie also thought that "we (the class as a group) go too far off subject where we just waste time joking sometimes". Yet, she rather liked that the teacher "teaches" and spends more time in class going over homework assignments. As Marie explained further, she showed signs of frustration and discouragement:

We're supposed to correct them (homework exercises) ourselves, but it's kind of, well big deal, you can mark something wrong easily, but do you necessarily understand why it's wrong? No. Well in my case no, sometimes. I wish we'd go over that. And yes, you can ask questions, but sometimes you feel like there's no time to, or just - I don't want to feel stupid in class, just feel like everybody else knows what the hell they're doing and I have no idea.

Furthermore, the issue of internal organization of the syllabus directly affected how students prepared for class and behaved during instruction. Depending on the difficulty of the topic studied and their prior knowledge, participants' views were different. In the

case of Sybille, she recognized that she was really affected by this organization to the point of "lacking motivation" in pursuing her effort from the previous two semesters of French. Jacques and Cécile reported similarly about their teacher's expectations from students in connection with his teaching style. Cécile claimed that, when talking to classmates, "we all feel like he's not a good teacher" because "he really jumps around and he doesn't clarify what he is saying". She stated that students' misunderstandings were due to their lack of language comprehension and the lack of organization by the teacher. In fact, Cécile felt that "he's kind [of] teaching on a whim. Sure he has this prepared lesson plan, but most of the time I don't think he sticks to it".

Another aspect of teaching has been addressed by participants that is, immediate feedback by teachers during whole class activities. Several viewed this practice as very positive and productive as Elaine explained:

A lot of the time when we read the lecture, she poses 'Avez-vous compris'<sup>3</sup> questions to the whole class, instead of just speaking to our partner, and I think speaking with her (the teacher) it's easier, because she can correct my grammar, or correct what I say. Whereas if I'm speaking with a partner I could say something completely wrong and no one would know, and I like having the feedback from her about my speaking. I think that helps me a lot.

In complete agreement with her classmate, Claire explained her preference for whole class activities:

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<sup>3</sup> This corresponds to a textbook activity offering purposeful questions to assist with the comprehension of a reading.

I just feel a little more comfortable with it, especially when there's a teacher there to correct you if you're wrong.... she'll correct you if you're speaking in class and you say something wrong or use the wrong word, she won't let it go until you actually use the right word. And I like that a lot.

To sum up, participants' comments about the delivery of instruction pointed to how teachers actually conducted the instruction which in turns impacted student's engagement. When students became confused by the lack of organization or/and clarity in the explanations, that confusion translated into misinterpretations and misunderstandings of what was expected by the teacher. This phenomenon becomes a larger issue in FL classes because language represents both the means to instruction as well as the content of the instruction. Thus, it makes it a priority for teachers to be particularly clear in their explanations of the lesson and their expectations of students.

#### *4.1.3. Classroom atmosphere*

When looking at all of the participants' comments about these factors, it appeared that what the teacher did or did not do during instruction was as important as how the teacher did it.

Moreover participants reported that classroom atmosphere<sup>4</sup> was the most important factor to affect student's level of interest, enthusiasm, engagement, and motivation. All participants agreed to defined *classroom atmosphere* as "the comfortability between people" (Ladislav), "how comfortable you feel with the group" (Amélie) that is, "how the students relate to

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<sup>4</sup>For the purpose of the study, classroom atmosphere consists of the environment, the ambiance, and the feel in the classroom as created by the teacher and perceived by students.

the teacher, the teacher to the students, the students to each other" (Sybille). Therefore, the classroom atmosphere is, by and large, determined by the teacher's attributes and teaching style.

Charlotte claimed the class atmosphere as number one factor of motivation and explained that "the teacher and the students all play into that. Our teacher is a lot of fun and we can joke around with her... [laugh] the classmates make it fun so it makes me want to go back". Marie also stressed the teacher's personality (as the most important element affecting her motivation) describing her teacher as a person who likes the class and what she is doing "and because of that they (the students) really get into the class ...She is funny and is really into the material that she's teaching, that passion almost gets transferred to you. ...that's what really pulls me". Charlotte was particularly responsive to her teacher's demeanor, which, in her opinion, greatly influenced the classroom atmosphere: "she (the teacher) is really lively and upbeat. So that keeps us lively and upbeat. And she's enthusiastic about the language and about the class. That keeps us interested".

Sybille underlined that "the teacher's attitude about it (teaching) and the teacher's enthusiasm play a big part in motivating me". This semester, "the atmosphere of the room ...is very discouraging for participation". Classmate, Jacques explained that despite having a strong intrinsic motivation (he told me), he acknowledged that in certain instances he would be most likely affected by the classroom atmosphere and energy:

How the class as a whole is engaging in the activity. If there are long periods of silence, and things are moving very slowly. It's much easier

to just stop being so engaged and just sit in the back.

Also sitting in this classroom, Cécile, sadly declared that “there’s no fun in my class. I think our teacher’s a bit intimidating... he’s so not fun. So, the lack of these things, what would motivate me, is actually what ruins my class experience. Because there’s none of that”.

As for Pierre, he simply said: “if it’s not fun, I don’t really like to do stuff”. This consensus among participants underlines the importance of the teacher’s role. Hence, what teachers say and do directly affects how students behave during instruction as well as how they feel about the class. Participants underlined that the classroom atmosphere is also defined by the teacher’s ability to make the class fun which allows students to be engaged and motivated.

#### ***4.2. Role Played by the Foreign Language Teacher***

Regardless of the levels of proficiency and the motivation for the class, participants frequently pointed to their teacher, through personality, demeanor, and attitude, to explain their own (the participants) behaviors in class. Although the teachers’ impact was perceived differently by participants based on their personal characteristics and prior experiences as French learners, teachers’ behaviors and actions affected students in every aspect of instruction:

- The organization of the class period
- The choice of activities and topics
- The explanations given prior to and during activities
- The occurrence of immediate feedback as well as encouragements and comments given to students
- The choice of the language of instruction.

Clearly, the consensus found among participants' stories demonstrates that the teacher is the key element associated with FL instruction and student level of interest, enthusiasm, engagement, and motivation. Additionally, participants were equally receptive and sensitive to how teachers connected and interacted with students, how they facilitated the involvement amongst students, which in turn would create a classroom atmosphere conducive, or not, to engaging students in the different activities and encouraging them to participate. In fact, the classroom atmosphere and the ability for the teacher to make the class fun emerged as the most influential factor in engaging and motivating students during instruction.

Furthermore, it is important to underline that the choice and use of the language of instruction and participation by the teacher represents a critical issue when understanding FL student motivation during instruction. In varying degrees, all participants cited the lack of understanding as a crucial factor that inhibited their participation in an activity and thwarted motivation for the remainder of the activity and eventually led to totally disengage for the remainder of the class period. Most participants established a connection between their ability to understand and the rules put in place by teachers to speak only French or to be allowed to use English strategically. Participants viewed the option of using some English as beneficial in terms of understanding and ultimately in terms of engagement and motivation.

### ***4.3. Implications for teachers***

The findings reveal specifics about the language instructional setting seldom available to teachers such as: salient characteristics of what engages and motivates students and perceptions of what the



teacher does and says and what actually shapes students' behaviors. Thus, the findings provide the community of FL educators with very valuable and constructive remarks and suggestions to implement during FL instruction.

The classroom atmosphere emerged as the key factor in engaging and motivating participants during FL instruction. Consequently, it is vital for FL educators to consider the role and impact of the classroom atmosphere in the model, shown in Figure 2, which materialized from the findings of this study. Classroom atmosphere holds the central position within the connections among the different factors affecting students' levels of interest, enthusiasm, engagement, and motivation during instruction. This makes the focal point of teachers the creation of a classroom atmosphere that will increase students' level of comfort and confidence and develop relationships within the classroom. To accomplish this task, the teacher should be approachable, not intimidating or distant, and understanding of students' mistakes and hesitations; he should also attempt to connect and interact with students at a more personal level.

To conclude this section, it is important to report a set of very informative and valuable findings that inform FL teachers about participants' behaviors and actions during whole class discussion, which represents a challenge for teachers to conduct and for students to participate. Frequently, whole class discussions are introduced as a result of or the follow-up to previous activities such as reading and comprehension of texts as well as themes discussed during the course of a chapter. From the viewpoint of FL teachers, this notion of students' participation is critical because it is viewed as an indication of students' abilities to understand and to express themselves in the target language.

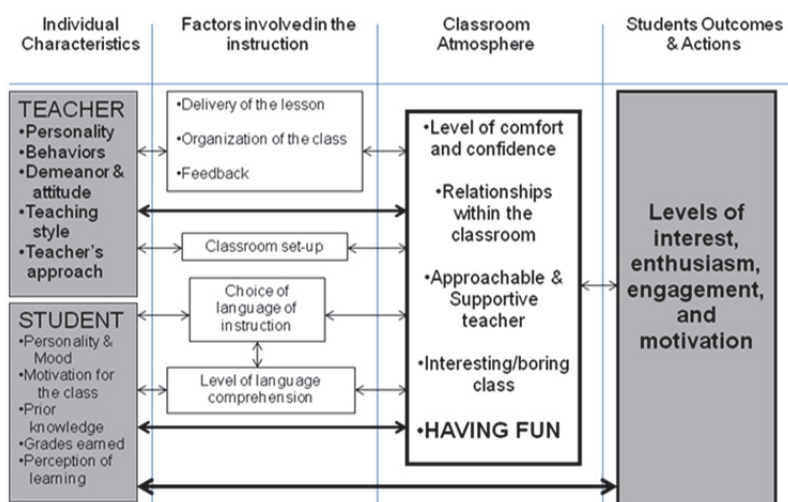


Figure 2. Model connecting the teacher, the student, and student motivation during language instruction

Participants' testimonies combined with descriptive accounts revealed factors that can be organized into six scenarios and situations explaining why students remained silent during whole class discussion and how the silence ultimately affected their motivation:

1. Lack of language comprehension (or misunderstanding) and/or misinterpretation of the language which generated feelings of frustration and discouragement and then, in some instances, drove students to disengage from the activity, or worse, from the rest of the class period.
2. Difficulty to formulate the answers in French once the comprehension is attained and the response is known; this includes experiencing the phenomenon of *mental block* or *tip-of-the-tongue sensation*
3. Feelings of self-consciousness and lack of confidence: With the exception of one, participants claimed to experience the thought of feeling stupid or foolish as well as being judged by their peers.

Grounded in participant's personality as well as in their prior experiences as French learners, these beliefs and perceptions were completely legitimate and real to participants who felt, to varying degrees, insecure, hesitant, and uncomfortable speaking in front of the class.

4. Mood and state of mind of the day.
5. Concerns for dominating the discussion and monopolizing the floor.
6. Perceptions of teacher's behaviors and demeanor; the majority of participants spoke of their teachers using mostly constructive and positive comments although some included disapproving aspects of their behaviors.

In conclusion, the ongoing challenge of language comprehension, the overall approach and demeanor of the teachers and students' personalities emerged as the source for most behaviors and reactions by students during whole class discussions and directly linked to their levels of interest, enthusiasm, engagement, and motivation.

## **Conclusion**

Grounded in the learners' and the researcher's perspectives, this study was conducted from inside the language classroom and revealed valuable and noteworthy insights about the teacher's role in engaging and motivating students during FL instruction. These findings confirm the viewpoint of L2 scholars involved in teacher training (Bailey & Nunan, 1996; Freeman, 1996; Richards, 1998), which is to focus on the importance of understanding teaching and classroom practice from "inside" rather than from the "outside in". Findings of this study allowed the introduction of a model, which encapsulates the main factors involved during FL instruction. The model specifically demonstrates the links between the teacher, the student, and student motivation.

Furthermore, the detailed account of teachers' behaviors and actions combined with the recommendations of students establishes groundwork for the usefulness and the application of this motivational model in FL classrooms at post-secondary level when examining students' motivation.

### *Direction for future research*

Though as valuable and as informative these findings are, it is important to understand that the data sources themselves were limited to twelve participants from three French classrooms. This reality is often viewed as a limitation of qualitative research though the value and usefulness of the findings are indisputable. Thus, it is now important to move from the qualitative to the quantitative research paradigm to further examine this matter and reach a larger number of FL learners in one study. One possible path to follow is the examination on a larger scale of specific points emerging from the findings. Drawing on specifics reported in the findings, detailed questionnaires would be created to be used as research instrument in a quantitative study. Conducted with a large number of FL learners situated in similar conditions as those of the present study, such examination could demonstrate the validity of the present findings.

### *Limitations of the study*

Lastly, it is important to address the issue of external validity or generalizability of the findings which represents a critical limitation in qualitative research in general. In other words, can the findings of this study be applied to other French classrooms and even to FL classrooms in general? While telling their stories as French learners, participants mentioned, on many

occasions, their prior and current experiences in French classes and other language classes. They drew on their various lived experiences to justify their explanations and formulate their interpretations of their current experiences. Thus, within the qualitative research paradigm, the notion of generalizability is to be considered from a completely different viewpoint as in quantitative research. In order to depict the best picture of the research context, the original study provides a myriad of excerpts of field notes and participants' quotes, so that readers will be able to establish "how closely their situations match, and ... whether findings can be transferred" (Merriam, 2002, p. 29). By adopting this approach, the final report depicts an informed and in-depth picture of the research context while presenting the findings.

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## **C**HAPTER 15

### **TEACHING ENGLISH SPELLING: WHY THE PROBLEM?**

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#### **Abstract**

English spelling has many vagaries of pronunciation. Students find difficulty with the unpredictable and non-literal aspects of English and decisions must be made about the most effective strategies to help students to learn. In order to teach spelling, instruction is needed in how to use phonological, visual, semantic and etymological knowledge. Inconsistencies in language features make learning difficult but there are strategies to help teachers and students to make spelling, pronunciation easier to understand and remember. The main stakeholders studied are pre-service students enrolled in a Bachelor of Education course at an Australian university. Their values, attitudes and purposes were directed to becoming primary school teachers and they, predictably, expressed positive attitudes about the importance of proficient spelling. Teacher educators, writers of the Australian National Curriculum and the

general public also have a keen interest in correct spelling. However, the rhetoric about the importance of spelling is undermined by ready acceptance of incorrect spelling, exacerbated by the pervasiveness of text-messaging communication where spelling is abbreviated and often careless.

## Keywords

Spelling Literacy Teaching English

### 1. Introduction

*My spelling is Wobbly. It's good spelling but it wobbles, and  
the letters get in the wrong places.*  
(Winnie-the-Pooh, A.A. Milne, 1926)



Conventional spelling allows us to write texts so the meaning is communicated with clarity. Accurate spelling can also be seen as a gauge of how well learners have mastered the language and this has important repercussions for both employment opportunities and social integration. Teacher educators, most parents and employers value accurate

spelling, often interpreting it as a sign of a literate person. However, students, from kindergarten to university, may see the computer spell-check as a trusty ally, negating their responsibility to learn how to spell.

English spelling clearly presents problems because there are so many variations for the sounds of English: there are only twenty-six letters to represent over forty meaning-bearing sounds or phonemes that make up our speech. *Bow* /bo/ is clearly different from *bough* /bow/ and *cow* from *cough*. Spelling is a cultural artefact and although the fertility of English spelling was standardised (to some extent) by factors such as Caxton's printing press (1476), the dictates of legal language and the dictionary of Dr Samuel Johnson, a common written language emerged slowly. Spelling possesses inconsistencies (e.g. how the alphabet is used to represent spoken language) and regularities (at the letter and morphemic level) in English spelling (O'Connor & Vadasy 2011). Words may look alike but they do not always sound alike. Common errors are caused because words which sound the same are spelt in different ways e.g. *there*, *their*, *they're*. The ability to spell correctly is closely linked with knowledge of correct pronunciation. The situation is further complicated because English has, happily, adopted many words from other languages. Accurate spelling is acquired through increasing recognition of the patterns of words. This is achieved through knowledge of phonology (how words sound); visual cues (how words look in print or writing); morphemes (how words are constructed from meaningful elements); and etymology (the origins of words). Idioms are those forms of expressions peculiar to a language, their overall meaning unable to be predicted from the meanings of the words alone (Kovecses & Szabco 1996). Understanding idioms is a demanding task for the second-language learner.

### **1.1. Contextual framework**

Insights, suggested strategies and observations made in this chapter are based on studies of pre-service teachers enrolled in the four year Bachelor of Education course at the University of Technology, Sydney, Australia. This practice-oriented course prepares students to teach a wide range of subjects in schools from Kindergarten grades to Year 6. The research question seeks to determine what kinds of problems these students experience with spelling, why spelling is perceived as problematical, and strategies they can use in the classroom. As future teachers, they need to be proficient spellers and know how to implement strategies to improve literacy development which includes developmentally appropriate spelling instruction.

Teacher educators see spelling as an important aspect of literacy. It must, however, be kept in perspective. The communication of a text, its cohesion and level of interest to an audience may be much more meaningful than a dull text free of spelling errors. Because a student cannot spell, it does not mean they cannot write.

Education authorities want schools (and teachers) to be accountable for standards of literacy and place emphasis on the testing process through standardised national testing of literacy where spelling features significantly. The NAPLAN (National Assessment Program – Literacy and Numeracy) tests are carried out for year 3 and year 5 students in Australian schools. However, the test scores are variable and may reflect an emphasis on 'teach to the test' rather than a broad assessment of student achievement. The Australian Curriculum (which will become mandatory) recommends the teaching of spelling in all grades. For example, for the Kindergarten level:

- Spoken sounds can be written down using the letters of the alphabet
- Regular vowel-consonant (CV) and consonant-vowel-consonant (CVC) words are made up of letters that correspond to the sounds heard
- Recognises high frequency sight words in texts
- Phonemic awareness includes how to recognise rhymes, syllables and single sound s (phonemes) in short spoken words).

(ACARA, Australian Assessment & Reporting Authority 2011).

### **1.2. Background research**

Recent studies of English spelling suggests practical teaching strategies which are useful for the primary school classroom (Tompkins 2011; Westwood 2008; Wanzek et al. 2000; Heald-Taylor 1998; Snowball & Bolton 1999). Tompkins' guidelines for teaching spelling to children still have relevance to the pre-service teachers, i.e. analyse errors, connect phonemic awareness and phonics to spelling, daily reading and writing activities to apply their spelling knowledge (2011: 133). Various researchers such as O'Connor and Vadasy (2011) and Wanzek et al. (2006) have investigated spelling and reading interventions and their effects on spelling outcomes and have come to similar conclusions. Good spelling strategies were "explicit instruction with multiple practice opportunities and immediate corrective feedback after a word was misspelled" (Wanzek et al. 2006: 540). Westwood also agrees: "Intervention should help students understand the phonological and morphological principles that underline English spelling, and should aim to establish the connection between sound units and letter groups" (2008: 65).

Silva and Alves Martins (2003) make an important contribution in stressing the close connections between children's invented spelling and their development of phonological awareness. Both Bouffler (1997) and Berninger (2002), the latter a researcher who has worked with children with disabilities, emphasise the need to 'teach' specific strategies for spelling and to link them with authentic writing tasks. In the Australian context, an inquiry into the teaching of literacy encouraged the integration of language skills (Coltheart 2005). The complex nature of spelling with its links to creativity is discussed by Kress (2000) in his research on British children. Spelling needs to matter and this can be achieved, to some extent, by clear assessment and the specific teaching of concepts (Westwood 1999).

Teaching and learning spelling is a complex process. As Gentry and Gillet explain:

The visual coding mechanism is elusive and complex. It is not simple visual memory or a learning style. Undoubtedly, it works in parallel with other processing mechanisms related to spelling. Certainly phonemic, semantic, and etymological associative linkages function in parallel with it, allowing the mind to consider input on different levels and to look for overlap and connections (1993: 54).

## **2. Methodology**

### ***2.1. The target group***

Surveys and questionnaires on English spelling were completed by students enrolled in the Bachelor of Education course preparing them to become primary school teachers. Additional information was gleaned from mastery tests and writing assessments and the spelling proficiency demonstrated in examination

answers. The cohort of c.130 students (95 female, 35 male) were studied over a 4 year period of their degree course, mainly in subjects focussing on English language and literature. The numbers varied slightly in each year because of factors such as student withdrawal or leave of absence.

There were no significant findings based on gender differences although the female students were generally more accurate spellers. However, the male students achieved similar results at the end of the 4 year period before graduation.

### **3. Discussion**

Problems experienced with spelling related to phonological, visual, morphemic and etymological knowledge. Linked with spelling proficiency was the value attached to spelling (how much did it matter) and their attitude to getting spelling right (careless or painstaking). The goal to graduate as a primary school teacher was paramount; they wished to learn specific classroom strategies to teach others how to read, write and spell. While their values predicted individual attitudes, the respondents were affected by the consequences they could foresee as future teachers.

#### ***3.1 Phonological knowledge***

Phonological knowledge can be gained through learning about the segmentation of words, helping students see how syllables work in a word. In the early years, a focus on isolated sounds, including the different sounds of the alphabet and the first sounds in a word, is needed. Texts that engage students can illustrate word study and spelling in context, reinforcing knowledge of spelling principles. Contrastive pronunciation can show the similarity or difference between sounds so that students can learn to discriminate. They can learn how to make up new



words by substituting letters, e.g. words that end in 'able'. Examples of alliteration give students practice in recognising same-sound recognition.

A knowledge of phonics and phonological awareness is essential so that students can master the code-breaking skills required for reading/spelling proficiency:

Phonics refers to learning the relationships between letters and letter groups in written language and the sounds associated with them. It does not develop the conceptual understanding that spoken language is comprised of a sequence of spoken sounds that can be acoustically separated and manipulated. An understanding and awareness of the sound structure of words in the pre-school years enables a child to better understand that letters are a symbolic code to represent those sounds (Coltheart 2005).

The relationship between sound-symbol relationships is confusing, e.g. the words *break*, *freak*, *beard*, and *heard* all have different sounds. The hard *c* of *carrot* or *caviar* is different from the soft *c* of *circle*, and different again from the *k* of *keep*.

A knowledge of phonemes, blends, digraphs and diphthongs can be introduced with examples from authentic situations.

**Phonemes** are the smallest distinctive group or class of sounds ('phones') in a language. For example, *cap* consists of three different phonemes or sounds and differs from *sap*, *map*, or *cat* simply by changing one sound or phoneme.

**Blends** are formed when different phonemes come together as in *street*, *blue*, *crow*, *scratch*, and *play*. Note that blends can be two or three letters in length.

A **digraph** is a pair of letters that corresponds to a single sound, e.g. *ch* as in *chief* or *ee* as in *meet*. There are vowel and consonant digraphs.

A **diphthong** is a sequence of two vowels produced in such a way that they are perceived to belong to one syllable, e.g. in Australian English *hope*, *wide*, *beer*, *bear* (Winch et al. 2010: 695).

Clear articulation can be practised through songs and poems that reveal the importance of pronunciation:

Sounds and letters often disagree  
When the English tongue we speak  
Why is 'break' not rhymed with 'freak'?  
Will you tell me why it's true  
We say 'sew' but likewise 'few'?  
And the maker of the verse  
Cannot cap his 'horse' with 'worse'?  
'Beard' sounds not the same as 'heard';  
'Cord' is different from 'word';  
'Cow' is 'cow' but 'low' is 'low';  
'Shoe' is never rhymed with 'foe';  
Think of 'hose' and 'whose' and 'lose'  
And think of 'goose' and yet of 'choose'  
Think of 'comb' and 'tomb' and 'bomb'  
'Doll' and 'roll' and 'home' and 'some'  
And since 'pay' with 'said', I pray?  
Why not 'paid' with 'said'. I pray?  
We have 'blood' and 'food' and 'good',  
Wherefore 'done' but 'gone' and 'lone'?  
Is there any reason known?  
And, in short, it seems to me  
Sounds and letters disagree.  
(Quoted in Williams 1977: 57).

Pronunciation may lead to misspellings for both children and adults. Syllabification and clapping out the sounds of syllables assists spelling acquisition:

- one syllable:           cat
- two syllables:       Per/u
- three syllables:     al/ pac/a
- four syllables:     Aus/tra/li/a

### **3.2. Visual knowledge**

A 'sight' vocabulary can be encouraged by techniques such as *Look—Cover—Write* and games with flashcards. For example, words such as *find*, *kind*, *mind*, and *wind* have *ind* in common.

Sight knowledge of words can be improved by visualising the shape and pattern of these words by highlighting particular letters (e.g. all the vowels) or by drawing a box around a selected letter or letters (e.g. segmentation of words). Use acrostics or crosswords to aid visual recognition, either invented by the teacher/student or composed on the Internet. A simple exercise is to base the acrostic on the student's own name. The more the student can be involved, the more engagement there will be with learning. Imagery can help in the memorisation of spelling. Encourage students to visualise a word with a memory trigger or mnemonic e.g. *accommodation* has two c's and two m's – think of two beds; *practice* (the noun) has the word *ice* in it.

*Imagery and illustrations can be used to memorise expressions (and spellings) of idioms. Australian idioms are: fair dinkum is an exclamation, often expressing exasperation or admiration and as an assertion of truth and honesty; flash as a rat with a gold tooth suggests someone is dressed ostentatiously but is still a 'rat' (despicable person) underneath. Kovecses & Szabco (1996) note that there is a lack of predictability in understanding the meaning of idioms but they also find that there is systematic conceptual motivation for analyzing the meaning of many idioms. The results of their experimental study showed that thinking/cognitive skills and semantic knowledge can facilitate the learning of idioms, in particular for second language learners. The learner has preconstructed phrase and writing texts involves an alternation between word combinations (open choice*

*principle) and preconstructed multi-word combinations which are typical of idiomatic expressions (Erman & Warren 2009).*

### **3.3. Morphemic knowledge**

The morphology of words refers to their form or structure, and the meaningful units of which they consist, such as word bases, prefixes, and suffixes. For example, the word *spelling* consists of two morphemes: *spell* and *ing*. Here, the morpheme *spell* can stand alone but the morpheme (or unit) *ing* is bound to the word *spell*. Morphemes are minimum meaningful units of language e.g. *childish* = 2 morphemes *child*, *ish*.

Good spellers understand the use of prefixes and suffixes, contractions, compound words, derivatives, and silent letter sequences. They have a spelling 'conscience' and regularly use the dictionary to check their spellings. The English language contains many suffixes or additions to words e.g. *-able*, *-ery*, *-ese*, *-ing*, *-ish*, *-ism*, *-ite*, *-let*, *-like*, *-ling*, *-ness*, *-ship*, and *-tion*:

- *-ese*: a noun or adjective suffix referring to locality, nationality, language
- *-ery*: a suffix of nouns denoting occupation, business, place or establishment
- *-let*: a diminutive suffix used for little objects
- *-like*: a suffix of adjectives, sometimes hyphenated
- *-ness*: used to form nouns denoting quality or state
- *-ship*: a suffix of nouns denoting condition character, office or skill.

Prefixes are letters put before a word that add to or qualify its meaning. Thus *un* before a word affects its

meaning, implying the opposite condition. For example, *un-*, as in: *unhappy* means *not happy*. Recognising prefixes and their meanings, e.g. *super-*, *trans-*, *circum-*, and suffixes *-er*, *-ing*, *-ish*, *-ly*, can help students to spell better if practice is given. A common rule for adding the suffixes is that *y* changes to *i* before *-ed* (a suffix beginning with a vowel) so that *satisfy* becomes *satisfied*.

Sometimes misspellings are used by the professional writer for meaning, or for humorous and rhetorical effect. Charles Dickens employs phonetic spelling to indicate speech, characterization and social class. Mrs Gummidge, of 'fretful disposition,' says: "I am a lone lorn creetur and everythink goes contrairy with me" (*David Copperfield* ch.3).

While the student may be more interested in mastering basic spelling, playing with words will increase spelling proficiency.

Context is very important and this is why it is important to teach and learn words within sentences and as they are related to authentic situations. In this way, *their*, *there*, *they're* can be learnt. Lists and charts of word families can improve spelling practices. Recognition of base words will help students identify how a word can be extended, e.g. *swim* can be extended into the *swimmer* and *swimming*. A word can be expanded by grammatical inflections or word endings such as the *-ed* past tense ending, and the *s* or *es* of plurals.

### **3.4. Etymological knowledge**

Etymology, the study of the origin and history of individual words, helps students understand how meanings and the formation of words have changed over time. The word *sandwich* allegedly comes from

the Earl of Sandwich (1718-92) who did not want to be taken away from his gaming table by the interruption of a meal but wanted one that could be eaten at the table, i.e. a *sandwich* of slices of meat between bread.

English has borrowed words from many languages. For example, *geo-* (from the Greek), means earth and we can see this in words such as *geography* and *geology*.

Word base	Origin	Meaning	Examples
bi	Latin/Greek	two	bicycle, bigamy
sex	Latin	six	sextet, sextuplet
bio	Greek	life	biography, biology
ology	Greek	the science of biology	palaeontology

Charts can be made to reinforce etymological knowledge, encouraging an interest in language.

### **3.5 A spelling 'conscience' and a sense of ownership**

Accurate spelling matters, not just as a courtesy to readers, but because it will communicate a message without distraction. Poor spelling may be a superficial indicator of literacy because it is easy to identify and often noticed. Nevertheless, the work force may be much less tolerant of errors than the classroom environment. Encourage students to have a sense of ownership by keeping their own dictionaries where they can record words, phrases, or sentences that they need or want to know. Words in context give students clues to meaning and spelling. Self-editing is important and the teacher can stress that a final draft, intended for 'published' writing, should be error-free.

The computer spell checker cannot always identify spelling errors although most will be found. Students can find out to their cost that some spelling errors remain because they are homophones e.g. *there/their*, *it's/its* or words such as local place names and names of people which do not appear in the computer's thesaurus. English/American spellings such as *colour/color* or *cheque/check* can add further confusion, even though the u may seem illogical and *check* accords with English pronunciation.



### **3.5. Spelling strategies**

Systematic instruction in spelling is needed but also at the point of need. Diagnostic testing helps the teacher find out the 'why' of good and bad spelling and what strategies will best solve problems. It is important to know why students misspell so that an appropriate strategy can be introduced. Are errors caused by lack of visual, semantic, phonological knowledge or simply a lack of editing? In the sentence *My mum **cum**plained about the noise*, the student is actually pronouncing the word correctly but is not aware of the *schwa* sound

and has probably not seen the word written very often. Teachers can check whether students sound out words, look up words in a dictionary, know how words are segmented, proofread their writing and if they are motivated to spell a word correctly. Those who read widely will invariably be better spellers.

'Have a go' books are divided into four columns: *Student's 1st attempt; 2nd attempt; Spelling check; and Personal dictionary*. They encourage students to try to spell words rather than avoiding spelling difficult words. Both the student and the teacher can thus monitor progress.

Students may find their own memory triggers, perhaps with a mnemonic:

<b>Words</b>	<b>Strategy to remember</b>
accommodation	double <i>c</i> and double <i>m</i> and three <i>o</i> 's
separate	separate a <i>rat</i>
tripod	<i>tri</i> means <i>three-footed</i>
breakfast	two words <i>break</i> and <i>fast</i> form a compound word that means

Strategies useful for the classroom include:

1. Spelling as it sounds (this may lead to 'invented' spelling).
2. Spelling as it looks (from a student's 'sight' vocabulary).
3. Spelling as it articulates (may also depend on the student's pronunciation).



4. Spelling as it means (e.g. thankyou written as one word because it is seen as a meaningful unit).
5. Spelling by analogy (borrowing from how other similar-sounding words are spelt) (Bean & Bouffler 1997: 17).

### *3.5.1. Spelling lists*

Rote learning of spelling lists can be problematic because they lack contextual clues and are therefore difficult to remember. Meaningful spelling lists (sometimes in phrases or illustrative sentences) can be compiled from commonly needed words or phrases, especially those related to classroom work and the curricula. Introducing 'spelling buddies' can make a weekly test a more cooperative exercise. Encouraging the participation of others can often motivate the student e.g. parents/friends can 'test' the list of words learnt.

### *3.5.2. Spelling 'rules'*

Spelling workbooks with practice examples are often used in schools to improve spelling proficiency. While reading a wide range of books, newspapers and magazines was strongly encouraged, some students found that spelling workbooks (at the level of the 6<sup>th</sup> grade) did help them to identify and overcome some individual spelling difficulties.

The 'rules' or generalisations indicate that there are many systematic aspects of English spelling, despite its irregularities. Placed in a meaningful context, these 'rules' may help in teaching plural endings, p.

1. Add s to singular nouns: cat—cats.

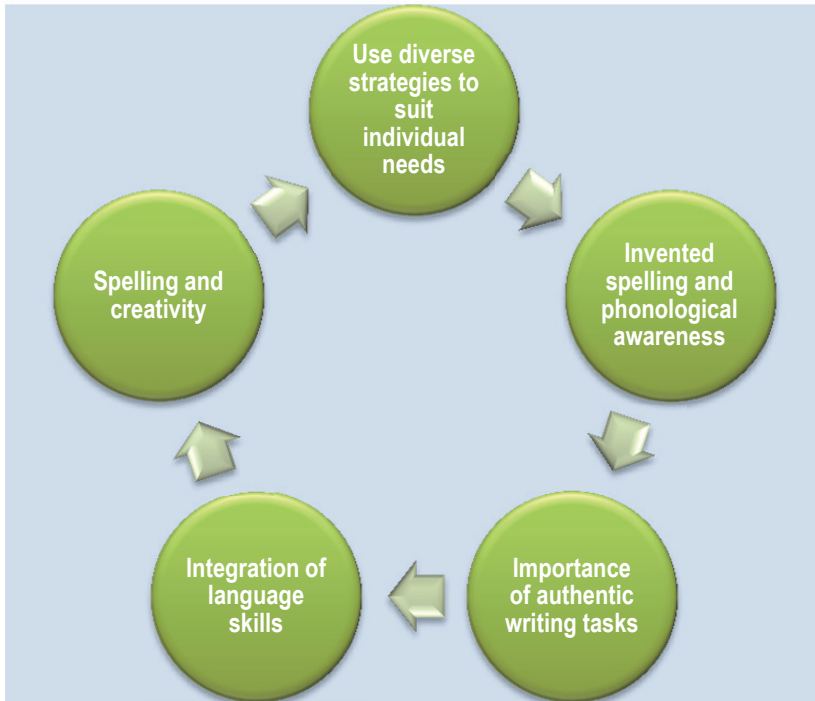
2. Words that end in *fe* or *lf* are made plural by changing them to a *v* and adding *es*: knife—knives, calf—calves.
3. If a word ends in *s x z ch sh* or *zz*, an *es* is added: bus—buses, witch—witches.
4. If the last two letters of a word are a vowel followed by a *y*, add an *s*: toy—toys.
5. If the last two letters of a word are a consonant followed by *y*, change the *y* to an *i* and add *es*: fairy—fairies, ferry—ferries.
6. Those words which do not add an *s* can be taught separately: fish, sheep, deer.
7. Others are still more irregular and change their vowel: tooth—teeth, mouse—mice, or add *-en*: ox—oxen, child—children (Ljungdahl in Winch et al., 2010, p. 274).

### 3.5.3. 'Look, say, cover, write, say, check'

Following the explicit instructions of this strategy works well for many students. They can later modify it to their needs, omitting steps such as saying the word aloud.

1. **Look** at a word carefully and observe its visual pattern.
2. **Say** the word aloud—this practice helps to reinforce the memory of the structure of the word, especially if the word is pronounced in its syllables.
3. **Cover**—this gives time to ruminate on what the word looked like in print.
4. **Write**—this further reinforcement mirrors the original word and reinforces the spelling pattern.
5. **Say**—by saying the word again, students may pick up whether it is accurately spelt.
6. **Check**—confirms accuracy of spelling (Ljungdahl in Winch et al. 2010: 348).

### Strategies to improve spelling:



1. The linking of the language skills of reading, writing, listening, and speaking. Culturally and linguistically diverse learners who have access to the internet and multimedia have opportunities to hear pronunciation of the target language. The growing knowledge of semantic, graphophonic, and syntactic information contributes to overall language ability.
2. Practice is needed in writing activities so that visual knowledge and understanding is reinforced.
3. Students need to understand 'why' they should give attention to spelling i.e. because it gives clarity to their communication. For older students, a metacognitive focus is very important. In the case of pre-service teachers there is additional motivation and purpose

because they will need to teach literacy/spelling and become role models for their own students. Editing, proof-reading and self correction should be encouraged without stifling their creativity. Silva & Alves Martins (2003) have pointed out the links between children's invented spelling and the development of phonological awareness. 'Invented' spelling is part of the learning process in the early years. The aim is to widen the students' vocabulary, not to have them fearful about misspelling and to deliberately choose a simple word they know they can spell.

4. A wide range of spelling strategies is advocated. A dictionary entry contains an enormous amount of information that can help students become aware of a word's meaning, how it is pronounced, with perhaps a phrase to illustrate what part of speech it is, whether the word is used colloquially, and its etymology. Similarly, a thesaurus can help students increase their vocabulary and choose words which are more interesting and descriptive e.g. *huge*, *colossal* instead of *big*.
5. The use of assistive technology such as computer spelling checkers and software programs (Vedora & Stromer 2007) can motivate students of all ages and abilities to achieve spelling proficiency. Digital and online materials present many teaching and learning opportunities to improve spelling outcomes.

### **3.6. Implications**

Future strategies for teaching English spelling and idioms will involve the important role of interactive software and computer games which can facilitate the language acquisition process. Talking books on the computer allow students to highlight particular words and to hear the correct pronunciation at the same time. The ability to work independently on language skills is a major factor in practising spelling.

George Bernard Shaw (1856-1950) advocated that *bomb* (from the French *bombe*) should be spelt *bom* in the interest of clarity and economics yet *bomb* is still spelt with a silent *b*. An established standard of spelling, accessible in dictionaries, will still be needed to aid effective communication. New words and new usage is introduced as more people use English as a *lingua franca*. Spelling reform may be introduced through the technology of the internet, multiculturalism, and globalisation. Gunther Kress predicts that in the future: "writing will, in the very near future, be speech displayed on a screen. The whole vast machinery of spelling regulation will very likely be unmade or remade by this move" (2000: 9). Over a decade later, however, this has not transformed English spelling although inroads are certainly being made through the contractions of text messaging. New spellings may eventually become standard and accepted in more formal writing: CU (see you) LOL (laughing out loud) 2NITE (tonight).

### **3.7. Conclusions**

While the information from surveys emphasised the importance the students attached to thinking strategies rather than a good memory in regard to spelling proficiency, the results have an element of subjectivity. The students used a wide variety of strategies to spell, sometimes idiosyncratic. The observations also have the caveat that the pre-service education teachers had reached graduate status at the end of their 4 year Bachelor of Education course and should therefore not be regarded as representative of other populations. Distortion of results can occur in surveys because it is difficult to express attitudes and values into words even where the respondents have high verbal ability. A further complication is that respondents may want to give a reply which they think is appropriate of a pre-service teacher. There is

possibly an alignment with the rhetoric of public perception but a misalignment with what they actually believe.

Despite these reservations, it is clear that accurate spelling is an aspect of literacy which requires thinking strategies, phonemic knowledge and a good memory. Teaching activities are more successful if linked to the curriculum and the real world. A balanced reading program which incorporates a wide variety of strategies linked to the individual needs is advocated. Teachers and students can practise strategies using word webs, 'have a go' books, spelling lists, spelling 'rules' or generalisations, 'look, say, cover, write, say, check', the dictionary, thesaurus, and word banks. New research questions could investigate the influence of multimedia on spelling proficiency. Spelling ceases to be a mystery if phonological, visual, morphemic and etymological knowledge is gradually acquired by the student. It can then become a tool for effective writing and reading. Correct spelling is a skill valued by society, placing pressure on the teaching profession. The teacher plays a vital role in the classroom since his/her enthusiasm and attitude towards language and spelling acquisition is infectious. Pedantry is to be avoided but accurate spelling is a courtesy to the reader.

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## **C**HAPTER 16

### **DIGITAL HUMANITIES AND HUMAN PERSPECTIVES: THE VERB TRAIN - A CASE OF TEACHING ANCIENT GREEK VERBS AT SECONDARY SCHOOL LEVEL**

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#### **Abstract**

This paper presents the results of a research concerning the application of educational software in classroom and its' possible correlations with pedagogical considerations and teaching behavior towards the software. It's been presented the application of the technical and computer environment features of the *Verb Train software* as well as some remarks concerning pedagogical perspectives during its' application in classroom. More specifically, *Verb Train* is educational software that facilitates teaching and learning the conjugation of Ancient Greek verbs at secondary school level. The rationale stems from the need to codify verb conjugations in alternative ways and is based on contemporary teaching methods that can be used in the classroom and as home study. The structure and organization of the curriculum is based on three functions:

LEARN & GRASP, PRACTISE & APPLY 1, and PRACTISE & APPLY 2. The program is accompanied by a CD-ROM Teacher's Handbook, which contains teaching tips and instructions, an extensive bibliography and worksheets with educational activities that cover the whole range of the curriculum, along with three Student's Books. School practice of this software showed a significant difference in the performance of students using it in order to understand and learn items of a "dead", classic language compared to those who didn't belong to a technology-oriented classroom. Important correlation between pupils' scores in learning to conjugate ancient Greek verbs and their teachers' perspective of ICT teaching has also been notified.

## **Keywords**

Ancient Greek – Grammar – Secondary school education.

## **1. Introduction**

In contemporary teaching, the traditional model of learning based on the Education-Educator-Learner approach is gradually being abandoned in favour of more flexible pedagogical practices that are personalized and open to a wide range of innovations. The concept of the daily classroom lesson is undoubtedly being gradually replaced by educational activities based on new methods and practices such as the application of new technologies. The singularity of audiovisual media is taking on great significance as a means of expression, thus acquiring more cultural and social value than technological. It is precisely this aspect that has prompted us to use computer technology for teaching and learning in one of the most traditional fields of study, i.e. Ancient Greek. Our experience as educators has shown that using computers in the classroom lends a different tone to the communicative activity. Although there are many examples of research projects in digital humanities, the area of teaching the ancient verb in its' entity by innovative methods is yet not quite explored.

More specifically, *Verb Train* deals with the specialized field of teaching Ancient Greek verbs. The rationale of this particular software stems from the need to codify verb conjugations in alternative ways so that the outlined pedagogical aims can be served. Information was drawn from the work of Bergeron (1990) in order to construct a learning environment based on the following principles: definition of the object of study; structuring of the activities and the related material; unification; creation of models; and, of course, the potential of experimentation. The locomotive engine and freight cars (see Fig. 1) are the kits to be assembled (Bertrand 1999), which provide the final data that will be constructive in the overall learning experience. Using the simple device of successive projections of the verb development stages, the data is gradually conveyed.



Figure 1:

## **1.1. Verb Train: software presentation**

### *1.1.1 Computer environment technical features*

#### *Minimum system requirements:*

Operating system: Windows 98, NT, Me, 2000, XP, Vista. Processor: Pentium III 500Mhz. RAM Memory: 32 MB. Graphics card: 800x600 screen resolution. Sound card: SoundBlaster 16bit or compatible. CD-ROM: 4x.

#### *Recommended System Requirements:*

Operating system: 2000, XP, Vista. Processor: Pentium III 800Mhz. RAM Memory: 256MB. Graphics card: 800x600 screen resolution. Sound card: SoundBlaster 16bit. CD-ROM: 32xlease use no more than three headings levels.

### *1.1.2. Introduction to the software*

On the home page of the program, Sophocles the Parrot makes his appearance. He is the wise helper who guides the user through the program. Three (3) main options will appear that will admit the learners to their corresponding class: the 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> year of secondary school. By clicking on any of these button/portals, the users are taken to the screen with the entries to the train station, which correspond to the teaching units, according to the grammar curriculum for each class.



Figure 2:

On this screen, the user can see six (6) options, which are activated by pointing the mouse to the icons of the corresponding students (Fig. 2). In this way, the user can choose the Voice of the verb in combination with the level of the task (learning or practice) and move to the corresponding platform. By selecting Active Voice, for example, at the PRACTISE & APPLY 1 level, the user moves to the central platform, where he/she has access to various categories of verbs (e.g. ones with vowel stems or dental stems). Here the user can click on one of the available categories on the wall of the corresponding platform, such as verbs with vowel stems or consonant (velar, labial or dental) stems. Following this route, the user ends up at the final station. He/she selects the verb of choice from the platform. Then, the user will see the six (or fewer) train engineer buttons (Fig. 3), by which to choose the mood, infinitive or participle. The user selects the verb, then the engineer (mood), at which point the train arrives, and finally he/she selects the tense of

the verb he/she wants to conjugate to start loading the train. There are additional buttons in the form of train parts (e.g. foglights, headlights and hooks) which correspond to suffixes, augments, reduplications, verb stem endings and infixes, helping the user to form the various verbs.

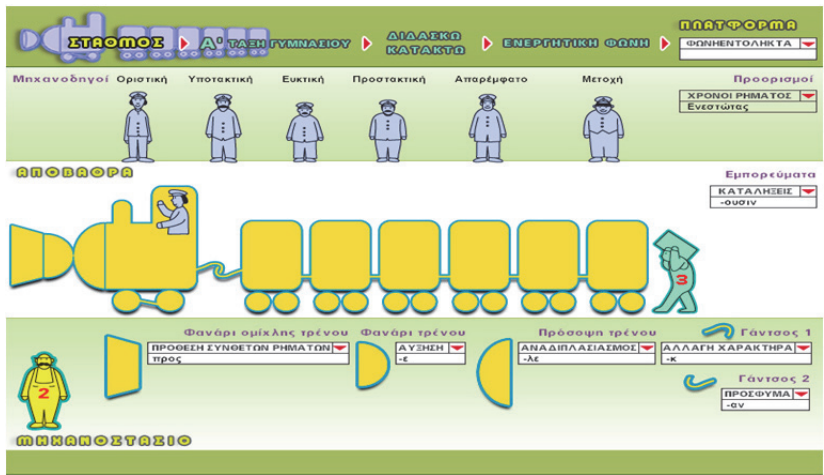


Figure 3:

STATION	YEAR 1	LEARN & GRASP			ACTIVE VOICE		PLATFORM VOWEL VERB STEMS
TRAIN ENGINEERS	INDICATIVE	SUBJUNCTIVE	OPTATIVE	IMPERATIVE	INFINITIVE	PARTICIPLE	
PLATFORM				GOODS SUFFIXES -ουσιϋ			
TRAIN FOGLIGHTS PREFIX FOR COMPLEX VERBS	TRAIN HEADLIGHTS AUGMENT	REDUPLICATION			HOOK 1 CHANGE OF FINAL CONSONANT OF THE STEM		HOOK 2 STEM ENDING
ENGINE ROOM							

When the user selects a verb and tense in the LEARN & GRASP function, then the verb is automatically 'loaded' onto the train car and a voice is heard reading

out the verb. In the PRACTISE & APPLY function, the difference is that the user must construct the verb form. The verb is conjugated as the user loads and unloads the proper affixes by clicking on the auxiliary buttons. The cars are loaded by dragging and dropping the correct parts in the correct car. When the user clicks on the "Information" button, Sophocles the Parrot appears on the screen and gives instructions and information about the auxiliary buttons.

In the event that the user makes two wrong selections, the rules for forming the particular Ancient Greek verb automatically appear. The number of correct or incorrect selections appears on the porter and the engine worker. The user also has access to the corresponding grammar rule at any time by clicking on the "Paper & Pencil" button. Each year level is differentiated on screen by means of the graphics for the station, the types of trains and the colours.

The following tool/buttons are on every screen of the program:

- "Information", which calls up the parrot with the corresponding instruction;
- "Back", which allows the user to return to the previous screen;
- "Exit", which allows the user to exit the program;
- "Eraser", which allows the user to delete mistakes in the PRACTISE & APPLY function;
- "Print";
- "Save";
- "Connect to the Internet";
- "Paper & Pencil", which calls up the grammar rules corresponding to the conjugation of the specific verb;
- "Volume";



- “Analyse”, which activates the grammatical analysis of a verb. The user may key in a verb using the polytonic system of orthography, and the verb is automatically analysed as to its voice, mood, tense, number and person, loading it onto the corresponding cars of the train.

## **2. Pedagogical principles**

The learner of Ancient Greek grammar initially has to deal with a range of mental functions that must be acquired in order to grasp the conjugations of verbs.

- The learner is called upon to memorize a large number of affixes corresponding to moods, tenses and noun verbs (infinitives and participles) and apply the corresponding rule in order to form them correctly;
- Apart from memorization, the learner must also have a firm command of the rules of spelling and of the diacritics (accents and breathings) used in the polytonic orthography system;
- At the practice stage, the learner must instantly recall a range of information that he or she must codify in order to give the correct answer.

This software was designed to help learners learn to conjugate Ancient Greek verbs and facilitate the above-mentioned mental functions. This is an interactive teaching method that compares the conjugation of verbs to loading the cars of a train. At the train station, the user is called upon to select the software functions that correspond either to learning verb conjugations or to applying the knowledge he or she has gained. There are two levels of difficulty: A and B.

The software obviously makes use of the train and cargo metaphor to achieve the visualization of the mental functions that the human brain must carry out in order to form the verb. At the same time, in a single

screen it presents all the knowledge needed to complete the complex task of finding the verb form, so that the learner can become familiar with it. The verb database is particularly broad, containing all the regular verbs found in Attic prose.

The software can be used by the teacher as an aid in the classroom and/or as self-access by the learner using the LEARN & GRASP and PRACTISE & APPLY functions. This interactive teaching method, based on the train metaphor, is capable of explaining the formation of the verb in terms of voice, mood, tense, number and person. Though the focus is on the learner in terms of choosing, loading and unloading the affixes, the teacher's role is definitive in coordinating and guiding the learners.

### ***2.1. Learn & Grasp function***

The message received by the user/learner at this phase is one-way and provides a specific and limited piece of information (the conjugation mode), aiming at developing powers of observation and pinpointing important information. Koroneou (2002) explains how using such messages in educational process serves specific learning aims and the precise knowledge of the object of study. Apart from the graphic representation of the verb conjugation during this phase, the user can also hear the verb being read out, since, according to Barthes' semiological observations (1964) on the functions of language in relation to images, the combination of oral speech and written text lend meaning to time and space, and fill in the information gaps.

### ***2.2. Practice & Apply 1 and 2 function***

This screen relays information with multiple meanings to the user, which aim at piquing his or her interest and imagination. The information unfolds gradually

(first the engine car with the verb stem, then the empty cars that are to be loaded). Canadian communications theorist Marshall McLuhan explains that each image invites the viewer to give meaning to it, as if it is saying 'fill me in'. The main aim is for the learner to assimilate the input. Regarding the strength of these messages, Koroneou explains that they cultivate creativity, personal research and participation in the building of knowledge.

We have made an effort to limit the multiple messages conveyed in the image for pedagogical reasons. We employed the technique of a montage of successive screens and a combination of the different elements in the development of the verb conjugation, since every screen/image acquires meaning based on the previous and following screen/image.

The sounds used in the program are limited so that the learner is not distracted, especially in the computer lab. Yet the complete absence of music and sounds would be dissatisfying and would impede the comprehension of the message. There are analogue sounds that are a direct reference to the real world (the hubbub of the train station and music heard on the platforms). The sounds allow for a greater dramatic effect, and activate and sensitize the learners' unconscious, encouraging them to identify with the role of the porter or traveler. The music substantially contributes to creating a unique atmosphere and the silence that follows is of particular significance because it prepares the learners to move into the activity stage. Emphasis has been placed on the sound of the train starting off because it functions as a reward. It essentially promotes an action and is a tool that facilitates the comprehension of the message, because it signals to the learner that he or she has successfully conjugated the verb.

The cars are the sign in semiotic terms; they are a strictly codified form of communication. For example, the users understand that the empty cars must be filled in (or loaded) with affixes in order for their train to be able to start off. There are two main aims:

- the information should be clear and brief;
- the visuals should be legible, that is, they should present the highest degree of imagery and representation (Koroneou, 2002, p. 48).

The introduction of this software as a teaching aid in the classroom aims at altering the structure of the lesson. The learning process can develop as Karakiza (1999) illustrates so that:

- A. The learners do not focus on the teacher, but on the computer screen in groups. The teacher only guides.
- B. Low-achieving learners develop a much higher level of communicative interaction with the teacher and their classmates, thus finding opportunities for a more substantial and equal standing in the classroom.
- C. The learners do not focus as a class on the teacher, but work in small groups focusing on the computer screen. In this way a localized form of communication is developed.
- D. There is shift in the teacher's role from the source of all information to the guide or facilitator.

In addition, the computer screen presents the information in a better structured way, easier to comprehend than the blackboard or a worksheet, and provides the learners with the means of reviewing the information as many times as they need. The multi-sensory organization of the verb conjugations through the train model also offers something of vital importance to dyslexic learners: the combination of movement and sound (Bradley 1981). This method

creates conditions for a “visual overview” (Stasinos, 2001), where the learners have the opportunity to do the following: a) look at the words; b) repeat the words; c) check their knowledge. One of the main advantages of the program is the indirect and impersonal correction of errors (when the cars have not been correctly loaded), remedying the problem of direct teacher correction, which can often be negatively interpreted by the learner. In any case, the new electronic learning environment presupposes that the teacher is prepared to contribute to the new teacher/learner interaction in a way that will make it productive.

### **3. Teaching uses**

This software is used by the teacher as a classroom aid and by the learner as self-access, using the LEARN & GRASP and PRACTISE & APPLY (levels 1 & 2) functions. As mentioned above, this is an interactive teaching method based on the train metaphor to explain the formation of the verb in terms of voice, mood, tense, number and person. Although the learners play the pivotal role in the classroom in selecting, loading and unloading affixes, the teacher’s role is definitive in coordinating and guiding them. Pregent (1992) describes the role of the teacher as the engineer of knowledge, who coordinates and evaluates the learners’ efforts and the paths they must follow to achieve their aims. The software aids the teacher in exploring and explaining an aspect of grammar by helping the learner comprehend and assimilate new concepts. It essentially prepares the feedback activities that will help learners grasp what they haven’t understood thus far.

As the software provides access to learning grammar through visualization (the train) in combination with sound (the reading out of the conjugated verb) in

addition to the traditional deductive presentation of knowledge (the grammar rule which appears in a pop-up screen), using the program in the classroom can go beyond the boundaries of the mechanical teaching of Ancient Greek. The learners have the opportunity to work together in the lab, to make use of the numerous pieces of data from the verb platform so that, on their own, they can inductively observe, discover and express the rule applying to the aspect of grammar they are studying. Moreover, the function of analyzing verb forms as to voice, mood, tense etc, is available by clicking on the platform icons, aiding the adequate comprehension of a grammatical form and its etymological relation to Modern Greek, thus helping to improve the translation of the verb in an Ancient Greek text. In this way, the teaching of grammar acquires meaning and purpose, for when it is taught in isolation, it can often become boring for the students and detrimental to the Ancient Greek lesson in Greek secondary schools.

Finally, the teacher can collect the results of the learners' project work either printed out or via email. The above-mentioned educational potential of this software is presented in an organized manner and the learning process is aided by supplementary specially designed worksheets that cover the curriculum in terms of the teaching of Ancient Greek verbs. These worksheets are included in the CD-ROM Student's Book and Teacher's Handbook.

#### **4. Teaching uses study**

A recent study attempted an examination of the relations of perceived use of ICT in classics and how the stakeholders concerned see the process of learning, with specific reference to either class or individual application of the verb train. It was thought that teachers involved in teaching ancient grammar by

the media of the verb train would feel rather satisfied by the innovation applied. In addition, it was hypothesized that any possible effects on pupils learning would be recognized as the verb train's contribution and their attitudes toward learning ancient Greek grammar would be different. As to the cdrom's creators, they were almost convinced of the efficiency of their creation in what concerns learning tasks, although they had some second thoughts about the complicated use of the drag and drop cursor system during the verb's choice by the cdrom's user. In short, it was a partial test of the application of ICT learning as the stakeholders were expected to be negatively related to differences in teaching or learning scores and positively related to the acceptance of the value of the educational item, in our case, the conjugation of ancient Greek verbs.

#### **4.1. Procedure**

The study was conducted in a population of teachers of humanities and their pupils' scores in written exams, in secondary education schools all over the country. They were selected to reflect the Greek population of humanities' teachers and the appropriate percentage was randomly selected to fill in a questionnaire as well as a standard test measuring their familiarity with ICT.

#### **4.2. Pilot Study**

The construction of the belief-based measures of attitudes and perceived behavioural action in teaching was based on an initial pilot study. About 26 teachers and their pupils, randomly selected, were interviewed. The pilot study consisted of structured scheduled interviews employing six open-ended questions: "What are the advantages of computer teaching ancient grammar?", "What are the disadvantages of computer teaching ancient grammar?", "Who approves of you

applying digital humanities?”, “Who disapproves of you applying digital humanities?”, “What will stop you from teaching the verb train in the future?” and “What will make you continue teaching the verb train in the future?”. The participants identified crucial factors regarding their teaching behavior, in the form of modal beliefs, with the advantage of eliciting their own personal beliefs. The procedure was employed at the early stage of the research so that a set of categories could be produced for the construction of closed questions for the main study that resulted from a content analysis based on the frequency that each belief was mentioned by the participants and the meaning they conveyed.

### **4.3. Questionnaire**

**Direct attitudes.** Direct attitude measures were obtained by asking the participants to evaluate, with reference to themselves, their ICT teaching on a set of 7-point semantic differential items. In half of the items the positive pole was presented first, and in the other half the negative pole was presented first, so as to control for response bias (e.g., worthwhile-frustrating, boring-interesting, competent-incompetent). The average over all scales served as a general measure of direct attitude toward teaching the verb train.

**Direct subjective norm.** Three 7-point rating scales were used to assess direct perceived subjective norms toward ICT education in humanities. The statements included: “Most people who are important to me think I should continue and enlarge my teaching ancient verbs via the verb train” (unlikely-likely), “Most people who are important to me approve a restriction of ICT teaching ancient verbs in the classroom” (disapprove-approve); and “Most people who are important to me would like me to teach the ancient Greek verbs without basing on the cdrom” (unlikely-likely).



Summing responses to the three scales gave a direct measure of subjective norms.

**Direct perceived teaching control program.** Three 7-point rating scales were used to obtain a direct measure of perceived teaching methodology. The statements included: "How much intention do you have in teaching ancient grammar by the verb train?" (very little intention-complete intention), "For me to continue teaching ancient grammar by the verb train is ..." (easy-difficult); and "If I wanted to, I could efficiently teach ancient Greek verbs via the verb train" (extremely unlikely- extremely likely). Average responses to the three scales provided a direct measure of perceived teaching behavior toward the software.

**Intentions.** Two 7-point semantic differential items elicited intentions to teach or learn humanities via ICT. The statements included: "I intend to teach more ancient Greek verbs" and regarding to software, ": "I intend to use more the *Verb Train in classroom*" and "I intend to use more the *Verb Train* as home practice" (extremely likely-extremely unlikely).

**Belief-based attitude.** The belief-based attitude measure was developed according to the beliefs elicited by the 26 randomly selected participants in the pilot study. They reflected the participants' perceptions of the advantages and disadvantages that result from the engagement in ICT education in Greek high school. The strength of these beliefs was assessed by means of 7-point scales. The statements included: "My ICT teaching will result in a better knowledge of ancient Greek grammar" (unlikely-likely); and "My ICT teaching will be more interesting to my pupils" (unlikely-likely). The subjective evaluations of these outcomes by 7-point scales included: "It is very important to me, the acquisition of ancient Greek

grammar by my pupils" (completely important to me-very important to me); and "Getting my pupils interested in class is ..." (completely important to me-very important to me).

***Belief-based subjective norms.*** The belief-based subjective norms involved the referents elicited in the pilot study. The respondents indicated the strength of their normative beliefs in a 7-point scale: "How much do the following people [pupils, other teachers, headmaster, parents, Ministry of education,] would agree with your teaching via the verb train?" (strongly disagree-strongly agree). Motivation to comply with each referent was measured by a 7-point scale of the following question: "How important to you generally are the views of the following people [pupils, other teachers, headmaster, parents, Ministry of education]?" (very unimportant-very important). Each normative belief score was multiplied by each motivation to comply score, and the resulting products were summed across the five normative referents to give a total score.

***Belief-based control program.*** Based on the factors in the pilot study believed to facilitate ICT teaching of classics, the participants were asked whether they believed they could control some factors. For example, the statements included "Preparing ICT scenarios for the verb train in the future is..." (out of my control-under my control); and "Performing ICT teaching of humanities in the school's laboratory in the future will be..." (difficult-easy); "Using fluently the software in a personal computer is..." (out of my control-under my control). Because the beliefs identified from the pilot study reflected both external and internal factors that could make the participants use the verb train, the scales for the external factors had poles in terms of control (out of my control-under my control), whereas the scales for the internal factors had poles in terms of

difficulty (difficult-easy). Subsequently, participants were asked about the perceived effect that each factor could have in their teaching. For example, the statements included "Getting my pupils to conjugate verbs in computer environment will help their scores" (false-true); and "Parents encourage pupils when practicing grammar courses in computer" (false-true).

All of the scales were scored from 1 to 7, and the scores of the perceived effect of each factor were multiplied with the perceived ease of accomplishment, and the sum of these products resulted in a belief-based measure of ICT teaching of ancient Greek.

## **5. Results**

Of the 152 educators who participated in the interview, 5 were unable to indicate the accurate sum of school hours used in teaching the verb train and almost 35 have admitted that they used the verb train more often when they gave private lessons at home, rather than in school. The sum of ICT school hours varies between 2 and 96 hours per school year ( $M=26.4$ ,  $SD=20.3$ ). The age of the sample ranged from 36 to 41 years ( $M=38.9$ ,  $SD=1.3$ ).

When teachers asked to evaluate their teaching with reference to themselves, the number of school hours they applied in ICT teaching was found to be unrelated to their class image: it seems that they considered their teaching as equally interesting or worthwhile. In addition, the direct attitude of teachers with less ICT school hours was found unrelated to their pupils' scores in the exams although their intentions, for example, to teach or learn more ancient greek verbs are positively related to bigger exams' scores. But, the more school ICT hours applied, the more teachers perceived its' necessity and the efficiency of an

amplification of ICT teaching of ancient Greek grammar.

The strength of the beliefs of teachers such as that ICT teaching will result in a better knowledge of ancient Greek grammar or will be more interesting to their pupils are positively related to their ICT school hours and the classes' scores. In addition, the ability to organize ICT courses of the verb train was reflected in those teachers who were already dedicated to many ICT school hours in classroom but didn't have a clear effect on pupil's scores.

The correlations of the duration of ICT classes (ICT school-hours applied per year) and the exams' scores of each class with the intention of teachers, the direct attitudes, subjective norms and their direct teaching control are reported in Table 1.

Table 1: Correlations of number of ICT school hours, class's exam's scores with intention, direct attitude, direct belief based attitude towards the verb train and direct teaching control of the teachers.

	ICT SCHOOL HOURS >30	ICT SCHOOL HOURS <30	EXAM'S SCORES >14.5	EXAM'S SCORES <14.5
INTENTION	.24**	.10**	.25**	-.05
DIRECT ATTITUDE	.26**	.13	.24	-.11
DIRECT BELIEF BASED ATTITUDE	.24	.13	.14	-.02
DIRECT TEACHING CONTROL PROGRAM	.23**	.13	.08	-0.4

Note : N=152

\*p<.05. \*\*p<.01

The correlations of the duration of ICT classes (ICT school-hours applied per year) and the exams' scores of each class with the intention of teachers, the indirect attitudes, indirect subjective norms and their indirect teaching control are reported in Table 2.

Table 2: Correlations of number of ICT school hours, class's exam's scores with intention, indirect attitude, indirect belief based attitude towards the verb train and indirect teaching control program.

	ICT SCHOOL HOURS >30	ICT SCHOOL HOURS <30	EXAM'S SCORES >14.5	EXAM'S SCORES <14.5
INTENTION	.24**	.10**	.25**	-.05
INDIRECT ATTITUDE	.26**	-0.4	.13**	.24
INDIRECT SUBJECTIVE NORM	.25**	-.10	-.04	.02
INDIRECT TEACHING CONTROL PROGRAM	.23**	.13	.08	-0.4

Note : N=152

\*p<.0.5. \*\*p<.01

## Conclusions

Regarding the beliefs of stakeholders evolved in the education process, it appears that pupils, teachers and headmasters' ideas about the value of the verb train vary. Parents and government administrators are alleged to be very enthusiastic about the ICT ancient Greek course. It seems that efficiency in teaching ancient Greek verbs via interactive media is related to the personal beliefs of teachers, pupils, parents and administrators evolved in education. The cdrom served as a common use material to educate but it was better used by those who already believed in its' value. As long as teachers were persuaded that authorities wished their ICT teaching, they invested in ICT hours. But, real progress scores were obtained in the case of teachers who believed, themselves, in the teaching value of this software. It was remarked that classroom efficiency of the *Verb Train* was spread positively mostly among students of medium scores in ancient Greek and especially in those cases where no conflicting values, having an influence on educational tasks, existed.

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## **C**HAPTER 17

### **PSYCHOLOGICAL ASPECTS AND DIDACTIC MODEL OF THE ACQUISITION OF THE BASICS OF IMPROVISATION ART BY STUDENTS**

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#### **Abstract**

In the educational process, the development of tools for the content-analysis of pupil's activity at mastering improvisation and defining and solving its tasks is undoubtedly very topical. Thus, for instance, these scientific means can serve as an essential initial stage for constructing the models of both improviser's activity and improvisations themselves. However, even finished didactic models for mastering the fundamentals of improvisation do not remove the necessity of tackling tasks pertaining to the development of students' creativity and intuition. It is essential to promote the development of students' ability to independently search for the needed information in order to solve their creative tasks. In scientific literature, among different approaches to understanding the content of a problem situation in the field of psychological aspects of mastering improvisation by students, three directions can relatively be identified: development of students' creativity

and intuition, methods of optimizing creative processes, and possibilities for modelling and structural analysis of creative processes. Today, one of the most topical issues is the problem of the application of style approach to studying processes of how students acquire improvisation. Author's research has shown that style modelling should provide the basis for a didactic model.

## **Keywords**

Music education - Music improvisation – Style modelling – Didactic model

## **Introduction**

Today, the notions of music improvisation are changing rapidly. Students of higher education institutions learn new forms of improvising, and these forms require an ability to improvise in various styles and genres. By increasing the effectiveness of higher professional education, by reacting to the changeable social and economic situation and creating conditions for a sustainable development of education, wider perspectives are provided for students' life-long education. In Latvia, at present extensive research is being conducted on the situation in higher education, on its quality and development trends. Latvia's joining the European Union has greatly contributed to starting research in this field. We have realized that the system of values in our contemporary world is rapidly changing. The expansion of the labour market, competitiveness and the necessity to work in a multicultural environment – are the new conditions to which the teachers of Latvia have to adapt themselves too. The research on the historical and theoretical aspects of the development of improvisation, on its brightest manifestations in contemporary music will enable us to determine the dominant tendencies in the development of today's improvisational art and in the study process of improvisation as well. Technical skills

of improvisation and psychological skills of improvisational art are the basic things which, if implemented together and in development, ensure a person's professional self-realization.

Several researchers of problems in pedagogy (e. g., Green & Gallwey 1987; Burnard 2000; Burnard & Younker 2004; Thompson & Lehmann 2004; Barrett 2005; Koutsoupidou 2005; Webster 2005; Goncy & Waehler 2006; Hickey 2009) are concerned with the research on the possible ways of developing students' creativity, intuition, self-effectiveness in performing art, composition and improvisation, the specificity of correlation existing between the qualities of a creative personality and the extent of his music experience.

## **1. Psychological Aspects of Acquiring Techniques of Improvisation**

At describing the psychological aspects of acquiring improvisation by pupils, there arose a vital necessity to consider alternative or analogous viewpoints of other authors reflected in scientific literature. It was essential to establish credibility, adequacy, non-contradictoriness and completeness of their viewpoints concerning this problem situation as described in their works. For this purpose, the scientific literature, published abroad and in Latvia, reflecting various approaches to the understanding of the content of the problem situation and identifying pedagogical problems and tasks of teaching the fundamentals of improvisation was analyzed (Reimer, 1970; Green & Gallwey, 1987; Elliott, 1995; Burnard, 2000; Pressing, 2000; Hamilton, 2002; Burnard & Younker, 2004; Thomson & Lehmann, 2004; Kertz-Welzel, 2004; Ward, 2004; Barrett, 2005; Koutsoupidou, 2005; Martin, 2005; Webster, 2005; Zariņš, 2005; Goncy & Waehler, 2006; Hallam, 2006; McPherson &

McCormick, 2006; Hickey, 2009; Dairianathan & Stead, 2010; Kingscott & Durrant, 2010).

Among different approaches to understanding the content of the problem situation in the field of psychological aspects of mastering improvisation which are reflected in scientific literature relatively three directions can be identified.

**The first** direction is concerned with the research on possible ways of developing pupils' creativity and intuition at music performing, composition and improvisation lessons, as well as with the research of conditions under which they are manifested and specificity of the correlation between the peculiarities of a creative personality and his musical experience.

**The second** direction investigates methods of optimizing creative processes.

**The third** direction relates to the research on modeling and structural analysis of creative processes.

### ***1.1. The development of creativity***

This direction has been taken by many researchers of pedagogical problems (for instance, Green & Gallwey, 1987; Burnard & Younker, 2004; Thompson & Lehmann, 2004; Barrett, 2005; Koutsoupidou, 2005; Webster, 2005; Goncy & Waehler, 2006; Hickey, 2009).

Within the frame of this paper we will address those approaches to the understanding of the content of problem situation in the sphere of psychological aspects of mastering improvisation which are reflected in the works by such authors as: Green & Gallwey, 1987; Thompson & Lehmann, 2004; Hickey, 2009.

B. Green and W.T. Gallwey, the American researchers of the problems pertaining to music playing, show ways for reaching new heights in this field. At investigating the problems of developing creativity they give the readers practical recommendations on how to relax psychologically and loosen muscle tension at the lessons of composition and composition. These authors are convinced that anyone has the ability to demonstrate spontaneous musical creativity. To optimize one's own musical creativity, it is necessary to lessen the interference of one's consciousness and rely on intuition more (Green & Gallwey, 1987).

The researchers are absolutely right at stating that to develop pupils' creativity and intuition the tension of their muscles should be lessened and they should feel psychologically relaxed at the lessons of improvisation and composition, however, they do not point out the fact that only a rich professional experience is a prerequisite for intuition. It is only the rich environment of professional sensations and sufficient amount of professional knowledge that can help to optimize pupils' intuition. The work on enriching the sphere of professional feelings and knowledge must not be carried out uncontrolled. Yes, any of us possesses the ability to demonstrate a spontaneous musical creativity on condition the rich environment of professional sensations and sufficient professional knowledge will comply with those requirements and criteria that are set by the content of contemporary music education.

Both the English researcher of theory and practice of musical performing art, S. Thompson and a music theoretician from Germany A. C. Lehmann have come to the conclusion that reading music from sheet and spontaneous improvisation require developing one and the same skills. For both perfect reading from sheet and improvisation, it is necessary to identify and learn



thoroughly typical patterns of texture of this or another style. But the aim of perfecting improvisation skills is developing a unique style of performance, while the aim of perfecting skills of reading music from sheet is to create the illusion of a well-rehearsed performance. Both authors state that if these skills are developed properly and are frequently used in practice, they may contribute to developing intuition and thus open new levels of understanding music (Thompson & Lehmann, 2004).

We share the opinion that automation of improvisational skills and skills to read music from sheet will form a good basis for creative activity and development of intuition. However, if the identification of typical patterns of texture for reading from sheet does not cause any difficulties, the identification of typical patterns of texture for improvisation is sure to bring problems. To create a unique style of performing the improviser himself will have to create typical patterns of texture, but the above mentioned authors do not offer any methodologies or methods for their creation. This is the weak point of S. Thompson's and A. C. Lehmann's research. Any didactic model which claims to be a complete description of the problem situation must be able to offer strategies for generating new knowledge.

M. Hickey, the American researcher of problems on music pedagogy and musical improvisation, is absolutely right when she underlines the fact that teaching the fundamentals of improvisation to all pupils by applying one and the same methodology whose sole aim is to make pupils master "standard blocks" of melody and rhythmic figures, of harmony and texture is not acceptable. Such methodology will inhibit the development of their creativity and will lead to mechanical repeating of ready-made patterns. She considers that "true" improvisation cannot be taught

by traditional pedagogical methods. M. Hickey sees the problem in the combination of “teaching” and “improvisation” itself. Therefore she offers that from all the stylistic diversity the pupils should acquire only free improvisation, and the function of a teacher should be reduced to observation, diagnostics, general supervision, offering alternative suggestions within the context of pupil’s creative initiatives and modeling the possible development of those initiatives (Hickey, 2009).

Though concerning her general position M. Hickey is right, we cannot agree with the conclusions she has made. Her notion about the process of improvisation is obviously confined only to her own experience. Pupils need and must acquire improvisation of various styles, and it must not be limited to mastering free improvisation only – the problem does not lie in style, it lies in the lack of a didactic model of improvisation adequate to the needs of contemporary pedagogy, and this is what M. Hickey does not offer.

### ***1.2. Methods of optimizing creative processes***

This direction is also well represented by a lot of researchers of problems in pedagogy (e.g. Reimer, 1970; Elliott, 1995; Hamilton, 2002; Martin, 2005; Hallam, 2006; Спигин, 2008). Within the frame of this paper we will focus on the approaches to understanding the content of a problem situation in the field of those psychological aspects of mastering improvisation which have been reflected in scientific literature by such authors as: Elliott, 1995; Hamilton, 2002; Hallam, 2006.

The leading America’s representative in the philosophy of musical education, D. J. Elliott, maintains that the development of students’ ability to deeply understand the structure and objective regularities of music, to

capture its essence, depends on their consistent defining and solving creative tasks at the lessons of music performing, composing and improvising etc. Students should participate in creative projects that are maximally close to real conditions in which different forms of musical experience are used (Elliott, 1995).

The appeal to set and solve creative tasks in real conditions sounds quite convincing. However, we seriously doubt whether any creative activity involving the use of different forms of musical experience might result in achieving the aims set by contemporary pedagogy. The situation when the existence of science schools, of their leader who would set the vector for the development of the school, of a research program which would consolidate the collective on the basis of a common goal, become non-obligatory raises serious doubts. Music performing, improvisation, composition, arrangement, practice of conducting and listening to music, either to recorded or at concerts, should be realized via conceptual network of methodological instructions of pedagogical science. Only that creative activity involving the use of different forms of musical experience, which is integrated into some leading scientific school with its own methodological tools of research, and talented teachers of higher education institutions will be able to help students to create their own unique creative style. The students should also be familiarized with the method of scientific thinking which is passed from mouth to mouth. Just this function is the most important function of both a teacher and a school. This combination of conditions provides for a further development of their musicality.

A. Hamilton, the English jazz pianist with a wide range of scientific interests, while investigating the interrelations between musical improvisation and composition arrived at the conclusion that

improvisation art and composition have many meeting points in common. For instance, improvisation is based on the method of composition. Like in an album of a painter or in notebooks of a composer, the fragments of the eventual whole are initially treated by the improviser as isolated pieces (Hamilton, 2002).

A. Hamilton's investigation is no doubt reliable, adequate and does not contradict with the description of the problem situation given in the title. However, we cannot speak of a full description here, because the problem is understood only one-sidedly. The research is conducted only within the framework of the discussion about the legitimacy of using patterns in improvisation. But the improviser does not go on stage in order to constantly demonstrate ever new texture and harmony solutions. The greatest improviser W. A. Mozart created his brilliant improvisations and compositions on the basis of scale-like passages, different kind of arpeggio and broken chords (Alberti Bass), namely, on the basis of patterns. Patterns underlie not only improvisation, but also composition and any human activity in general. Patterns are the basis of creativity. The problem lies in a different plane. It lies in the ability or in the absence of ability of creating improvisations or compositions from different kind of patterns in which the emphasis is laid on the figurative-intonational dramaturgy. The interpreters, too, are faced with the problem of figurative-intonational dramaturgy. And this is the central problem of scientific research and practice. The solution of this problem should also be part of the acquisition of fundamentals of contemporary improvisation. Otherwise pseudo-values may become the major object of the research and pedagogy.

S. Hallam, a specialist in the psychology of musical education from England, in his investigations on the psychology of creativity of performers, composers and

improvisers maintains that if students wish to express themselves creatively within the frame of some musical genre, they will have to broaden their experience beforehand by obtaining knowledge about the specificity of that genre. They can acquire this knowledge by listening, analyzing, imitating and participating in developing the patterns of this genre together with more experienced composers and improvisers. For instance, students who study jazz improvisation may analyze and memorize patterns of melody, rhythm, harmony and other means of musical expressiveness selected from recordings of various jazz musicians. S. Hallam suggests that students should develop and vary these selected patterns (Hallam, 2006).

On the whole, S. Hallam's research complies with the requirements for reliability, adequateness, non-contradiction and completeness of the description of a problem situation which has developed in the area of pedagogical knowledge concerning training performers, composers and improvisers. However, in the content analysis of this problem area the issue about transition from not-knowing to knowing remains open. For instance, when students develop and vary the selected patterns of means of musical expressiveness from improvisations of different jazz musicians. How should they develop and vary the borrowed material? This is the most essential question at the developmental stage of the prospective improviser, and a proposed solution to this problem is collective composing or joint improvisation together with more experienced composers or improvisers. This solution is mistaken because it does not reveal the methodological basis for the formation of students' knowledge. The outstanding composers and improvisers we mentioned above are, in most cases, self-educated persons who have no pedagogical education, and therefore to entrust students'

education to them would be wrong. Lecturers of higher education establishments are the right persons able to ensure the transition from not-knowing to knowing, because they know the didactic model for the acquisition of the fundamentals of improvisation, and the content of this model will describe the procedures of defining correct tasks adequate to the structure of pedagogical problem situation.

### ***1.3. Modelling and structural analysis of creative processes***

This direction is widely represented in pedagogical science (e.g. Pressing, 2000; Ward, 2004; Kertz-Welzel, 2004; Zariņš, 2005; McPherson & McCormic, 2006; Dairianathan & Stead, 2010; Kingscott & Durrant, 2010).

Within the limits of this paper a good example is those approaches to understanding the content of problem situation in the field of psychological aspects of mastering improvisation by pupils which are described in works by such authors as: Pressing, 2000; Zariņš, 2005.

J. Pressing, the Australian researcher of issues of psychology of musical improvisation, unfolds a wide panorama of possibilities for modeling improvisation by means of various scientific disciplines. J. Pressing asserts that what an improviser needs is, first and foremost, effectiveness (Pressing, 2000).

With all due respect we feel for the author, we have to point out, however, that for the investigation of a problem situation in the area of musical improvisation his description is too overburdened with excess knowledge. Therefore it is very difficult to identify the final goal of the research. On the other hand, there is obviously not enough knowledge about the procedure

of improvisation, about ways of forming pupils' initial movements of playing, skills and abilities, about the mechanisms of the origin of new knowledge. It should be admitted that the author himself emphasizes the fact that in this research the issue of modeling the development of students' improvisation skills remains less explored, and therefore only a brief discussion of the problem is provided here.

D. Zariņš, the Latvian researcher of issues of musical pedagogy and improvisation, has managed to develop a well-balanced system for the acquisition of improvisation at piano playing lessons. The time frames of the research of methods and techniques for mastering improvisation comprise the stage of pedagogical experiment from the first period of unconscious perceptive musical activity up to the period of pupils' conscious use of some means of musical expressiveness in their improvisations. The principle merit of this system of education is a detailed step-by-step description of the procedures for the transition from not-knowing to knowing the objective regularities of musical improvisation and ways of forming pupils' initial movements of playing, skills and abilities, and this procedure takes place under the supervision of a teacher. D. Zariņš considers that the music teacher's main task is to assist in musical creativity, but not to stimulate pupils to manipulate various elements of the language of music (Zariņš, 2005).

The analysis of the descriptions of various problem situations in pedagogical activity showed that when skills are developed in the process of mastering improvisation, pupils' creativity and intuition are of major importance. This is why almost all the researchers of the problems of the acquisition of improvisation insist on the development of creativity and intuition.

Issues concerning psychology of creativity and psychology of improvisation are of major significance for the theme of this paper. However, these problems are relatively new and therefore insufficiently studied. The issue of "improviser's consciousness" and that of "improviser's behavior" and his dependence on rational, conceptual, logically mediated as well as sense, contemplative, intuitive, spontaneous perception of being are often treated abstractly, theoretically or absolutely speculatively. The fact that every improviser has his own "point of reference", his own reasons to be "himself" and the right to formulate his own rules of creativity is not taken into account. The implementation range of his behavioral alternatives is wide – from "the rule must by no means be violated" to "the rule must by no means be observed".

#### **1.4. Main ideas**

At acquiring improvisation, student's central objective is developing such skills as:

- skill of intuitive search for creative solutions among the variety of impressions and emotions during improvisation process;
- skill to be guided by integrated impressions, integrated images which fulfill the function of peculiar generalized "plot" frames during improvisation process;
- skill of instantly assimilating any musical idea, of enriching by images and creatively embodying the material offered from the outside during improvisation process;
- skill of making changes in the previous program of actions during improvisation process;
- skill of generating seminal ideas, of activating intellectual spontaneous activity during improvisation process;



- skill of analyzing and modeling original, creative musical ideas during improvisation process;
- skill of organizing the process of developing a musical form from accidental fragments of other integrated systems during improvisation process.

*The skill of intuitive search for creative solutions among the variety of impressions and emotions during improvisation process.* From what Carl Martinsen (Мартинсен, 1966) has stated, it results that during the improvisation process, improviser's sound-creating will is based on spontaneity and instantaneousness. Isolated fragments of a thinking process as a unity of the sensual and the rational flash across the mind unconsciously, but we are maximally conscious of the outcome – the concrete embodiment of what was intuitive into realities of musical textures. The decisive role in the process of materializing musical ideas is not performed by the experience of building sound constructions guided by consciousness, but rather by sub-consciousness.

On the one hand, musical ideas which the improviser is aware of release resources of sub-consciousness; on the other hand, by sending various impulses to consciousness, sub-consciousness enriches them before they get materialized. The process of improvisation is a succession of moments of materialization of unpredictable reflective constructs of sound-creating will which follow one after another in a real time of performance.

*The skill to be guided by integrated impressions, integrated images which fulfil the function of peculiar generalized "plot" frames during improvisation process.* Actually, during the improvisation process musical theme proper is of little importance: important is "collective getting into some stream, into some river" (and just this is what gives the musicians and

listeners the greatest pleasure, joy, satisfaction), where "the stream" or "river" is familiar norms of style, genre, texture, form etc. And these norms are willingly and readily realized, as if improvised, by the whole collective, though actually it is no greater impromptu than, let's say, the presentation of a lecturer given "on the spot", the lecturer who knows his subject excellently, has long been teaching it and has explained it to his listeners many times. The "theme" itself (both in case of improvisation and in case of a lecture) is only an external reason, impulse or a definite intonation or sense accent. During the concert, the improviser is guided by integrated impressions, integrated images which fulfil the function of peculiar generalized "plot" frames. An integrated impression appears to be, first of all, an unconscious, "spontaneous" process which has nothing in common with the moment of conscious, artificial uniting of elements (Kypт, 2005).

During the process of improvisation, this skill is manifested in the professional ability of regrouping stable and mobile elements of improvisation. In improvisation, the generalized plot frame is traditionally understood as a way of unfolding the chain of musical events. For instance, such as plot or exposition, the development of actions, culmination, coda (in the best improvisations). The unfolding of the chain of events implies also the succession and motivation of the application of methods by means of which the musical material is being varied. Varying is realized on the basis of ready-made fragments of melody constructions at improviser's discretion. This provides the opportunity to vary the ways of unfolding the succession of musical events. For instance, the change of succession and motivation of applying methods by means of which musical material is being varied. The change of the succession and motivation in

the use of the most stable and mobile elements of improvisation is also possible.

*The skill of instantly assimilating any musical idea, of enriching it by images and creatively embodying the material offered from the outside during improvisation process.* To instantaneously assimilate any idea, to enrich it by images and then creatively embody the material offered from the outside (for instance, in a collective creative activity at exchanging replicas when improvising in ensemble and, in general, at perceiving and developing an unfamiliar improvisation line in ensemble). In this case improvisation is not a spontaneous lyrical self-realization, but rather a public and urgent fulfilment of somebody else's creative will. It is also the skill of stirring up the whole improviser's creativity, the whole wealth of his imagination at the needed moment to fulfil a musical task dictated from the outside and to transform it into a personal creative act. Within this context, it would be irrelevant to speak about freedom and absolute independence of emergence of images from the will or consciousness. Here we have to speak about the improvisation on a given theme (in a wide sense of a word). To tackle tasks the improviser is faced with in such situations, personality needs qualities relating to the influence of previous experience on the perception – to apperception. Besides, this experience should be of a definite content and quality. Boris Teplov maintains that only a person with great spiritual, intellectual and emotional content may become a great musician (Теплов, 2005).

*The skill of making changes in the previous plan of actions during improvisation process.* Every process of musical improvisation (if it is actually a creative, but not a mechanical, deliberately non-regulated process) involves some new melodic nuances, fresh harmonic colors, unusual textural solutions and articulation

shades. Sometimes the dynamics of accents, saturation of intonation as well as the dynamics of sounding changes, in other cases even the plastic of creative behaviour and the way the improviser's personality is embodied into a created musical image are transformed. This happens due to various reasons: such improviser's impromptu is sometimes induced by his creative dissatisfaction, unforeseen search for a different solution, constant need for experimenting, or in other cases – by the changes in his general creative state, which also determines the modus of improvisation process; beside these, there might be also: unusual visual factors, a new environment, different acoustics, a strange instrument, unfamiliar audience, a new group of performers. In such cases the improviser is not always aware of the necessity to change the previous plan of actions beforehand, he himself often feels stunned in this situation.

In extreme cases, having lost a psychological stability, creative processes are reduced, the improviser loses control over them against his will. If the control of will is not present, we deal with creating primitive things, i.e. with intentional or unintentional imitating patterns or with a spontaneous, underdeveloped manifestation of composing by sub-consciousness. In such cases, a hand itself, without consciousness' knowledge, hectically implements the needed texture, as if running ahead of improviser's intentions: usually these are persistent repetitions of cadence formulae functioning as an axis, round which, with a constant persistency, rotate different broken phrases, once learnt to a complete automaticity with "accidental" sound combinations (Мальцев, 1991).

The most striking feature of an improvisation process lies in the fact that even during the creativity which takes place under the control of highly developed composition models, improvisation is able to generate

a processual inversion. In this case, its embodiment precedes intention when a hand itself guides the thought, therefore what is being created is under a poor control and is comprehended and evaluated by the improviser only post factum. This inversion often testifies to the manifestation of his creative potential. The rhythmic pulsation created by the improviser suddenly subjugates improviser himself. And then, yielding to its potential, its immanent logic, its internal dynamics, its creative imperative the improviser also further moves in the direction prompted by it, even if this contradicts his previous plans. In this context, improvisation may be treated as a logical and psychological model of a creative process in general.

*The skill of generating seminal ideas, of activating intellectual spontaneous activity during improvisation process.* Conception according to which creativity can be viewed through the concept "anticipatory reflection" (both historically and logically) seems very important to the author of the paper. The phenomenon of anticipation when the improviser implements his creative ideas before he is aware of his own intentions becomes a factor for surprising discoveries, because these ideas and their implementation have not been foreseen before, and therefore they are unexpected for both the improviser himself and for his partners when they exchange replicas improvising in ensemble. A collective improvisation begins when the necessity to penetrate into the structure of genuinely artistic and genuinely original cognition arises, which can be viewed also as a range of local improvisations taking place in a real performing time. At generating any (not only musical) seminal ideas, collective creative process is experimental throughout its whole course. By its principles of generating new ideas, the collective improvisation greatly resembles the methods of activating intellectual spontaneous activity in research

and investigation programs. And at some stages of collective improvisation, in some of its manifestations the improvisation is not so much keeping to the already existing plans and models as a naturally developing rejection of these plans (Рунин, 1980). Everywhere, at the levels of texture, syntax and composition there emerges something unexpected even for the improviser himself. No matter how clear and perfect the plan might have been, the improvisation unfolds and appears before him in all its complexity of tasks only during the process of the materialization of texture under his fingers. In cases like these, the role of retrospection, of recapturing the past and images of the past events increases. And here a place can always be found for new and unexpected solutions, new and unexpected for both the improviser himself and other participants of this activity.

*The skill of analysis and modeling original, creative musical ideas during improvisation process.* During the act of creating the improviser holds a constant dialogue with his creation, and via this creation - with the surrounding reality. The demands of the audience might essentially differ from his previous conceptions about them, but a sensitive and serious improviser will always analyze and assimilate them: this allows us to call this process an artistic cognition; besides, it often becomes a source of original creative findings. Through the moment of improvisation the musician speeds up the process of perceiving the logic of composition.

Improvisation determines the necessity for inspiration. However, the reverse dependence, saying that "inspiration needs improvisation", would not be wrong either. A lot of musicians consider improvisation the generator of creative processes. Creativity is a process of self-organization, of self-tuning, and here the initial

moment and the first impulse are very important. In this case improvisation may have the function of inspiring personality's creative state and may determine the whole course for the further development of a creative idea. Improvisation activates musician's immanent potency, it saves his mind from inertia, makes this art alive and spontaneous.

*The skill of organizing the process of developing musical forms from accidental fragments of other integrated systems during improvisation process.* Careful investigation of improviser's creative work cannot be reduced to studying the sphere of objective regularities only. Any improvisation can proceed within the framework of "relative necessity" only. It is impossible to calculate some empirical or theoretical totality of improviser's experience, it is difficult to establish information context of its selection. Style and content of improvisational art are not constant: they may change and their existence is not regulated by some precise rules. Everything that is necessary and possible for the improviser, what he tries to collect and put together even under conditions of maximal intentionality, exists only as accidental fragments from other integrated systems before the moment of the process of developing a musical form.

Improviser's creativity is the struggle of his individuality with trends, styles, dominating ideas of music which depersonalize him, and modeling of individual information system which later partially transforms into a general one. In improviser's activity, chance determines his inconsistency concerning information sources, changeability of functional meanings of the material in these sources (style, genre, improvisation content) and depends on a number of factors, for instance, social, historical and biological.

## **2. Didactic Model of Acquiring Techniques of Improvisation and their Components**

The didactic model for acquiring the basics of musical improvisation by students reflects an integrated system of various techniques of improvisation: modelling of improvisation process, variation of a theme, counterpoint *alla mente* and diminution, figured bass and virtuoso cadenza within the context of the components of improvisation techniques taking into account various style and genre norms of music form and its flow (see figure 1).

To the components of improvisation techniques belong such factors of musical expressiveness as:

- Musical idea;
- Order of the display, development and interrelations of musical ideas depending on form;
- Linguistic plane, principles of development.

*Modelling of the process improvising art.* Musical form is the basis for a constructive organization and planning in music. It determines the order of display, development and interrelations of a musical idea. This notion comprises not only the basic structures of improvisation but also methods and procedures which are to be applied to develop musical ideas within the limits of a musical structure. To some extent it is based on the accidental factor. The process of improvisation can be based on different developmental models. Modelling of the process of improvising art relates to the cognition of creative processes and possibilities of structural analysis. This trend is widely represented in the science of pedagogy (for instance, Pressing 2000; Ward 2004; Kertz-Welzel 2004; Zariņš 2005; Mcpherson & McCormick 2006; Dairianathan & Stead 2010; Kingscott & Durrant 2010).



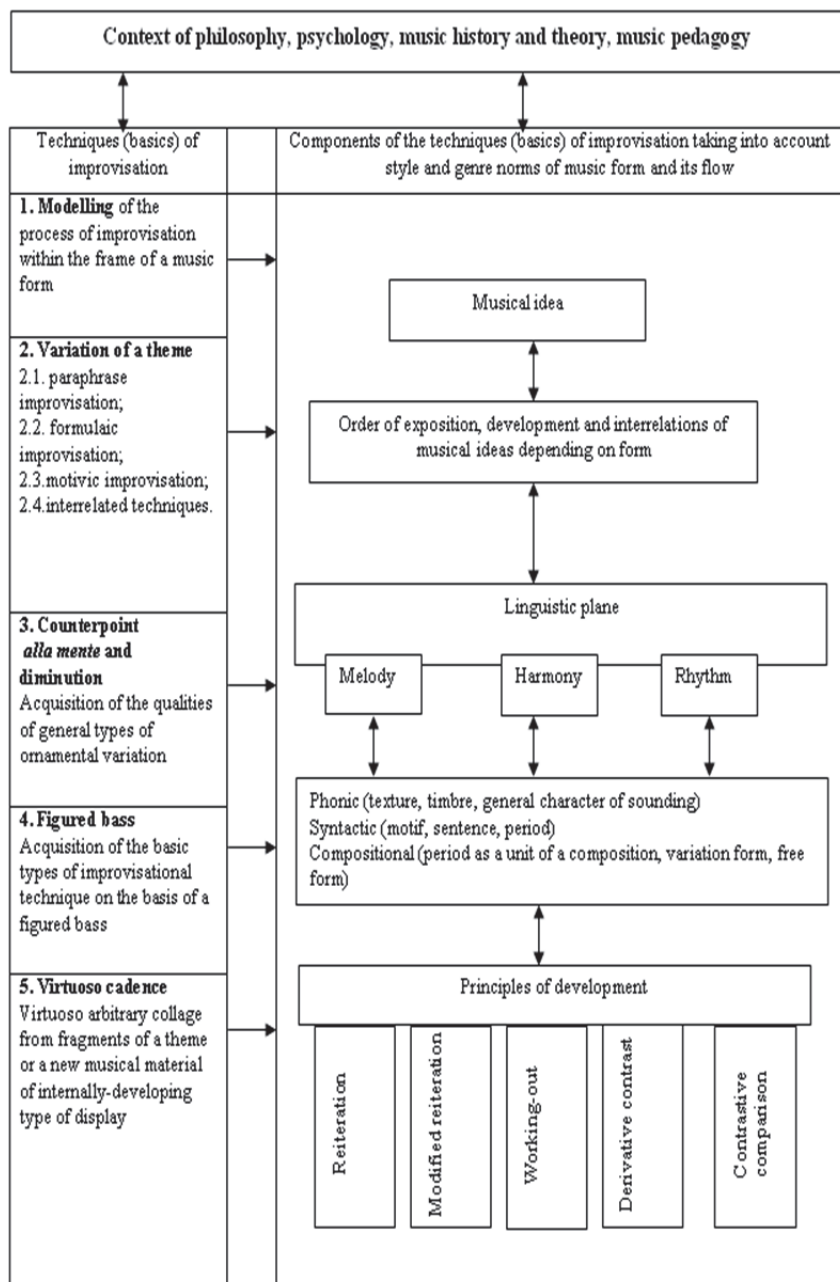


Figure 1: Didactic model of the acquisition of techniques of improvisation

Modern theories about psychology of improvisation treat accidental factor as an obligatory condition of creative work (Мальцев 1991). In the general plane and strategically, the creative flight of an improviser will be constricted by such stable conditions as genre of music, genre of musical activity, style, canon or tradition of art. These conditions will completely determine a form as the process of improvisation and a form as a result of improvisation. But in any concrete case improvisation will also tactically remain quite mobile. Improvisation will be able to comprehensively and flexibly reflect the will of the improviser and mastership of the individual in all parameters of musical form and its flow – in melodic, harmonic, rhythmic, texture (linguistic plane); variation, elaborating aspects (principles of development).

*Variation of a Theme.* A theme practically never remains unchanged, if compared to the original, it undergoes changes even being played for the first time, before other variations follow. This is an established tradition. In comparison with the tradition established in contemporary academic music it is not the text that should be learnt and played immediately, it is only one of the possible information sources about the given composition. In case the impulse from the first encounter (if there is no hearing experience) grows into a stormy desire to create something adequate (though only in improviser's own vague ideas), seeking for additional information begins. Creative agony begins, and it is hard to predict its outcome. The state of seeking solutions can last the whole life, but those intermediate solutions that are offered to the listeners have a relative completeness, they principally remain open to different kind of changes and additions. The composition seems to be developing and changing together with the improviser. At the very start it has a new and different form.

Despite the fact that improvisers never have two improvisations that would have been developed by the same technique, some of their methods and procedures may be identified as being general or even standard for variation of any musical material. To describe them, they can be grouped into four general and fundamental groups (though musicians-practitioners can use several methods and principles simultaneously within the frame of the same improvisation, often laying one over the other). These groups are:

- Improvisation of a paraphrase type – ornamental variation of a theme or only its part which remains recognizable;
- Formulaic improvisation- creation of a new material from diverse fragments of ideas, formulae – cliches (principle of combining motifs);
- Motivic improvisation – creation of a new material by developing one or two separate fragments of the idea (principle of improvising motifs);
- Interrelated techniques.

The three latter methods can be developed either in relation to or independently of the theme. The principle of improvisation of linear transitions is realized in them (composing a new melody).

*Counterpoint and Diminution.* These techniques are types of general ornamental variation. They influence the method of texture development in improvisation. All the familiar kinds of improvised movement appear in a complicated synthesis.

*Figured Bass.* The principles of a figured bass are the basis of the piano solo improvisation. In practice, a figured bass is often realized as a technique of the texture of piano playing: leading the bass line in the left hand part and decoding the figured bass in chords

and figurations in the right hand part. The performance of left and right hand parts remains the concern of the musician, and this requires from him fantasy, abilities and skills of improvisation, taste and special skills.

*Virtuoso Cadenza.* Virtuoso cadenza is an arbitrary collage from fragments of a theme or a new musical material of internally-developing type of display. In a cadenza the solo instrument demonstrates all of its possibilities. Fast passages and powerful chords, sonorous and energetic melodies follow each other. Near the end of the cadenza the ensemble joins in, and the musicians finish the improvisation all together.

Practice has proved that without acquiring the didactic model which reflects the techniques of improvisation and their parameters the student is not ready either for a practical solo or a collective improvisation. The didactic model optimizes both the acquisition of the basics of improvisation and practical activities. The issues of optimizing the acquisition of improvisation and composition have been widely discussed in works of several researchers of pedagogical problems (e.g., Reimer 1970; Elliott 1995; Hamilton 2002; Martin 2005; Hallam 2006; Спигин 2008; Shaughnessy 2010). Only the above described skills of applying various techniques of improvisation and parameters of techniques of improvisation of various styles and genres open up for a student the possibility to structure the form of improvisation to a full extent and to control the dependent on form order of display, development and interrelations of musical ideas, taking also into account the linguistic plane and principles of development. For instance, everything begins with the selection of a musical idea for improvising it as a whole or its separate segments. These ideas may concern intervals, structure, rhythm, melody, harmony, tempo or merely some images.

From all that a student starts shaping a form by developing this idea. He knows how to do this, he has all the necessary technique to do this, he uses his technical and psychological skills of improvisational creativity.

The choice in favour of one or the other technique, taking also into account different style and genre norms of musical form and its flow, depends on situation. For instance, relying on a modified reiteration as a principle of the development of musical idea, and taking into account the order of display, development and interrelations of musical ideas which depends on a musical form, the student can choose the technique of paraphrase improvisation for the first variation on a theme. But for the following variations, if variation form has been chosen, he/she can apply the technique of motivic improvisation, using contrastive comparison as a principle of the development of a variation cycle. Melody, harmony, rhythm and texture will be in a constant variation.

## ***2. 1. Criteria, Parameters, Levels and Indicators of the Acquisition of the Basics of Improvisation Techniques***

To assess the quality of the acquisition of the basics of the techniques of improvisation, the criteria, parameters, levels and indicators for their successful application in practical improvisation have been developed (see figure 2.).

*Criteria for the skills of the acquisition of the basics of improvisation techniques.* Three general criteria underlie the acquisition of the basics of improvisation techniques:

- **Phonic criteria:** texture, dynamics, timbre, general character of sounding;

- Syntactic criteria: motif, phrase, sentence, period;
- Compositional criteria: period as a compositional unit, form of variations, free form.

All five skills of acquiring the basics of techniques that meet the requirements of texture, syntactic and compositional criteria reflect the quality of the acquisition of improvisation. The terms *texture*, *syntax* and *composition* are based on J. Nazaikinski's findings (Назайкинский 1982), which have been supplemented with improvisation context. A teacher of music should be able to promote the creative initiative at classes of musical improvisation. Any musical improvisation, if it is really artistic but not mechanical, by all means, involves some new melody nuances, fresh harmony colours, unusual texture solutions and articulation colouring. Every time there is a change in the dynamics of accents, in the saturation of intonation and sounding, the plastic of artistic behaviour itself and the character of embodiment of artist's personality in the improvised musical image are transformed. Inspiration is vital for improvisation, without it improvisation is impossible (Рунин 1980).

The conducted observations of the pedagogical process at Liepaja University while working with the students, prospective teachers of music, resulted in defining the criteria, parameters, levels and indicators of skills.

*Levels of skills of the acquisition of the basics of improvisation techniques.* The content of criteria and parameters for the acquisition of improvisation is revealed in three levels: low, average, high which have been content wise described in indicators. The acquisition of improvisation is assessed according to such parameters as:

Criteria	Parameters	Levels	Indicators
1. Phonic	Texture	I <i>Low</i>	- no purposeful artistically justified work with texture in accordance with style and genre;
		II <i>Average</i>	- purposeful artistically justified work with texture in accordance with style and genre is fragmentary;
		III <i>High</i>	- work with texture in accordance with style and genre is purposeful and completely artistically justified;
	Dynamics	I <i>Low</i>	- dynamics is uniform;
		II <i>Average</i>	- possibilities of dynamics are partially used;
		III <i>High</i>	- multiformity of dynamics is obviously demonstrated;
	Timbre	I <i>Low</i>	- register and harmonic timbral colours are not used;
		II <i>Average</i>	- the choice of register and harmonic timbral colours is not well-considered;
		III <i>High</i>	- multiform register and harmonic timbral colours are used;
	General character of sounding	I <i>Low</i>	- rhythm, melodiousness, emotionality, imagery and virtuosity are poorly developed. The performance is not expressive and consecutive;
		II <i>Average</i>	- the pupil does not combine changes in rhythmic and melodic material with changes in imagery and emotionality. There is progress in the mastership of performing;
		III <i>High</i>	- richness of rhythmic picture, melodiousness and imagery, suggestion and mastership in performing, emotionality and virtuosity;
2. Syntactic	Motif, phrase, sentence, period	I <i>Low</i>	- within the frame of a period the syntactic flow is chaotic, without obviously finished motifs, phrases and sentences. Rhythmically uniform;
		II <i>Average</i>	- within the frame of a period there is a syntactic flow with isolated finished motifs, phrases and sentences;
		III <i>High</i>	- within the frame of a period there is a masterly syntactic flow with obviously finished motifs, phrases and sentences;
3. Compositional	Period as a compositional unit, form of variation, free form	I <i>Low</i>	- compositionally the evaluated flow is impulsive and has not been planned (from the point of view of wholeness of form);
		II <i>Average</i>	- accidental imprecisions in structural control (from the point of view of the wholeness of form);
		III <i>High</i>	- masterly compositionally evaluated flow (from the point of view of the wholeness of form). There is a clear musical idea.

Figure 2: Criteria, parameters, levels and indicators for the skills of acquiring the basics of improvisation techniques

- Texture;
- Dynamics;
- Timbre;
- General character of sounding;
- Motif, phrase, sentence, period;
- Period as a compositional unit , form of variations, free form.

The level of student's acquisition of improvisation is characterized as low, if:

- There is no purposeful and artistically justified work with texture according to style and genre;
- Dynamics is uniform;
- Colours of registers and harmonic timbral colours are not used;
- In the general character of sounding rhythm, melodiousness, emotionality, imagery and virtuosity are poorly developed. The performance is not expressive and consecutive;
- Within the frame of a period the syntactic flow is chaotic and without obviously finished motifs, phrases and sentences. Rhythmically uniform;
- Compositionally evaluated flow is impulsive and has not been planned (from the point of view of the wholeness of form).

The level of student's acquisition of improvisation is characterized as average, if:

- Purposeful and artistically justified work with texture according to style and genre is fragmentary;
- Possibilities of dynamics have been used partially;
- Choice of registers and harmonic-timbral colours is not well-considered;
- Pupil does not combine changes in rhythmic and melodic material with the changes in imagery and



emotionality. There are achievements in mastership of performing;

- Within the frame of a period there is syntactic flow with isolated motifs, phrases and sentences;
- Accidental imprecisions in the structural control (from the point of view of the wholeness of form).

The level of student's acquisition of improvisation is characterized as high, if:

- Work with texture according to style and genre is purposeful and artistically justified;
- Multiformity of dynamics is obviously demonstrated;
- Multiform register and harmonic-timbral colours are used;
- Richness of rhythmic picture, melodiousness and imagery, suggestion and mastership in performing, emotionality and virtuosity;
- Within the frame of a period there is a masterly syntactic flow with obviously finished motifs, phrases and sentences;
- A masterly compositionally evaluated flow (from the point of view of the wholeness of form). Musical idea is clear.

## **Conclusion**

The developed didactic model for the acquisition of the basics of improvisation is oriented towards the development of students' creativity, intuition and self-effectiveness during the process of the acquisition of the basics of improvisation. The assessment of the acquisition of the basics of improvisation according to the described criteria, parameters, indicators and levels involves the acquisition of certain knowledge by students: knowledge in history and theory of music, music pedagogy; practical knowledge and skills in art of performing, in composing music; abilities and skill

of promoting creative initiative at classes of musical improvisation.

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## **C**HAPTER 18

### **MUSIC AND DRAMA BEYOND SCHOOL: THE CASE OF MADEIRA ISLAND**

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#### **Abstract**

This paper aims to present a critical reflection on a pioneer project of Music and Drama and its specific ways of artistic expression and communication. The project was carried out by Gabinete Coordenador de Educação Artística (GCEA) in Madeira Island. We used a multi-referential approach in order to have access to the representations of the actors involved (children, teachers and direct responsables of GCEA).

For about 30 years, Madeira primary schools provide music and drama to all children, from 6 to 10 years old, involving

them, as well as their parents and teachers, in a relationship that is beyond pedagogic and educational purposes. Our research focuses on the curricular orientations, teachers training, structure and organization of the project to understand the role that Music and Drama, as key areas, have on the integrated development of young children, namely in the domains of creativity, self-expression, and autonomous thinking.

## **Keywords**

Art education – Expression – Teacher training

## **Introduction**

This case study focuses on a music and drama education project held in all primary schools of the Madeira Island, Autonomous Region of Portugal.

In the XX century, especially in European context, curricular orientations have privileged scientific disciplines, as mathematics and first language, over arts. In spite of that, it is possible to identify a growing movement that advocated the importance of arts in children development, of which UNESCO International Appeal for the Promotion of Arts Education and Creativity at School is a great example.

The importance of arts in children development is being studied in several contexts and by several researchers, as it is important to understand educational policies and practices. According to Iwai, K. (2003) the research findings in this area can be included in five domains: aesthetical, socio-emotional, socio-cultural, cognitive and academic achievement. UNESCO Positional Paper highlights that «by giving its rightful place to the teaching of arts in places where knowledge is transmitted (schools, cultural institutions and centres, training centres), this teaching, by its very nature, becomes a tool to strengthen ethics, social and aesthetic values.»<sup>1</sup>

On the other hand, professionals of music education agree that teaching music implies involving children in diverse musical activities from playing and singing to listening,

improvising and composing. Arts education enables the child to express ideas, feelings and experiences in language, gesture and movement. Music provides children with opportunities to engage in moving, dancing, illustrating, storytelling and making drama. The use of drama and music in the classroom encourages the child to express ideas that are creative and explorative. So, it is important to understand that Arts Education curriculum should explore pathways to learning that involve reflection, imagination and sensitivity. Learning through the arts facilitates children life. According to Small, C. (1998) musicking is the present participle of the verb to music, which implies the engagement in any kind of music performance, including dancing. In Portugal, for the majority of primary students the only place that gives them access to art education is the public school. So, it is fundamental to include these areas in school curriculum as well as to guarantee an efficient evaluation of the process so that children can really profit from these activities.

To Barret&Landier (1991) drama Education is "pedagogy of the process", a process in which children develop ways of knowing/doing and ways of being. This is one of the most difficult aspects of having drama education in curriculum, since the products of its teaching are personal, and it's quite easy to fall into the trap of misunderstanding drama education and theatre, or socialization games. On the other hand, since in Portugal drama education doesn't even have a specific higher education degree, it is difficult to make people recognize its importance and to legitimate it.

In this article we will propose a new regard about the project of Music and Drama and its specific ways of artistic expression and communication carried out by Gabinete Coordenador de Educação Artística (GCEA) in Madeira Island. This project's specific Music Curriculum was specially designed for all primary schools in this region and aims at introducing children (from 6 to 10 years old) to the experience of drama and music reading and writing, song singing and also, in some cases, to playing classroom instruments. In order to accomplish that, the mentors of this project founded GCEA (<http://dre.madeira-edu.pt/gcea/>) with the endorsement of the Regional Office of Education. In



the following text, we will analyse the structure and the organization of the GCEA, as well as the implementation and the supervision of the project.

## **1. The local context – Madeira Island**

Madeira Island is an autonomous region of Portugal, located in the Atlantic Ocean west to the African coast (Morocco), 978 Km southwest from Lisbon (capital of Portugal). Its main town is Funchal, with approximately 245 000 inhabitants. Tourism is the major force of Madeira's economy, providing a significant number of jobs in tourism activities.

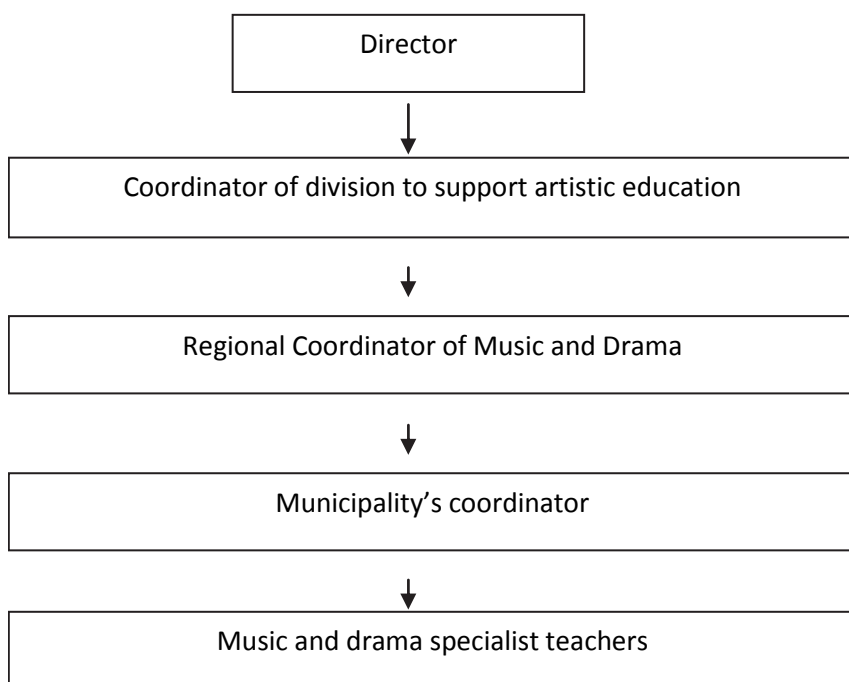
As an economic and administrative region of Portugal, the island has autonomy to decide on local education policies. Being so, Madeira's government decided to improve and develop musical culture. The promotion of music and drama culture through the teaching in primary school allows children to develop a musical and drama sensitivity but it also promotes Madeira's cultural interests. The results of this projects can already be seen in the growing number of music groups that in the region.

## **2. Gabinete Coordenador de Educação Artística (GCEA)**

Primary schools in Madeira Autonomous Region have been having on a regularly basis for about 30 years Music and Drama, as a consequence of a project developed by specialist teachers. In addition to the inclusion of music and drama in classroom curriculum, all schools are covered by a "supply" of five artistic forms - Choral Singing, Drama, Dance, Instrumental and Traditional chordophones Madeira - as an extra-curricular offer.

The hierarchical structure of GCEA (figure 1) includes the director (one of the mentors), three coordinators

for the different divisions who intervene and the music and drama specialist teachers.



As this project grew, it needed a firm direction which was progressively transformed in a stiffening structure that promoted one-way communication, i.e. top to bottom of the work pyramid.

The project provides 60 minutes in curricular time and 90 minutes in extra-curricular, defined by the specialist teacher according to his own skills: drama, Orff instruments, choirs, dance and Madeira traditional instruments. During curricular time, teachers, generalist and specialist, are in the classroom and are supposed to work together. Only during extra-curricular activities is the specialist teacher alone, although the teaching should be articulated with the class. Throughout the entire year, and as a way of showing the results of the project, GCEA promotes

several public events which culminate with a huge television show at the end of the school year (June).

As a guide to the program, GCEA published two years ago music and drama manuals that should be used as guidelines to the children work. Even though the specialist teacher can use other kind of materials, teachers should give priority to these textbooks. GCEA also provides all the material needed to teach music lessons in schools, such as music instruments, record material (cds and dvds), as well as stereos (playback).

### **3. The Project and GCEA**

In Portugal, primary school curriculum emphasises the importance of literacy, numeracy and language, and at the same time appeals to finding answers to changing needs in technology and citizenship. The aims of primary education should be to enable the child to live a full life as a child and to realise his or her potential as a unique individual capable of co-operating with others.

In spite of being a formal activity, music and drama in Madeira Island correspond to 60 minutes during normal school curriculum activities and another 90 minutes as an extra-curricular activity (during a week period).

In Continental Portugal things are different: in public primary schools, music is mostly an extra-curricular activity. In 2006, the Ministry of Education issued a law that defines music education as an extra-curricular activity; as a consequence, music is not considered a curriculum subject and has not been implemented in the same way as in Madeira (Mota, 2001, 2007).

This project was born out of the desire of a Conservatory music training teacher and primary

drama training teacher to give the children the opportunity to experience music and drama and to arrive at feeling them as fundamental areas of their life. Together they created the seed of this project.

8. Teacher training specially designed to music and drama teachers
9. Teacher training specially designed to regular teachers of primary school

In 1980, after obtaining regional government support, they needed to train music and drama specialist teachers in order to accomplish the aims of the project. However, it was not easy to find in Portugal music and drama teachers with pedagogic training to teach at primary school. So, it was necessary to provide teachers training in this area. The project began with conservatory students, as they already had music training.

It was important for the success of the project that regular primary teachers were involved in the whole process, so special training for them was also considered. However, primary teachers kept on raising obstacles to their inclusion in the project. In fact, they still consider themselves as generalists and the majority confesses that they prefer to teach Arithmetic and Portuguese language and feels that art education should be left to specialists. Most of them leave the classroom when music class begins.

In the early days, one of the problems was the fact that a curriculum had not yet been set out for music and drama classes. To plan music and drama classes for the following week, all the music and drama teachers gathered with the two mentors on Saturdays.

Nowadays, GCEA already has its own music and drama manuals that resolved that problem. However, GCEA

continues to support their teachers in very different ways: on-going training (they are obliged to attend at least one training action per year), supervision and working meetings.

Supervision is understood by GCEA as a way to ease the teacher's adaptation to the project (that is done over a two week period) but also as a guarantee of the quality of the teaching. The municipality's coordinator is responsible for a group of specialist teachers, supervises their classes (participating and observing them once a month) and participates in their planning. GCEA receives a report of all observed lessons, a report with which both parties agree.

#### **4. Teacher training: a critical reflexion**

For a better understanding of the basis of this project it is important to briefly emphasize the various perspectives that, after 1974, underlie the continuous training of teachers. In particular, it is important to stress the political changes that brought about different ways of conceiving the initial training of teachers in "Escolas do Magistério Primário" (graduate schools of Teaching), where only a few of the teachers with tenure kept their jobs, whereas the majority of teachers were replaced by others interested in investing in new practices, and where new areas of education, such as music, movement and drama, emerged. But the political changes in Portugal were also reflected in the curricula, with a reformulation of the first years of schooling to accept the existence of different learning speeds and new styles of teaching-learning that took into account the social context of the school, the fight against academic failure, the changes in the physical spaces of the school, etc. The enforcement of the new curricula, not always well accepted due to its connection to the political regime, demanded that the continuous training of teachers be

conceived in such a way as to highlight the importance of a dynamic relationship between the various areas of knowledge, of group dynamics, project works, artistic, movement and drama expression, creativity, etc.

In the interviews conducted, particularly the one carried out with the director of GCEA but also those with teachers that worked, or work, since the first phase of the project, can be seen the marks left by the teaching of this period in the references to the investment made in listening to the student, in group work and, especially, in creativity and expression. Simultaneously, another influence, previous to the change in the political regime, can also be perceived in the discourse of these people. It is a kind of naturalized mark, which is surely responsible for a certain unity of the leading group and is naturally accepted by the teachers born and raised in the island, but to which most of the teachers interviewed, born in continental Portugal, react badly. There is an intersection of principles that assume importance because of their impact in group formation, in the need of regulation through rules that impose order and the achievement of the Office's objectives, etc. In their formulae of intervention, you can understand a discourse that dates back to the end of World War I, through the action of Baden Powell, a discourse that might have been an element of defense against the regime of Salazar, but that comes in conflict with the sense of liberty that existed in the educational practices and discourses after 1975<sup>1</sup>. In fact, the discourses of these people responsible for training are oriented towards knowledge of the group, self knowledge and knowledge of others and, more importantly, towards following the discourses that

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<sup>1</sup> It is important to note that, today, it is more common in discourses than in practices.

inspire power relationships and normalization of relationships in the island:

"Show them that you can obey orders, whether they are given by word of mouth or are printed or written rules and that you can carry them out, whether your Scoutmaster is present or not. Show them that you can get badges for proficiency in various handicrafts, and your boys, with very little persuasion, will follow your lead. But remember that you must give them the lead and not the push" (Baden-Powell of Gilwell) <sup>2</sup>.

The training of teachers at the beginning of the school year works as a kind of welcoming ritual to those who are newcomers to the island. These teachers belong to a generation with high expectations towards teaching and are not willing to accept a management that controls all their actions. No doubt the training done during the period of integration of teachers in schools and activities of the island has quality, particularly in what concerns music, knowledge of musical instruments typical of the region's culture, dramatic expression, chants, etc. The training is usually followed by the indication of the Office's availabilities in terms of support, guidance, etc. Besides that, the regular meetings of the different groups, set up according to the localization of the schools, allow for exchanges between the teachers, suggestions to find solutions, and that is referred by teachers as enriching and as fostering learning and friendship relations. However, teachers sense that such meetings and training cause them to lose their identity and to act in a standardized way. More specifically, they make them focus their efforts in the final result, forgetting or reducing actions that take into account the

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<sup>2</sup> "Robert Baden-Powell." Wikipedia. Aenciclopédialivre. Sept. 2011. <[http://pt.wikipedia.org/wiki/Robert\\_Baden-Powell#Carta\\_aos\\_monitores\\_de\\_patrolha](http://pt.wikipedia.org/wiki/Robert_Baden-Powell#Carta_aos_monitores_de_patrolha)>.

contributions of the children and their world. First grade teachers with tenure and with general training (teaching several subjects, such as Portuguese, Arithmetic, Drawing, Social Studies) are expected to support and to collaborate with the work of music teachers. In the interviews, there are references to training at the beginning of the school year that invests in the articulation of different kinds of knowledge and actions. Music teachers seem to be very well accepted by the schools' staff and management. However, in all the sections we attended, despite the effort of the music teachers, it was clear that the other teachers had no interest in cooperating with their plans. At times, boredom defined the atmosphere of these sections and teachers tried to fight it by correcting the tests they had brought along with them. Clearly, preconceptions about what is important in teaching were working at these meetings (and it seems that all over Europe gains weight this idea that one learns separately, that mathematics and language are the most important subjects, etc.). Likewise, all that has to do with learning about oneself, with artistic and corporal expression, with knowledge of the other, etc., took a secondary place. In these teachers' mind, education should be, from the early years, individualist and competitive. And to this is added GCEA's point of view about the shows to be produced: their economic side and visibility to the community seems to have great importance, sometimes even more important than their function as an element of learning and of integration in the local culture. We understood that to continue this huge project it was important that the parents and the whole community considered it as a very important project; otherwise, there was the risk of it losing the funding.



## **5. Research methodology**

The research was done as a study case.

The data gathering process took two years – it covered the period from November 2007 to November 2009.

In order to accomplish all the objectives and take in the complexity of the project we combined qualitative and quantitative methodologies. The qualitative methodologies included ethnography, content analysis and narrative inquiry (Bresler, 1992; Clandinin, 2006). The quantitative methodologies consisted of a statistical analysis of the questionnaires answered by classroom teachers, music and drama specialists and parents.

Qualitative methods were manifold: analysis of GCEA's documentation; unstructured interviews to key figures/mentors of the project and coordinators; semi-structured interviews to music and drama teachers; observation of several music and drama classes; attendance of public presentations; children's focus group, and researchers' field notes.

The topics that constituted the design of unstructured and semi-structured interviews had been previously discussed and established by all the team members; the same had been done for the children's focus group. Some of the key elements of GCEA were re-interviewed for clarification purposes and to "give them feedback" of our understanding of their voices. All interviews (a total of 31) were tape-recorded, transcribed and analyzed using both content analyses for identification of emerging themes, and narrative inquiry for the analysis of the different actors' discourses. Thirty-seven music and drama lessons were observed and, whenever a parent's permission had been signed, the classes were video-taped.

A few weeks before the final television event, we developed several children's focus groups, with parents' authorization. Each group was constituted by 6 or 7 children including children that had already participated (in the past) and others that were going to participate or had never participated in that event.

Quantitative methods were used in the statistic analysis of questionnaires. Since we aimed at obtaining a comprehensive vision of this project, the questionnaires were answered by teachers, classroom teacher and parents, all the actors involved in it.

## **6. Some results**

### **6.1. Questionnaires**

#### *6.1.1. Questionnaires to classroom teachers*

Out of 132 questionnaires sent out to classroom teachers, 107 were returned. The statistic analysis reveals that the majority of these classroom teachers (ca. 60%) did not have any kind of preparation to teach music or drama. In Portugal, the initial teacher training does not include arts teaching and the primary curriculum only refers drawing. Teachers that reported to have had music and drama education (only 33%) received on-going training mainly through GCEA and 64.5% referred a complete lack of confidence, due to poor preparation, if they had to assume total responsibility in music and drama teaching.

As we were able to confirm in our class observation, the majority of classroom teachers has a passive presence in music and drama classes, with only 9.3% manifesting an active collaboration.

### *6.1.2. Music and Drama Specialist Teachers*

75 questionnaires were sent out to specialist teachers and 71 were returned. The majority of them were graduate music educators (ca. 49%), but there were also others specialist teachers with music and drama training provided by GCEA, such as primary school teachers (ca. 14%) and kindergarten teachers (ca. 10%). 13% were Music Conservatoire musicians and the other 10% were non-graduated music and drama professionals (certification provided by the GCEA). The lack of collaboration of the classroom teachers is reported and stressed as the key factor that jeopardizes the continuity of the work developed in music and drama classes.

### *6.1.3. Parents*

226 parents answered the questionnaire. The majority of the parents had a low level of academic studies (only 18% had college studies). Likewise, the majority did not have any kind of music or drama education and had never participated in music or drama groups. However, 76.5% indicated a regular attendance of events in which their children were involved, and 98.7% said that they would support their children if they choose a musical career.

## **6.2. Interviews**

### *6.2.1. Interviews of GCEA members*

Content analysis of the interviews of GCEA members evidenced the following themes: 1. recognition that this is a pioneer project, very updated with the best practice done in the eighties; 2. overall control of artistic education practices in the whole island, due to the high structure and organization of the program; 3.

unison discourse (even entire phrases) shared by all the elements of GCEA, which reveals a high sense of ownership and leadership; 4. recognition that some of the initial ideas of the project have been lost, such as the collaborative work between classroom and specialist teachers.

#### *6.2.2. Interviews of music and drama specialist teachers*

The interviews with the specialist teachers allow us to trace two different profiles. On one side, there are the specialist teachers coming from the mainland, who see this project as a transitional phase in their careers, and, consequently, although they may criticize some practices, try to avoid confrontation. On the other hand, there are the island origin specialist teachers (some of them returning to the island after an absence to graduate in the mainland), who are comfortable with the project, have prior knowledge about its existence and, due to that, demonstrate a more intensive involvement in it. This provides them with the capacity of questioning more accurately the practices of the project and to propose new ones.

#### *6.2.3. Focus group with children*

The primary students reveal enjoyment in music and drama classes. However, the reports of having difficulty in participating in music or drama improvised moments were quite representative. The majority of the children were unaware of the process of public events, and focused only in the importance of being chosen to attend them, regardless of their effort or their level of involvement.

At this point we want to call attention to the grandiosity of this project, according to the children's

point of view. This project allows all the children in primary schools to have an early contact with music and drama through a specialist teacher, which gives them the opportunity to experience different situations – to perform in school, public or television events and to visit different parts of the island (some of them never left their own).

The opportunity to experience music and drama classes as part of curriculum allows children to have contact in an early stage with cultural features, since music and drama classes promotes regional features. On the other hand, music and drama performances request the selection of the students that are going to perform and that implies the development of the ability to cope with rejection and similar processes of social rejection. This also implies the development of the teacher's ability to cope with different levels of skills and of his empathy with the feelings of the students.

### ***6.3. Music and drama class observations***

The majority of music and drama classes were mainly musically performed focused in public events performance. The pedagogical methods used were old fashion (on-going repetition) and did not imply the children's involvement.

Drama Education was quite rarely observed and was limited to miming songs and small choreographies. Rarely, if ever, a creative moment with the group was encouraged. The specialist teachers revealed a lack of drama training and very restrictive ideas about what drama education is.

### ***6.4. Public events***

GCEA considered that, in order to maintain government support, public visibility was indispensable

to the continuity of this project. The school year is full of public presentations in the community, which are prepared after the work done in extra-curricular activities.

The school year ends with a big television event that is supposed to demonstrate the work done in regular music and drama classes. This television event is held in playback (vocal, instrumental and theatre dialogue). The event starts as a live concert, but soon turns into a full playback, sustained by the public expectation and television demands.

Although GCEA's discourse highlights the importance of public event performance as the final result of the teaching-learning process, the highly structured organization around the final year event shadows all the work done in class. The television event, which takes place in June, engages all the attention of specialist teachers from January onwards.

## **Discussion and conclusion**

The complexity of this project can be defined by the two types of relation with the practice that define education sciences: 1. the immediate practices of the actors and 2. the macro social practices (Berger, 2009).

Beginning with the first axe, it is important to bring to discussion the pertinence of artistic education in educational places, such as schools, and its contribution to an integrated development of young children, mainly in the domains of creativity, self-expression and autonomous thinking. GCEA initial idea for this project should, in fact, promote this development. However, the progressive stiffening of its structure and functioning leaves no space to teacher's creativity and to children implication in music

and drama classes. As Beauchamp & Harvey (2006) referred, teachers are understood as part of the operational and implement curriculum proposals.

The lack of opportunities for experiencing music and drama, rather than performing, does not allow the children to embrace arts as a reflection of their own self-expression. At the same time, it only provides stereotyped relations between teachers and children that do not accommodate individual differences.

Barrett (2000) challenges all music teachers to wonder if they expose their students to the new and if they support their capacity for development. With these questions, she highlights the importance of creativity moments, integrating composition, improvising, as well as thinking in an autonomous way.

On the other hand, the direct collaboration between classroom teachers and specialist that GCEA tries to promote requires that training of teachers in artistic expressions be of quality. Good training also needs to be combined with the adaptation of performances to pedagogical practices, as a continuous work to be carried throughout the whole primary school experience (Mota, 2003).

This is highly connected with the second axe: the macro social practices. GCEA's project has at its basis a formal school culture, characterized by a relation with the exterior and the need of public recognition or, more particularly, of government support. That is to say that, contrary to recognising the importance of arts in the development of children, what is proposed to children is an education based on reason, rather than affectivity and an integrated development (Carasso, 2005).

Nevertheless, GCEA's effort should be recognised since, as Anne Bramford (2006) argued in an international study for UNESCO, there are great international art education programmes but the economical imperatives tend to reduce the place of arts in the education policies. Likewise, Maestracci (2006) highlights the importance of controlling the quality of educational activities, which implies a clear definition of the objectives to work with the children, because school culture is explicitly based on curriculum contents.

### ***In brief***

Our findings show that this is a very ambitious and organized project. All children attending primary schools should have the chance to have contact with music and drama education in a formal way. GCEA sees Artistic Education as a responsibility of the school, rigorously organizes and controls music and drama classes and takes into account that all children should be able to learn exactly the same things and have the same opportunities as in any other area of learning. That proves that a consistent pedagogical perspective is respected and that there are the feelings that directive pedagogy is good for the children and for the project. The director and coordinators of the project mentioned several times, in formal or informal ways, that they also had a critical view about some of the aspects here presented and that is their aim to introduce new and different perspectives that give children the possibility to explore music and drama by themselves, in a more autonomous and creative way. Furthermore, they showed an interest that our research could bring new contributions and ideas to improve and enlarge their project.



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## **C**HAPTER 19

### **ALTERING STUDENTS' MOTIVATION IN ANCIENT AND MODERN GREEK CLASSES THROUGH THEATRE EDUCATION**

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#### **Abstract**

Teaching and learning through arts in education is a current subject which promises alternative and effective educational means. Concentrating on theatre/drama in education, this paper examines the interaction of theatre and drama techniques on the teaching and learning of ancient and modern Greek language and literature in Secondary Education in Greece. The theoretical framework of this exploratory research is based on contemporary theory of theatre/ drama in education and on the ideas of John Dewey, Jerome Bruner, Paulo Freire, Howard Gardner etc. The practical framework deals with the application of drama and theatre techniques in specific classes of Secondary Education in Crete in order to teach ancient and modern Greek language and literature. The research tool is the questionnaire which was given to 1040 students and 30

language teachers in different schools at Heraclion-Crete. The results showed a great effect of theatre/ drama techniques on the understanding of the text and the willing and creative response and participation of every student (no matter how "good" s/he is supposed to be at the specific subject) in the processes of learning and teaching.

## **Keywords**

Language arts, theatre education, drama education.

## **Introduction**

Teaching and learning through art, as a subcategory of arts education, is an effective educational process, no matter its official or non official introduction at the international curriculums. In this frame, teaching and learning other subjects through theater, as a cross-curriculum mode of teaching, has been increasingly applied in Education. This paper discusses an international Greek question: How and in which grade could theatre/ drama in education be useful for the teaching of ancient and modern Greek language and literature in secondary education in Greece?

I will present some basic results, part of the exploratory research I did in order to include the students' voices as well in my study of teaching ancient and Greek language and literature through theatre in Greece, where theatre/drama education is not still systematically embodied in the national curriculum. The theoretical framework of this exploratory research is based on contemporary theory and methodology of theatre/ drama in education (Shank & L. Brown, 2006; O' Toole, 2006; Wagner, 1998) and on the ideas of John Dewey (Dewey, 2007), Jerome Bruner (Bruner, 1977; Bruner, 1996) Paulo Freire (Freire & Macedo 1987), Carl Rogers (Rogers & Freiberg 1994), Daniel Goleman (Goleman, 2005), Howard Gardner (Gardner, 2004), among others.

## **1. Theatre/drama methodology**

I give emphasis on the application of theatre and drama in the teaching of philological lessons, not as a substantial way of teaching these, but as a creative, alternative and additional way to the traditional teaching processes. For this reason my teaching was concentrated on a methodology which included:

- a. Reactivation of traditional didactic techniques such as dialogue, question-response, conversation, by introducing them into the dramatized lesson
- b. Theatre-drama techniques and conventions, ranging from free dramatic playing to a complex dramatization of the lesson, contemporary theatre forms which call to physical and devised theatre (Callery, 2001), site specific performance (Kaye, 2000), forum theatre (Boal, 2002).
- c. Participatory role of the teacher who pretends ignorance and shows interest to inquire the subject with the students (teacher in and out of roles, which derived from the text or the philological subject)
- d. Cooperative drama learning techniques, frequent use of team role
- e. Dramatization exercises before, during or after the teaching of the basic didactic unit
- f. Oral and written speech production
- g. Self and team evaluation.

The need of adolescents nowadays to express and redefine themselves as integrated personalities among the digital reality imposed on them, could be effectively discussed or dramatized in the classroom by applying contemporary theatre forms and employing processes which facilitate these: team-building, personal commitment, creativity, political, social and intrapersonal issues, the participatory role of the actors, interactivity, critical thinking.

## **2. Research Data**

From the 1040 students who participated in this research, 768 answered a questionnaire after participating in a lesson of ancient Greek or modern language or literature by my guidance as the basic theatre/drama teacher in a pre-planned collaboration with the «philologist» of each class (The term philologist is used in the Greek secondary educational system for the teacher of ancient and modern Greek language, literature, history, Latin language and philosophy).

The lessons were not adjusted to some method that had to be applied, but instead I tried to choose and adjust the theatre-drama methods according to the teaching needs and the current lesson plan. Students were from each of the six classes of secondary education which constitute gymnasium (ages 12-15) and lyceum (ages 16-18). Almost all of them participated for the first time in a lesson taught by theatre's didactic methods and they had no previous experience with it. The specific «philological» subjects that I examined were: ancient and modern Greek grammar and syntax, language, poetry and literature (by translation or the original ancient text).

After collecting the research data, the student responses at the open ended questions were categorized based on the content analysis and then, every response was coded . All the data was inserted into a computer with the help of the SPSS Statistics pack, with which the accurate processing of the research data was performed. As far as the resolution of the research questions is concerned, the tests of statistical significance that were done ( $\chi^2$  criterion) allowed us to conclude whether there is any relevance among the questions or whether there are statistically important differences between the students' sex, age, type of school, school level, lesson and specific

teaching units. The significance level that was adopted was 5% ( $\alpha = .05$ ), therefore if  $p \leq .05$ , then we considered any difference statistically important. The data of the research presented in this paper are part of my PhD's research (University of Patras, Department Theatre Studies, February 2010).

TYPE OF SCHOOL (NOMARCHY OF HERAKLION)	LESSON	NUMBER OF STUDENTS THAT PARTICIPATED IN THE COURSE	NUMBER OF STUDENTS THAT COMPLETED THE QUESTIONNAIRE
Urban-Rural	Ancient Greek Literature	206	162
Urban-Rural	Ancient Greek Language	81	43
Urban Private Rural	Modern Greek Literature	503	391
Urban-Rural	Modern Greek Language	250	172

Table 1:

The first question that the students are called to answer is the degree in which they enjoyed the application of the TDTC in the teaching of the philological lessons (I use the abbreviation TDTC for theater-drama techniques and conventions):

The second question is related to the effect that the teaching of the philological lessons through the TDTC had on the students, and it consists of seven multiple-choice categories. In this question students were allowed to answer to more than one category and each following percentage represents students that answered positively to each category.



<b><i>"What do you think of the application of the theater-drama techniques and conventions in the teaching of the philological lessons?"</i></b>	<b>Number of students</b>	<b>Percentage %</b>
Excellent	308	40.1
Good	230	29.9
Mediocre	128	16.7
Poor	44	5.7
Bad	26	3.4
Don't know	32	4.2
Total	768	100

Table 2:

<b>"The teaching of the philological lessons through the theater-drama techniques and conventions:"</b>	<b>Number of students</b>	<b>Percentage that answered positively in each category %</b>
Was interesting	476	62
Freed your imagination	352	45.8
Motivated you to participate actively and voluntarily in the lesson	287	37.4
Left you indifferent	29	3.8
Was boring	62	8.1
Motivated you to work more on the text and learn about the author	243	31.6
Motivated you to work on some other theater-drama activity	203	26.4
Anything else you would like to add	73	9.5
Total	768	100

Table 3:

We can therefore observe that the responses concerning the fulfillment of cognitive, social and emotional purposes of the teaching of the philological

lessons through the TDTC are found with high frequency. On the contrary, the percentages of the students that expressed a negative opinion over this specific way of teaching are considerably small.

- 1) Question number three considers why students enjoyed or did not enjoy the teaching of the philological lessons through the TDTC in contrast with the traditional way of teaching. Being an open-ended question, it led to the analysis of the content of their responses and their distinction in eight categories which encompass relevant characteristics. The first category, titled **"more interesting – pleasant – vibrant"** in the following table includes answers similar to: it was a more interesting, lively, pleasant, exciting, creative, comfortable, free, realistic, and different way of teaching. The student mentioned as well that it helps them enjoy themselves and learn at the same time. They note that it cultivates their sense of humor and creates a comfortable learning environment.
- 2) The second category, titled **"active and voluntary participation"** consists of responses that focus on whether the teaching of the philological lessons through the TDTC stimulates the students' attention and leads them to participate actively and voluntarily in the lesson (including the "weak" students, or those who did not usually participate in the lesson).
- 3) The third category, titled **"imagination – freedom of expression"**, is related to the free expression of the students' imagination, thoughts, views, emotions, bodies, and the simultaneous experiential learning of the text. For example, the students described how teaching erased the barrier between the text and the reader and brought the book to life in front of their very eyes. They reported witnessing the facts, entering a role, experiencing the dramatized story and drawing on their own experiences and personal traits.
- 4) The fourth category, **"boring"**, includes the responses from the students who did not like the teaching because they found it boring.

- 5) The fifth category, titled **"communication – collaboration"**, is related to the communication and the collaboration that was developed not only among the students, but between the students and the teachers during the teaching through the TDTC. The students mention that they found a way to observe their fellow students' way of thinking.
- 6) The sixth category, titled **"understanding – consolidation and cultivation of knowledge"**, contains responses that regard the understanding of the lesson by the students and the cultivation of creative thinking over its themes. The students state that they understood the lesson better or more easily when they were able to memorize and consolidate it directly when it was taught without having to work hard at home. This teaching process made them ponder over the themes of the lesson helped them understand views, that they do not embrace or do not concern them, confront social issues and learn new things on various fields.
- 7) The seventh category, titled **"difficulty in meeting the needs of the teaching"**, includes answers that have to do with the difficulty of students to express themselves and to meet the requirements of this specific way of teaching. The students mentioned that they were not able to express themselves freely in front of the others, they did not like this way of teaching, they are not used to it or it is not particularly necessary for their exams.

Based on the categorization we used, there are students that belong to more than one category, as illustrated in the table that follows:

<b><i>"Why did you or didn't you like this specific way of teaching the lesson in relation to the way you are used to?"</i></b>	<b>Number of students</b>	<b>Percentage that answered positively in each category %</b>
More interesting - pleasant - vibrant	419	54.6
Active and voluntary participation	123	16
Imagination - Freedom of expression	164	21.4
Boring	33	4.3
Communication - Collaboration	71	9.2
Understanding - consolidation and cultivation of knowledge	134	17.4
Difficulty In meeting the needs of teaching	51	6.6
Uncategorized	31	4
Unanswered	83	10.8
Total	768	100

Table 4:

We can confirm that the biggest percentage of the students preferred the teaching of philological lessons through TDTC in comparison with the traditional way of teaching mostly because the former activated emotional, mental, social and cognitive need of the students during the lesson.

The students' responses in question number four refer to the degree in which teaching through theatre and drama techniques helped the students understand the text:

We can observe an increase in the positive and a decrease in the negative statements for the effect that this specific way of teaching had on the understanding of the text.

<b><i>"Do you believe that teaching through TDTC helped in the understanding of the text"</i></b>	<b>Number of students</b>	<b>Percentage %</b>
Very much	505	65.8
Considerably	174	22.7
Moderately	56	7.3
A little	13	1.7
Not at all	6	0.8
Don't know	14	1.8
Total	768	100

Table 5:

In question number five, the students choose between seven close-ended categories what they thought that was developed between them and their fellow students during their lessons using TDTC. According to the fact that students were allowed to answer to more than one category, each percentage represents students that answer positively in each category.

<b><i>"During the lesson using theater-drama techniques and conventions, what do you think was developed between you and your classmates?"</i></b>	<b>Number of students</b>	<b>Percentage that answered positively in each category %</b>
Sense of unity – amicable relations	474	61.7
Collaboration	516	67.2
Communication	380	49.5
Trust	110	14.3
Indifference	40	5.2
Discomfort	69	9
Anything else you would like to add	52	6.8
Total	711	100

Table 6:

In the first part of question number six, students state if they noticed any change to the student-teacher

relationship during the teaching of the philological lessons through the TDTC. Those that gave a positive response, explain in the second part why they liked this different student-teacher relationship. Their responses were divided into four categories based on their content analysis:

- 1) The first category ("**friendly, intimate, efficient relationship**") refers to the following: the teacher becomes friendlier, more social, more pleasant, and not at all strict or distant. It seems like he/she walks in their shoes and becomes himself a student again. The teacher experiences the text and transmits it to the students. In this way, the students trust the teacher, can express their opinion freely, without being afraid to say something that might be wrong. They can express their feelings towards the text, their emotions and goals, without the concern of being exposed in front of the teacher. During the class, all students can express themselves, even the more weak or indifferent.
- 2) The second category ("**the teacher, part of the group and detector of the student's individualities**") includes responses that focus on the fact that the teacher leads the students, does not actually dictate what they have to do, but rather works with them and listens to their opinions. He/she takes part in the activities, becomes a member of the group, and "teaches the lesson with them". In this way, the constant monologue of the teacher can be eliminated and the dialogue between the teacher and the students can be favored. The teacher can see that every student is part of this lesson and s/he gets acquainted with elements of their personality, learns more about the students, not only according to their assessed grade. Hence, together teacher and students become more responsible.
- 3) The third category ("**pleasant, comprehensible, efficient lesson**")
- 4) refers to the fact that the aforementioned friendlier relationship between the student and the teacher brings

changes to the lesson as well; it becomes more comprehensible and pleasant, students are more interested in what the teacher says, they are quiet, they improve and become more responsible and efficient. Through this spirit of collectivity, students mature. The lesson becomes more comprehensible because students can also have a visual image of it, not just audio. In addition, the translation of ancient Greek is more easily understood (fourth category: **“unanswered-uncategorized”**). According to their answers, we are led to the following results:

<b><i>"Did you observe any changes in the student-teacher relationship during this teaching method?"</i></b>	<b>Number of students</b>	<b>Percentage %</b>
Yes	471	61.3
No	190	24.7
Unanswered	107	13.9
<b>If yes, did you like it and why?</b>		<b>Percentage that answered positively in each category</b>
Friendly, intimate, efficient relationship	354	75.2
The teacher part of the group and detector of the students' individualities	100	21.2
Pleasant, comprehensible, efficient lesson	68	14.4
Unanswered - Uncategorized	47	10
Total	768	100

Table 7:

The majority of the students observe a change in the student-teacher relationship during the teaching of the philological lessons through the TDTC. The students like the different relationship because the teacher becomes part of the group, recognizes the individuality of each student and encourages the student to participate willingly in the lesson.

According to the content analysis of the students' responses in reference to their positive or negative observations about the teaching of the philological lessons through the TDTC, ten categories were created. According to the categorization undertaken, there are students that belong to more than one category. The study of the data given by the above categories produced the following results:

<b><i>"What were your observations (positive/negative) on this specific way of teaching the philological lessons?"</i></b>	<b>Number of students</b>	<b>Percentage that answered positively in each category %</b>
More interesting/pleasant – creative/efficient	481	62.7
Active and voluntary participation	63	8.2
Imagination – Freedom of expression	69	9
Communication - Collaboration	104	13.5
Understanding – Memorizing – Cultivation of knowledge	129	16.8
Commotion - discontentment	43	5.6
Boring	24	3.1
Time consuming	17	2.2
Difficulty in meeting the needs of this new way of teaching	25	3.3
Uncategorized	37	4.8
Unanswered	156	20.3
Total	768	100

Table 8:

The majority of the students expressed positive observations about the teaching of philological lessons through the theater-drama techniques and conventions, in comparison with those that focus on the negative observations, without, however, minimizing their importance to the research. The sixth



category, ("**commotion**") refers to the commotion that is caused by some students in the classroom during this specific way of teaching. The eighth ("**time consuming**") refers to the fact that the teaching of the philological lessons through the TDTC is time consuming; it demands more time in order for the whole lesson to be covered, and the students want to dedicate more hours to this kind of teaching as well. The tenth category, titled "**uncategorized**", includes answers that were unable to fit into the previous categories or even new ones. Some examples: 'The lesson should be done this way since gymnasium', 'It should be done more frequently, because it would draw students' attention and make them love the ancient Greek language'. 'If it is established, and students get used to it, they will not ridicule it', 'If this was done on a daily basis, everybody would get a 20/20 in their exams'.

In the first part of question number eight, students state which kind of individual or team activities helped them to participate in the lesson. In the second part of question number eight, according to the content analysis of the students' answers, we created five categories that justify the first part's choices:

- 1) The first category refers to the **communication, the collaboration and the reciprocal help**: all the students can express their opinions and they work together for a common purpose. Together they can produce more ideas and thoughts, intercross impressions and collaborate. At the same time the students learn to respect their classmates' opinion, to show empathy for their personal experiences, and understand their way of thinking.
- 2) In the second category, there are the responses that reflect the students' opinion that **in small groups they can find the answers more easily**, develop criticism, exchange ideas and can control more easily the harmony of a small group and avoid commotion. In this

way, a group of mediocre students can become better, since each one undertakes a task; each student takes the floor and tries to always be present to the lesson. The group gives the students self-confidence, and helps them participate more.

- 3) In the third category are the responses that refer to the **freedom of expression in the individual activities**, and more specifically to the fact that the student, as an individual can work better, can express his/her opinion at any moment, has the feeling that he/she contributes to the promotion of the lesson, there is no mixing of opinions or any commotion.

According to the categorization that was done, there are students that belong to more than one category.

<b>"Which of the following activities do you believe that helped you to participate more during the lesson?"</b>	<b>Number of students</b>	<b>Percentage that answered positively in each category %</b>
Group activities (the whole class)	306	39.8
Group activities (in small groups)	414	53.9
Individual activities	70	9.1
Don't know	102	13.3
<b>Justify your response</b>		
Communication – collaboration – reciprocal help, better performance in the groups (small-large)	322	41.9
Better collaboration and participation in the small groups	119	15.5
Freedom of expression in the individual activities	27	3.5
Uncategorized	11	1.4
Unanswered	292	38
Total	768	100

Table 9:

It is obvious that students prefer group activities, which help them participate more during the lesson. Nevertheless, most students prefer small groups,

because of the better collaboration, participation and performance in the lesson.

In question number nine students answer whether or not they would like to be taught again the philological lessons through the TDTC. Then, they justify their preference to the second part of the question. This open ended question was categorized based on the content analysis and then, every response was coded.

<b><i>"Would like to be taught again the philological lessons through the theater-drama techniques and conventions?"</i></b>	<b>Number of students</b>	<b>Percentage that answered positively in each category %</b>
Yes	664	86.5
No	89	11.6
Don't know	15	2
<b><i>"Justify your answer ("because...)"</i></b>		<b>Percentage that answered positively in each category</b>
More interesting/pleasant – creative/efficient	389	50.7
Active and voluntary participation	62	8.1
Understanding – memorizing – cultivation of knowledge	154	20
Communication - Collaboration	62	8.1
Difficulty in meeting the needs of the teaching	26	3.4
Boring	25	3.3
Imagination – Freedom of expression	29	3.8
Uncategorized	30	3.9
Unanswered	140	18.2
Total	768	100

Table 10:

The majority of the students want to be taught the philological lessons through the theater-drama techniques and conventions, since this way of teaching covers their psycho-emotional, social, communicative and cognitive needs.

In the last question, the students are asked to select any other philological lessons that they would like to be taught through the TDTC.

<b><i>"Which other philological lesson would you like to be taught through the theater-drama techniques and conventions?"</i></b>	<b>Number of students</b>	<b>Percentage that answered positively in each category %</b>
Ancient Greek Literature	239	31.1
Ancient Greek Language	236	30.7
Modern Greek Literature	218	28.4
Modern Greek Language	218	28.4
History	319	41.5
Nothing	91	11.8
Don't know	77	10

Table 11:

We note that the majority responded positively to the application of the drama-theater techniques and conventions to the teaching of philological lessons, since 78.2% of the students would like to be taught a philological lesson using this method. My personal reflection on the research accords to the students' response concerning this teaching proposal. It is true to admit that the application of theatre/drama techniques in the teaching of ancient and modern Greek language and literature brings the contemporary pedagogical principles (Moore, 2007) to light and activates their totally effective performance by:

- Using previous experience and students' personal stories in class
- Connecting the lesson with reality
- Cultivating the continuous, energetic and participatory watching of the lesson
- Giving light to students' personality and skills

- Creating a friendly environment through which students experience respect and a democratic, positive stance towards one another
- Facilitating the understanding of ancient Greek language and literature, motivating students to read and write, through a multi-disciplinary process which fosters the presence of the self, the emotion and the senses in class
- Modifying the relationship between student and educator and activating a Socratic way of learning (Abbs, 1994).

Simultaneously, it is obvious that this kind of teaching and learning process requires training on theatre in education methodology and calls for the introduction of specialized theatre/ drama educators in Secondary Education in Greece. The oral or written expression of the stakeholders of the above research, either with their involvement in the practical work or the answers to the questionnaires, points out the need of training in teaching language and literature through drama for both students and language teachers. Not only the students but also the language teachers (philologists) who participated in the research express their need of upgrading their teaching methods through art education, in the corresponding answers of their questionnaires. (As I mentioned above, I present a part of my PhD's research in this paper, part of which is the corresponding questionnaires and participation of the 30 philologists-language teachers, who were also stakeholders).

Taking into account these students' and teachers' correspondence to this research and my reflection as the basic theatre/drama educator who collaborated with the language teacher, I would like to question the realistic application of theatre's didactics in the class. What I perceived from both teachers and students, was an effective positive influence on students' attitudes towards (a) the lesson and subject, (b) the teacher and (c) the classmates. Students expressed

the change of the relationship between the class and the teacher (table VII) and how they experienced the supportive interpersonal relationships which our methodology promotes. Teachers pointed out how all the students participated in this art educational process and how "weak" students came to the front and surprised them with their high participation in the class. Would these teachers maintain this effective change in their stances and attitudes towards their students? Can the language teacher be able to teach language and literature through art as a supplementary method, without being trained in this process?

In Greek Secondary Education, although theatre/drama education has been recognized as a possible learning process within the frame of interdisciplinary ways (Beane, 1997) of teaching (with the introduction of new books in 2006 and new literature curriculum in 2011), the situation is not so applicable in practice. The absence of theatre/drama teachers in Secondary Education (with the presence of an infinitesimal number of those) leads the discussion to the only realistic solution which is the training of the language teachers without diminishing the importance of introducing specialized theatre/drama teachers in schools (?).

In this way the experienced teacher will help students to set aside every fear and confront every conflicting value which may come in contrast with the traditional learning values implied; According to many examples of traditional classes (when teachers do not use any team building exercises and techniques) students get used to a passive orientation towards learning acquisition. They have been adjusted to answer 'the one right answer' to the teacher's question. Nevertheless during language teaching through theatre education, students are free to express their own opinions, feelings, thoughts and assumptions.

They are free to make mistakes. Then, if the students have mentioned a piece of information which is wrong, the teacher provides instruction by participating in the exercises and by taking a specific role, that bridges the gap between 'wrong' and 'right' answers. But all this process takes time for both students and teachers to adjust to the new facts. 'Good' students need more time to realize that they could express themselves freely without thinking which is the answer that the teacher would like to hear? They need time to feel secure with spontaneous responses, without been negatively evaluated.

Teachers need time to feel secure that they could adapt themselves to this new role. At the same time all the stakeholders who are involved in the introduction of theatre/drama education in language teaching, should be flexible to firstly understand how it can instill different kinds of values in students; moral, didactic, personal, social, ethical, aesthetic, human, multicultural values. Thus, not only teachers but headmasters, parents and cooperative foundations and companies, public, private and non profitable organizations should upgrade their philosophy of viewing and sensing pedagogy.

How students respond to a language and literature lesson has also to do with the teacher, the course topic and teaching performance, the physical environment and the social trend towards approved alternative methods or not. Although the physical environment is not always ideal for doing theatre/drama work in class and despite the fact the headmaster may be more conservative and less open to new ways of teaching, theatre and drama in education can dynamically offer an effective way of understanding and sensing ancient and modern Greek language and literature.

## Conclusion

This Socratic process loves inspiring the question in class along with cooperation, friendliness, laughter, compassion, smiling, emotion and pulse. It conflicts the traditional value of a silent class with a vivid, sometimes noisy and spontaneous class. Though it sometimes provokes noise and seems to be very spontaneous, it is *designed* to cultivate spontaneity. For this reason, there is a teaching methodology behind it and specific active pedagogical principles which consummate it.

During my intervention in schools, students changed their values and attitudes towards the lesson, the teacher and the classmates in a positive way with a variety of examples of either higher or lower strength. Even if the 'purposes' and goals of curricula do not enhance language arts, drama teacher and language teacher are blessed to have the key codes via the subject they teach; theatre, text, drama, literature. What follows is the motivation to perform teaching as an ongoing dialectical process.

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## **C**HAPTER 20

### **USING PREFERRED LEARNING STYLES TO IMPROVE ATTAINMENT IN PHYSICAL EDUCATION**

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#### **Abstract**

The aim of this conceptual paper is to explore and analyse the perceived importance of using preferred learning styles within the education system with the emphasis on the teaching of physical education. Teaching is a broad and complex discipline involving a fixed pursuit of identified objectives and the process has inter-related and interdependent stages designed to contribute to an overall goal to impart knowledge in an efficient manner which maximizes the learning taking place within the child. The art of teaching is being able to nurture children and assist in their development to reach their true potential, however, the challenges of teaching lay not in the planning but may lay in the mixture of intended lesson outcomes coupled with the learning differences between those pupils in your classroom, and as such, are not fixed variables, which need

to be accounted for when in the teaching environment. The dialogue and empirical data between learning theories and teaching practice has been expanded, especially in light of current trends regarding individual learning styles and thoughts of bringing the two paradigms together to offer possible reasons for utilizing such knowledge within the teaching domain have been examined. This paper has sought to understand the complex and diverse nature of learning styles within children and has highlighted the need that teachers should be able to construct an appropriate learning environment which allows the teaching delivery to guarantee that children learn, develop, and demonstrate an enhancement to their attainment needed for lifelong participation in sports and physical activities.

## **Key Words**

Children, Teaching, Learning styles, attainment

## **Introduction**

Understanding the different developmental dimensions of a child is not as easy as first thought, yet to do so, would allow teachers a deeper level of knowledge in how to enrich the lives of these young people. A key factor when educating others is to understand and accommodate for differences within children as they develop and mature into adulthood. It has been well cited that there are many physiological adaptations (Gardner et al. 1997: Boisseau et al. 2000: Williams, 2005 and Armstrong & Van Mechelen, 2008) and maturation adaptations (Malina & Bouchard, 1991: Haywood & Getchell, 2005) taking place during childhood, and indeed psychological changes with regards to acquiring skills (McMorris, 2004: Schmidt & Wrisberg, 2008) and other such psychological barriers to participation (Fraser-Thomas et al. 2008: Jowett & Cramer, 2009).

Yet, within the area of cognitive development the notion that we all possess a preferred learning style, or learning trait, is somewhat of a taboo within certain sectors of academia, suggesting that learning styles and associated models have little practical application and use in teaching (Kratzig & Arbuthnott, 2006; Leamson, 1999). Conversely, others openly accept the notion that perhaps we do not all learn in the same fashion, nor at the same speed as each other, and that we prefer to complete our learning using one, or multiple methods of learning, (Dunn and Griggs, 2000) who argued that there is an overwhelming amount of credible data that academic attainment can be derived by focussing on individual learning styles.

Equally, and to fully understand the concept that we all do learn, albeit it differently, a crucial area for those in the education domain who teach children the complex techniques, skills and demands required for participation in sporting activities and physical education, at present, literature of this nature appears extremely limited (Salter & Graham, 1985; Stevens-Smith & Bowling, 2002).

Furthermore, when participants learn how to perform such physical movements, in a coherent, confident and competent manner, this is proven to heighten motivation to learn more and achieve higher results, (Henderson, 2009), leading to a healthier life and a better understanding of procedures and improvement in movement (Bailey, 2001) and physical literacy skills (Whitehead, 2010). Thus, by ensuring all children are learning and developing *per se*, the educator is facilitating this process and fulfilling their role efficiently.

Is it not the duty of our generation of educationalists to ensure that each child is given the opportunity to develop and fulfil their potential in both academic

success and physical well being, and to nurture young people into well balanced human beings? And one of the key areas which need addressing by all educators is to develop our understanding of different learning styles and how these impact on young people.

Teaching is a broad and complex discipline involving a fixed pursuit of identified objectives and the process has inter-related and interdependent stages designed to contribute to an overall goal. Within the education system, irrespective of which country you reside, the central aim is that of long term individual development, and effective teaching has a central role in setting up favourable development conditions for all children, whatever their age, gender, race, creed or ability.

The aim of this conceptual paper is to analyse the perceived importance of using preferred learning styles within the education system with the emphasis on the teaching of physical education (PE). Although, it must be stressed that the information contained in this paper is not limited solely to the teaching of physical education, as the theory can be transferred to other curriculum subjects. However, it is necessary to recognise certain key areas of research in order to contextualise the basis of this paper. The key concepts identified in this paper will be, child development, learning theories, learning styles, and the teaching process of an effective teacher.

The underpinning theory for this paper was based on the empirical work in the 1970's of David Kolb. Although Kolb's work has been hugely debated and critiqued over the years, it must be stressed that this paper does not wish to use labels placed on children of a given learning style, as this would be seen as a negative consequence for child development, rather using the learning styles paradigm as a vehicle to

demonstrate to teaching practitioners that there is a need to accommodate for the individual learning trait within the delivery strategy when teaching PE. This paper wants to offer this area of academic interest in order to recommend possible changes or improvements to the way we, as educators, add to the knowledge and skill base of our children.

## **1. Physical Education in the United Kingdom**

By definition, in the UK, "Physical Education develops pupil's physical competence and confidence and their ability to use these to perform in a range of activities. It promotes physical skillfulness, physical development and knowledge of the body in action. Physical Education provides opportunities for pupils to be creative, competitive and face up to different challenges as individuals, groups and teams" (DfEE & QCA, 1999).

In 1988, The National Curriculum in the UK was improved by the introduction of the Education Reform Act, with an aim of ensuring that schools not only teach and set objectives in a balanced range of subjects, but also monitor pupil progress on an annual basis (Mawer, 1995). Schools in the UK, both primary and secondary, are required to keep annual records of pupils' progress that hopefully demonstrate such progress is occurring. There is a statutory requirement to report a pupils' progress in all subjects within the National Curriculum and the introduction of Standard Assessment Tasks (SATs) have addressed this issue. However there are currently no such SATs for PE, as such tests are completed as a demonstration of knowledge in a 'sit down test' as opposed to a physical assessment of what a pupil can or cannot perform. Therefore, under the Education Reform Act (1988) PE was assessed using a chart of attainment for the various movements, skills and knowledge required to

participate in this subject. ('An attainment target for PE in England and Wales sets out the knowledge, skills and understanding that pupils of different abilities and maturities are expected to have by the end of each Key Stage' (DfEE & QCA, 1999)).

Attainment targets are assessed throughout the year by the school's teacher initially and verified by an external moderator; these assessments are recorded and updated according to the pupils' progression. It is therefore not about the teacher and learning process but how the pupil naturally evolves from this exposure to teaching where feedback and opportunities for improvement are given. The assessments should enable the pupil to show what they can do, the understanding and knowledge of the activity and importantly support progression of learning. However, within the Secondary School setting, the individual learning style of each pupil has been overlooked as a viable and reliable source of information when setting lesson objectives and as such the development of the child may be hindered without this knowledge.

Traditionally, it has been believed that an individual's successes and failures within a learning environment stem from ability alone. Yet PE is always under judgement (Bailey and Kirk, 2009), as some believe it to be physical "recreation" rather than "education" and therefore is not considered serious study. However, if taught correctly, PE enables a child to gain knowledge on the different processes of movement and how to utilise these attributes, something which cannot be taught in the classroom (Capel 2001). Nevertheless, there seems to be little variety in teaching within PE with the main focus being kinaesthetic learning, that is, the 'learning by doing' approach, and many strategies (Games for Understanding, Sport Education and Active Learning) have been implemented in the hope of transforming how PE is taught. Yet, if PE

continues to be taught via this 'one style fits all' approach, then we could be in a situation where the majority of children will be turned off by physical activity and sport because they have missed the opportunities in which to learn the necessary movements, techniques and skills.

This issue is compounded by Mohnsen (2008) who found that throughout different schools within the UK, physical educators seem to be using the same strategy, teaching through direct movement, which appeals to the kinaesthetic learner but neglects other forms or styles of learning. This (learning through movement) is a valid method for simple skill development, however if higher complex skills are being taught, pupils must be stimulated through varied activities, with attention to detail and individual needs considered if success is to be achieved by all learners. Moreover, if teaching is performed in the correct way using a variation of different teaching methods and accounting for different learning styles within individuals then attainment of the complexities of PE can be achieved.

This issue is highlighted further by Kirk (2009) who argues that multi-activity, sport-based forms of physical education have been dominant in schools since the mid-20<sup>th</sup> century and they (teachers) have been highly resistant to change. The practice of physical education has focused on the transmission of de-contextualised sport-techniques to large classes of children who possess a range of interests and abilities, where learning rarely moves beyond introductory levels. Kirk also argues that the most likely short-term future for the teaching of PE is 'more of the same' and states that the education system in the UK requires a major reform in the longer-term, arguing that without it 'physical education faces extinction'. Potentially then, this paper could provide the platform to assist in



an improvement in teacher education and an improvement in physical literacy for hundreds of thousands of children undertaking compulsory physical education across the National Curriculum (NC) in England and Wales, and prospectively in all corners of the globe.

Assisting the process of teaching, and in fact teaching development per se, has to have at its forefront, knowledge of how each pupil will learn. The particular learning preference for each pupil is an instrumental aspect when considering how to develop the pupil. However, at any key stage of the NC in the UK, there are no requirements to administer such an assessment of preferred learning styles. Thus the learning styles of each pupil are not openly considered when improving the knowledge and understanding of the teacher when writing formal lesson plans and schemes of work when planning lessons. Therefore we need to address a combined approach to our teaching processes coupled with knowledge of how children learn.

## **2. Theories of Learning**

Learning has previously been defined simply as 'when an individual can demonstrate that they know something, or can perform something, that they did not know or could perform before' (Honey & Mumford, 2000:7). Although Kennedy et al. (2000:626) has defined learning as "A more or less permanent change in performance associated with learning experiences but excluding changes which occur through maturation and degeneration". The word 'less' in this statement suggests that perhaps learning has not happened initially, but may well surface in the future after experimentation by the person, i.e. during a training drill rehearsing sports techniques or performing a specific discreet skill. In essence, learning can and

does occur, whether it is directly or indirectly and whether it is instant or later.

Everyone has their own way or style of learning, and which will offer the greatest benefit to the individual. As Cornett (1983 p.7) states 'each of us possess unique ways of learning that are woven inextricably into the fabric of our personalities'. Nevertheless we share many learning similarities which consequently allow educators to design a generalised curriculum which relates to the needs of the masses under their tutorage. However Cornett (1983 p.7), also expresses concern that 'each child will approach these general learning experiences in a personal, individualised way' which gives every child their own unique learning style.

Uberman (1997) stated that we learn more when we are taught in the way we want to learn, and this is supported by Stronge (2007) who suggests that teaching is more than just conveying information to pupils, it is the ability to communicate the information at a level in which every child can understand and learn. Danielson (2008) further supports the notion that there is the need to have engaging lessons in which all children can learn, and this is the fundamental concept of teaching.

More recently, Armour (2011) defines learning as 'a learning practice, referring to the ways in which individual's learn, and to the pedagogical knowledge and skills that teachers need to support them to learn effectively'. Armour argues that it is not so much as the teacher facilitating the teaching process, but how the teacher can relate to how the learner prefers to learn. This is prevalent within children who develop and learn at different rates and speeds to that of their peers (Capel & Whitehead, 2010), and an effective teacher is able to differentiate between the needs of

those individual pupils, as well as teaching to the whole class.

Over the past 60 years, development of learning styles research means there are many theories which aid in the learning of individuals. In order for us to understand the manner in which individual's learn, it is important to understand how the learning process occurs, and this is often referred to as cognitive learning. There have been many theorists who have been well cited, including Welford (1968) Information Processing Theory: Keele (1968) Motor Programming Theory: Fitts and Posner (1967) Three Stage Theory: Schmidt (1968) Schema Theory: Kolb's (1976) Experiential Learning Theory: Anderson (1982) Adaptive Control of Thought Theory and Bandura (1997) Observational Learning Theory, and such theories are geared towards adult learners and try to establish what learners are trying to learn and how they are going to do it. Whereas theories, or indeed, an understanding with how children learn, hasn't really moved the dialogue forward from the earlier works by Dewey (1897-1952), Vygotsky (1896-1934), Piaget (1896-1980) and Erikson (1902-1994). Thus, in some small way, this paper hopes to address the modalities of how children learn.

The opposite to the theories of cognitive learning are known as dynamical systems approach and come from ecological psychologists. Gibson (1979), an ecological psychologist, believed that we actively search the environment for opportunities to achieve our goals and unlike cognitive theories; perception does not require memory but comes direct from the present time (McMorris & Hale 2006). As such, sociological theories related to the teaching process present the concept that learning can, and does present itself within the environment (Cushion, 2012), and there is a collaborative approach to our learning between

cognitive and dynamical theories. An expansion to such dialogue was offered by McMorris & Hale (2006) who stated that 'learning cannot be claimed to have taken place until a skill can be performed 'consistently' over a period of time'. It was accepted that learning could only happen when the learner consciously set out to learn the skill, and this is known as 'explicit learning'. Yet Magill (1993) and later by Masters (2000) had previously accepted the concept that we can also learn subconsciously or 'implicitly'. Both Magill (1993) and Masters (2000) found that we are able to improve our level of skill expertise, even when completing a task but not consciously attending to it. Stafford (2011) reinforced this by stating "there are numerous ways of ascertaining the instructional and learning preferences of an individual" and focus should not be placed on a 'one-method-fits-all' approach, yet in opposition to this very statement, Stafford does not offer, nor suggest, how these preferences are ascertained?

With this in mind, the process of learning through sport has seen 2 main theories come to the fore; Firstly, Behavioural Learning Theory, (Bandura, 1997: Slavin, 2003), which suggests that individuals learn through consequences of an action. The assumption being that participants will learn whilst performing, via the building and cementing of correct techniques and appropriate skills – as in the schema theory (Schmidt & Wrisberg, 2008).

The second theory is the Constructivist Theory, (Lave & Wenger, 1996: Simpson, 2002: and Slavin, 2003), and earlier works by Vygotsky and Piaget have been instrumental with this approach to learning. In essence, constructivist theory suggests that we learn through observations, paired with our own interpretation of a task, and by using a self-discovery method of practice based on constructing our own

meaning to what is being asked of us. For example, children will interpret what a teacher is telling and showing them, formalise their own understanding and perform a particular skill or technique without, perhaps, not fully grasping 'what' the teacher has initially instructed (Schunk, 2009). An obvious downside to such learning is the misinterpretation of what is actually needed as the participant will continue to perform an incorrect technique or use of an inappropriate skill at a given moment within the performance until this is corrected by a significant person, i.e. the teacher.

It is essential then, that we utilise our capability to learn so that new or complex skills become simple over time. Learning to walk for example is a possibly overwhelming task for a baby but is done with no thought over time as we get older, that is, we perform the art of walking subconsciously. It is the combination of motor learning through the development of a set schema with learning experiences that allow humans to combine new knowledge with old to improve skills (Shmidt & Wrisberg, 2008). This process does not change throughout life, and indeed it is assumed that we never stop learning. However the capability to learn effectively is best captured in youth, as this is when there appear to be no, or limited barriers based on experiences, perceptions or pre-conceptions.

Having then a better understanding of the theories of learning allows us to grasp the concept that we possess similar or different modalities (styles) of learning to each other, and it is these individual styles which make us unique as individuals.

### **3. Learning Styles**

A learning style can be defined in a variety of modes, as the experience(s) of the individual will shape and determine how one person prefers to learn when comparing similarities/differences to a given peer. Schmeck (1988) argued that "at the extreme, one learner might describe learning as the literal retention of knowledge, often achieved through repetition and recitation, while another might describe learning as an interpretative process aimed at understanding reality". James and Gardner (1995) defined a learning style as "the complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store and recall what they are attempting to learn". Equally, Tickle (2001) defined learning styles as "an expression of personality within the academic context, and as such it is said to include learning strategy, motivation and cognitive style". In essence, a learning style is the way in which we think, perceive and remember information and our preferred approach to using such information to solve problems, (Lavenda & Schultz, 1990).

As previously mentioned, David Kolb's work in the 1970's is credited for the development of the early learning styles questionnaires based on a solid theory, however it has been largely criticised on its reliability as it bases itself on individual's personality style and confuses this with learning style. Apter's (2001) Motivational Style Profile (MSP) is similar to this in that it separates individuals into four key areas but like Kolb, the MSP is more interested in personality types. Dunn & Dunn's (1978) model is an effective instrument in showing different types of learning, but unfortunately this model looks into adapting the setting and environment in which an individual is placed to aid the learning process, thus does not illustrate a stable trait within children. Gregorc's (1985) Style Delinator questionnaire can also be

dismissed for its use on a child population as some of the wording within the questionnaire is too complicated to be using with children and adapting this model too much would hinder its validity. The Myers-Briggs Type Indicator (MBTI) is again too complicated for children and looks primarily, as per other authors, at personality types. Likewise, Riding & Rayner's (1998) Cognitive Style Analysis (CSA) questionnaire cannot be used solely for preferred learning styles as it looks more into individual intelligence and cognitive structuring process. Allinson and Haye's Cognitive Styles Index (CSI) investigates intuition-analysis and is far too complicated for children to comprehend, let alone complete thoroughly. Honey & Mumford's model, in the 1980's and later in the early 2000's, is largely based on David Kolb's model and bases its conclusion on four learning styles, later adopted by McMorris and Hale (2006), nevertheless, such models still lack validity and reliability.

The negative impact of some inventories has seen a saturation in the literature and the works by Kolb (1977), Honey and Mumford (2002) and later still by McMorris and Hale (2006), have highlighted four types of learners, which are activists, reflectors, theorists and pragmatists. Such works have exhausted the literature regarding these learning styles, and it is not the intention of this paper to disagree with their work, but merely highlight that although these works are prevalent, we cannot eliminate other forms of preferred learning styles, such as; divergers: convergers: assimilators: accommodators: theorists: verbalisers: imagers: analytics: wholists: analysts: changers: and realists, and much more research into this area is very much needed, which this paper cannot currently explore.

Although many learning style questionnaires have been designed and used in a variety of settings, through sport, business, entertainment and education, the use of the term VAK (visual, auditory, and kinaesthetic) was offered as a means to simplify the other styles mentioned above. Fleming and Bromwell (2001), influenced by our own five human senses, chose to focus on just three learning senses: seeing (visual), hearing (auditory) and touching (kinaesthesia) believing that these three senses tended to assist our daily life's the most which later included the VARK (visual, auditory, reading and kinaesthetic) model of learning.

Based on such an assumptions, the DfES (2003) chose to encourage such a learning style preference indicator in FE colleges and HE institutions, focusing on the late teenage and early adulthood population, and despite its predominance, and condemnation by Coffield et al (2005), such learner assessments were frequently employed. Despite such usage, and the further condemnation from Lucas (2005) stating that the learning style indicator did not constitute a learning model, could this have been the reason why the assessment model was not employed within the compulsory school sector within the UK? Equally, and with limited literature on the cognitive developments of children, learning style preferences amongst children (<16) have yet to be established, and the dialogue of such being extremely limited as a consequence.

Middlewood et al. (2005) had found that the proper use of the visual-auditory-kinaesthetic (VAK) assessment and its application within differing contexts, helped to improve motivation, behaviour and achievement and was seen as the optimum method to promote deeper and more effective learning. This is extremely significant as Green and Hardman (2005)



also found that 'how' information is conveyed was as important as the content being conveyed: e.g., sports specific techniques are extremely important but if a child cannot retain the information due to ineffective teaching methods then the child will not be able to relate the content and use the information at a later date. Dreeben (2010) found that in some schools, utilization of the VAK learning theory seems to be the best tool for effective teaching academic classes. This supports the earlier work of Gould (2008) who found that the use of VAK testing has been in use in some form or another since the 1920s, and when teachers account for individual learning styles in the classroom, the likelihood of information being received and retained is improved. This is later supported by Beadle (2010) who states that in the education field, the simple VAK model is the easiest to understand for both learners and teachers, yet for some reason is not widely subscribed due to the small number of cases which do not constitute sufficient evidence. That is, in each case mentioned above, the sample sizes were very small in comparison to the estimated 8.4million children in the UK which could be affected by its use in a compulsory fashion.

Although it has been accepted that an individual's successes and failures within a learning environment cannot stem from ability alone, Wrisberg (2007) state there is considerable research to show that the accepted VAK (visual, auditory and kinesthetic) model of learning (Tobias, 1994: Davenport 1997: Brower et al. 2001: Stevens-Smith & Bowling, 2002: Coutts & Farrow 2004: Beadle, 2010; Capel and Whitehead, 2010; and Armour 2011) has been accepted as the norm for educating children, and this has slowly transferred into the sporting domain (Sternberg & Zhang, 2007). Cautiously, we must recall the previous works by Brower et al. (2001) and more recently Gonzalez-Haro (2010) who assessed young adults, and

using adapted VAK style questionnaires to ascertain athlete's preferred learning styles in college athletics programmes. Both studies concluded that there was no one dominant preferred learning style between all of the participants, which as any proficient teacher would acknowledge, is to be expected, as you'd expect there to be a variance in individual learning styles, like you would for individual ability.

Most humans (and there is no reason to suspect that children are any different from adults) learn in different ways and Eys (2009) states there has been concerns about the VAK preferred sensory modalities and personality characteristics that have an effect of the behaviour patterns in different learning situations. This supports the earlier works of Pollock and Lee (1997) who suggest that children have differences in their cognitive processing mechanism, such as their selective attention and the speed at which they process such information. Such assumptions are supported by Chuah & Maybery (1999) and later by Ferguson & Bowey (2005) who state that when processing information, children use visuo-spatial working memory, object recognition memory, verbal cue learning and by copying a lead person, in this instance a teacher. Whether these motor learning principles are concurrent in all children still remains to be tested, especially as there is limited literature to suggest whether individual preferences to a given learning style is a stable trait amongst children. Nonetheless, Hampson et al. (2006) found within general psychology that the personalities of children remained quite stable when reassessed some 40-years later, giving sufficient evidence to prove that it is possible for these traits to be stable, and important for educators to accept and meet the learning requirements of the child learner and become effective in their teaching strategies, (Eys, 2009 and Gordon, 2009). This information is extremely useful when

writing this paper as although a recent pilot study (Cunliffe, 2011) selected only a small population group, further investigation of a longitudinal nature is required to assess whether learning styles for children are stable traits, as some academics would argue such traits change or alter within the confines of the learning environment or over a period of time, but the works by Hampson et al (2006) certainly give cause for thought?

Whilst, for some, they remain sceptical in terms of using, (or labelling), children with a preferred learning style, e.g. the mode of learning which they favour (Coffield et al, 2005: Lucas, 2005), others do frequently state that as learners, we all appear to have a perceived preference to learn via a certain manner/method (Beadle, 2010: Capel & Whitehead 2010). The VAK model of assessment may appear to be a useful starting point, and this paper has utilized a version of this in a pilot study, later in the chapter.

Learning style theories, and models of learning, do come under some criticism though. Some psychologists and neuroscientists have questioned the scientific basis for these models and the theories on which they are based. Curry (1990) forwards the idea that there is little evidence for the confidence in learning style models and that most rest on dubious theoretical data. Greenfield (2007) believes that from a neuro-scientific point of view, learning styles approach to educating is nonsense, and Claxton (2009) believes learning styles may be more of a hindrance than a help as they label Individuals, which may restrict learning with learners perceiving that one style of learning is weaker/stronger than another.

Nonetheless, as PE teachers, who educate others through appropriate practices and exercises, we must now start to turn our attention to the modality in

which children learn and accept that learning styles are a paradigm, and once accepted and understood, the teaching methods employed must then be altered to suit the needs of the learners as individuals. Equally, it may be appropriate that the delivery of teaching styles may also be altered to best suit the individual child.

#### **4. The Teaching Process**

The ability for a child to successfully learn and master new techniques and skills should be seen as a logical step to sporting attainment and participation, and even success. The role of the teacher in this process however, should not be underestimated, and their teaching style and teaching philosophy is likely to significantly affect how successfully the child learns. Therefore, information regarding a child's preferred learning style could possibly be invaluable to a PE (and any other subject for that matter) teacher. In order to get the most from a child learner, it seems logical to teach them in a way which will suit them best, where they feel most comfortable and be stimulated to learn, thus will flourish when learning new techniques and skills. By understanding which teaching styles fit with which situations for the individual child, a teacher should theoretically improve their own impact on the teaching process, and ultimately develop their own teaching ability in the process.

Despite the plethora of teaching textbooks in circulation, teaching styles in physical education found prominence through Mosston's (1965) 'Spectrum' model, which has been remarkably successful, and its logic currently underpins the conceptualisation of teaching styles in Western education systems. However, Joyce and Weil (1986) argued that to be an effective teacher, you must master a repertoire of teaching styles, because no one style is adequate for

every child, nor every situation the child may be in. Equally, it is accepted within cognitive psychology that we acquire fundamental movement patterns with age and experience, following repetition and practice, and this process of experimentation starts from when we are in childhood (Robert & Halverson, 1984).

As with most subject specialism's, different teachers possess different teaching abilities and styles, mainly based on theoretical underpinning during teacher training and mentoring whilst in situ in a school, but more importantly, these styles are based on past experiences and comfort, that is, 'what worked well before will work again' mentality. Coupled with Winnick's (2011) work who states that there are other factors which influence the choice of teaching style such as the teaching philosophy of the teacher, the task they are teaching, the intended lesson objectives, the environment in which they teach, the demographics and characteristics of the children and the previous rapport the teacher held with the children, making the dimensions of teaching styles extremely varied.

Within the PE setting, where there is potential to combine multiple classes to make a larger or 'super class', the children respond to a given stimulus, mainly from the instructions and/or demonstrations before the group then perform the required action/movement together en masse (Kassing and Jay 1998). An advantage to this style of teaching allows a useful period of initiating and manipulating children into a purposeful lesson, giving them the structure of security from which the lesson can gain impetus (Bailey & Macfadyen, 2000). This type of lesson (usually) utilises the command style on Mosston's spectrum of teaching and allows children to feel safe and confident in what they have been asked to do and allows the teacher an opportunity in which to keep the

lesson in a safe environment for the children, especially those who may be at the beginning stages of technical development (Chandler et al, 2007) or physical literacy (Whitehead, 2010).

At the other end of Mosston's spectrum of teaching styles is 'learner initiated' which allows the children, usually much older, more freedom in which to experiment and practice, with the teacher merely giving advice when asked by the child. This style is based on individual learning, and has critics as well as supporters, but is based upon the knowledge, confidence and experiences of the teacher to allow the child an opportunity in which to develop using their own knowledge and experiences.

There is, however, limited literature which focuses on the process of teaching, with authors opting to share 'best practice' as opposed to a definitive conceptualised answer (Capel, 2001; Cassidy 2004). Sports coaches John Cross & Neville Lyle (2002) have contextualised the teaching process within a sporting domain, and have stated that "the teaching process should be the common, all-embracing term for representing and understanding sports teaching". Therefore, effective teaching can come in a variety of ways and forms the basis in which all people, (adults and children), learn. Cassidy, Jones and Potrac (2004) summarised the difficulties when trying to define the teaching process within the education sector by stating that teaching is "multivariate, interpersonal and dynamic" in nature. The same authors also discuss the behaviourist approach adopted by Hanrahan (1997) and Martens (1997) who simply tried to concentrate on the 'how to' approaches to teaching. Such actualities of how to teach will differ between academics and teaching practitioners, but the model displayed in Figure 1, from a behaviourist approach, simplifies the schema presented by Jones, Hughes &

Kingston (2008) and illustrates that being able to instruct, demonstrate, allow children to perform and evaluate their performance (from a teaching perspective) seems to be an accepted simple model for effective teaching, being offered by teaching practitioners.

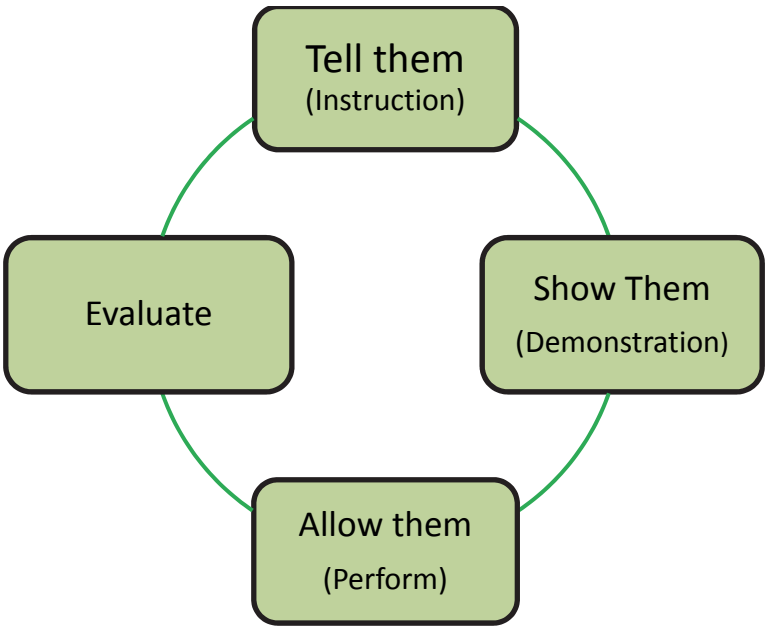


Figure 1: A simplified model of teaching PE

The process of learning through sporting movements and activities has seen two main theories come to the fore; Behavioural Learning Theory, (Slavin, 2008; cited in Jones, Hughes & Kingston 2008), which denotes that individuals learn through consequences of an action. For example, praise for doing something right will result in the child repeating this action. By contrast, some teachers are dishonourable at using forms of punishment for a negative response, so as to not see a repeat of doing something wrong. This form

of learnt behaviour hasn't been proven to develop learning within children and teachers are well advised to avoid such treatment towards children for fear of possibly being accused and charged for child abuse allegations under the Child Protection Act (2009).

The second theory being offered is Constructivist Theory, (Slavin, 2003: Cushion, 2012), and earlier works by Vygotsky and Piaget have been instrumental with this approach to learning. In essence, constructivist theory means that we learn through observations, paired with our own interpretation of a task, and by using a self-discovery method of practice based on constructing our own meaning to what is being asked of us. Schunk (2009:168) expressed this when stating that "learners build their own mental structures through interaction with the environment". For example, children will interpret what a teacher is telling or showing them, formalise their own understanding and perform a particular skill or technique with perhaps not fully grasping 'what' the teacher has initially instructed.

In essence, it is important that PE teachers need to appeal to the way that children learn best so that knowledge can be retained (stored in the long-term memory) and used to lead to successful completion of sports skills and techniques in the future, (Shmidt & Wrisberg, 2008). When learning new techniques and skills within PE, both theories of learning need to be taken into consideration. Even more so when educating children, as the PE teacher needs to appeal to the needs of the individual child. Being fully equipped, in terms of qualifications, experience, competence and confidence, the PE teacher should be able to satisfy the needs of the individual child. Thus by maximising the delivery of movement exercises and drills, by utilising the delivery methods should enhance the learning of the individual child.



Mohnsen (2008) found that throughout different schools, physical educators seem to be using the same strategy for educating others, teaching through direct movement. Obviously, this method of delivery appeals more to the kinaesthetic learner but directly neglects the visual and auditory learners, and other styles of learner. It would be appropriate to stress that this (teaching through direct movement) is a valid method for teaching simple skills for children and/or new beginners, however if higher complex skills are being taught, children must be stimulated through a variety of appropriate activities, differentiated for each child based on their competence and ability to understand what to do, i.e. their ability to learn what is expected from them. The model of teaching in Fig. 1 clearly fails to establish whether a child has actually 'understood' what is expected of them, and indeed, many children will more intently observe their peers in a hope of gathering sufficient information in which to construct what they have to do, thus in this context, the teaching process has failed to adequately educate the child. Walker (2008) proclaimed that it would be impossible for an educator to account for all three VAK learning styles regularly throughout a single session, as whilst appealing to one style of learner, they would be neglecting the other styles of learners. In its defence, Fig.1 does the opposite in fact by appealing across the VAK spectrum within a single session, by the very nature the instruction appeals to the auditory learner, the demonstration appeals to a visual learner and be able to practice/perform appeals to the kinaesthetic learner, thus using the VAK spectrum, all learners are being catered for. However, the fundamental flaw with Fig.1, unlike as mentioned by Walker (2008), is that it doesn't allow for an assessment of whether the children 'identifies' what they are asked to perform, in short, do they actually understand what they have to do or are they just reacting to a given stimuli?

To contextualise this issue into a learning environment, PE teachers become frustrated that some children “just don’t get it”, but in fact the problem may lie not with any incompetence with the child, but with the delivery methods employed by the teacher (Fig.1). Different learning styles require different methods of stimuli; if individuals are not taught in their preferred way then they are less likely to achieve success as they are not being stimulated , (Stevens-Smith & Bowling, 2002). Equally, educating through sport, if taught correctly, enables a child to gain knowledge on the different processes of movement and how to utilize these attributes, something which cannot be taught in the classroom sitting behind a table, thus, effective teaching needs to be taught in the correct environment, (Capel & Piotrowski, 2001). In the future, the process of teaching children, needs to be administered in the actual environment in which the techniques or skills are to be utilised, as it might not be as simple as teaching football on a football pitch, rather, teaching a required technique in a certain position on the field of play for football. This will allow the child to grasp a better understanding of what they need to do and they will be able to retain such information for use at a later time. The responsibility of teaching to educate children then appears to be great and very demanding. However, for many PE teachers, they are found to teach in a manner that accounts for their own learning style and not that of their children, and this is detrimental for the education of the child (Sarasin 1999). Owen & Stewart (2004) also found that PE teachers tend to account for one style of leaning, kinaesthetic (learning by doing), and this is supported by the literature with other proposed theories of learning: Active Learning (Rogers, 1975); Play Practice (Lauder, 2001); Games for Understanding (Thorpe et al, 1986); Discovery Learning (Raab, 2009); and Sport Education (Hastie 2010).

In addition, it has been noted that both the learning and teaching experience has been improved when individual learning styles are considered as it makes the experience more enjoyable for children, due to a heightened understanding of 'what' they are doing and 'why' they are doing it (Uberman, 1998). In addition, when teachers are proactive with their assessment of planning they gain an enhanced sense of achievement. Yet for some teachers, it has been reported that negligence in catering for individual learning styles means they may fear the enjoyment of teaching far less and do not gain any richer experience from this engagement (Reed et al, 2004).

By not knowing or appreciating different learning styles, a teacher is leaving themselves open to deliver sessions containing instructions that some performers either do not understand what is being asked of them or do not fully understand how the technique or skill 'fits' into their learned activity. Such intricacies involved when teaching children do exist and are reported by experienced and newly qualified teachers (NQT), as although the assumption and knowledge that not all children prefer to learn in the same fashion, little or nothing is done to cater for such differences, other than some form of differentiated activities.

The real problem lies not in the model of sports coaching in Figure 1, as this partially allows the children to learn via the VAK styles of learning; Instruction (auditory learner), demonstration (visual learner), and performance (kinaesthetic learner), but in reality, the ability of the teacher to reinforce what is being taught to all children in a way all children understand is the real fault

As a result, children are often unsure about what they are learning as the two-way communication excludes

opportunities of feedback, which have been described as an essential component when teaching when supporting and guiding the learner (Capel & Whitehead, 2010). It is important to stress the need for all teachers to give positive and constructive feedback throughout their teaching delivery, and with a plethora of teaching papers in the domain, it is not the intention of this paper to re-state them.

It is however accepted that the use of appropriate feedback is a skill in which the teacher must master, as an inexperienced teacher could be asking too many/ or too few questions at potentially the wrong time, thus disrupting the learning of the child. It must also be stressed that just because there is an opportunity for the teacher to offer feedback after each of the delivery stages, - instruction-demonstration-performance-evaluation - it does not mean they have to! Consequently, selection of when to and what feedback to offer children is paramount for the delivery model in Fig 1. to be successful, and teachers can only get this experience from delivering the model within their own lessons after building a profile of the children they are working with.

The findings of a pilot study (Cunliffe, 2011) illustrate that children learn in a variety of methods and have scored across the whole VAK spectrum, thus will learn something even though the teacher is not focusing on their preferred learning style all of the time. Table 1 illustrates this point with a breakdown of learning styles across secondary school years 7-11 (11-16years old) separated also by gender (n=900 children)

Table 1: Percentage of preferred learning styles in each year group categorised by gender

School Year		7	8	9	10	11
Female	Visual	21	12	17	10	5
	Aural	9	8	15	11	27
	Kinesthetic	8	19	12	7	8
	Combined	10	13	9	13	10
Male	Visual	18	9	9	16	10
	Aural	13	4	13	5	20
	Kinesthetic	17	26	17	26	10
	Combined	5	10	9	12	10

It is important to understand that the data presented in Table 1 needs to be taken at face value, as the percentages are only a snap-shot of the children in each year group, and although reliability of data was measured via the mean score of a learning styles questionnaire being administered three times, we need to accept that it is unproven if individual learning styles are stable traits or not? However, it is interesting to note that there is a combination of all three learning styles across the VAK models of learning, in every class, and even more so with those who demonstrated a combined learning style score (that is a mix of VA, VK or AK).

Consequently, it has been reported by Cunliffe & Rist (2011) that the child will learn quicker and be able to utilise this new knowledge at a quicker rate if the teacher is reinforcing 'what' they should be learning by adopting a directed questioning approach throughout the lesson, thus the children won't have any misconceptions (constructivist approach) about what the teacher is asking of them or how the skill/technique/movement can be applied to their sport/activity.

## **Conclusion**

The obvious breakdown between teaching strategies and preferred learning styles may be a result of the way pupils actually learn, compared with the mode in which the pupils are taught. The overall aim of teaching is, after all, the ability to impart knowledge in an efficient manner which maximises the learning taking place within the child (McKeough, Lupart, and Marini, 1995).

There is not a one-preferred learning style for any specific age group and that the results from a given learning styles questionnaire need to be taken at face value for each and every individual. As a result, PE teachers should aim to be the first stepping stone to developing talent within the UK, and this is supported by the previous work of Farrow et al. (2008) who stated that accounting for learning styles in children can prove critical in the development of a child with elite potential. This can also provide opportunities for effective teaching for the individual child, paired with an enjoyable experience, and both have been found to be key factors needed to nurture child development (Houlihan & Green, 2008).

Effective teaching can come in a variety of methods and forms the basis in which all children learn. The actualities of how to teach PE will differ between academics and teaching practitioners, but the model displayed in Figure 1 demonstrates that being able to instruct, demonstrate, allow children to perform and evaluate their performance seems to be, in its simplest form, an accepted model for effective teaching of PE.

By virtue of following the method of session delivery in Fig.1, the PE teacher has (perhaps unknowingly) subscribed to the VAK style of learning for the recipients of the teaching session, e.g. instruction

(auditory learners), demonstration (visual learners) and performing (Kinaesthetic learners). Of course, just because PE teachers follow this form of delivery strategy, it doesn't always mean the child fully understands what they have to do? And as such, teachers often fall into the habit of assuming that because they themselves have explained and demonstrated what to do, that the child will automatically know what to do? Therefore, PE teachers should aim to provide an interesting and varied learning experience so that all children have the opportunity to develop physical literacy, sports techniques and sports skills within an appropriate environment to utilise their new found skills, either immediately or in the future, and the delivery method in Fig.1 fails to do this as not all children will learn from this method.

In addition, it cannot be argued how important learning is for a child's development, yet it is essential that information conveyed from the PE teacher to the child is sent into the long term memory for future use, as this is the key element for lifelong execution of correct techniques and skills to prolong possible participation in sport, and in doing so, it needs to be a positive learning experience for the child. Conversely, information received which is not transferred to the long term memory, say, if the information is not perceived as important/relevant by the child would lead to a decrease in motivation and ultimately could lead to a decline in participation. Therefore, the first step to successful teaching is to appeal to each and every child on an individual basis, that is, appealing to the way an individual learns, in short, appealing to their preferred learning style.

Utilising preferred learning styles, has both their critics and supporters. Of course there may be margins for error, and these must be controlled. The specialisation

of teaching to a group of children on a differentiated basis, as opposed to teaching using a particular style, is a challenging prospect for both new and experienced teachers. Solely using one mode of delivery, because the teacher feels comfortable with that style of delivery, could prevent children challenging themselves to learn in different ways and could take time for the teacher to master such skills. Equally, there may also be a danger of mislabelling children through poor assessment of their preferred learning style, although this could be solved through consistency during any assessment period.

The art of teaching is being able to nurture children and assist in their development to reach their true potential, whether this is Olympic glory or the introduction of basic motor skills. The role of the PE teacher is to understand their child(ren) and to prescribe suitable lesson activities which will help develop the individual child. By knowing how a child learns, e.g. their preferred learning style, the PE teacher is able to employ appropriate strategies, and using a varied session delivery, will speed the process of successfully enhancing that child's development and maintaining engagement within physical activity and sports. In short, if teaching is performed in the correct manner, using a variation of different teaching methods, and accounting for different learning styles for individuals and not teaching en masse, success will be achieved. A learning style is the way in which a child learner tries to learn. It includes how they approach learning, what they experience whilst learning and how they utilise such information. But learning is ineffective unless knowledge of how a child learns become part of an ongoing programme of teaching and learning embedded by a teaching philosophy. Children who are taught using these methods are able to plan more effectively, reflect and solve problems more easily, and enhance their own



ability to improve skills on their own, leading to improved attainment of information. How the teacher presents something is often as important as what they say, indeed it may determine whether it is understood at all?

Finally, who is to say that preferred learning styles are stable traits? This paper is not professing any such claim, as such a statement is only possible after prolonged assessment of the same child(ren) during a longitudinal study. With this in mind, this paper has sought to understand the complex and diverse nature of learning styles within children and has highlighted the need that teachers need to ensure the delivery is right to guarantee that children learn, develop, and hone their skills needed for lifelong participation in sports and physical activities.

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## **C**HAPTER 21

### **ISSUES AND PROSPECTS FOR PEACE EDUCATION IN JAPANESE SCHOOLS: AN EXAMPLE OF TEACHING MATERIALS RELATED TO THE ATOMIC BOMB**

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#### **Abstract**

This research aims to examine the problems and issues surrounding peace education in Japanese schools, to introduce the current situation of peace studies and peace education based on teaching materials related to the atomic bomb in schools, to situate such studies and education in an overall context, and to grasp the issues faced in the 21<sup>st</sup> century, and to open up the prospects for the future. Close examination of the current situations and the teaching materials related to the atomic bomb enables to situate various practices across the society in an overall context. Categorized into four levels or types, peace education and peace studies should not associate themselves to any specific ideology that leads to inculcation; rather, it is essential that they remain open for true democratic attempt in which the learners make choices to create new forms of peace utilizing their newly acquired skills and knowledge. However, a single program cannot accomplish such

objectives. It is important, therefore, that each educative attempt for peace should clarify and fulfill its mission at first, and collaborate with many other even beyond the school boundary. This will ensure the learners the diversity, and peace education its success in the 21st century.

## **Keywords**

Peace Education-Teaching Materials-Atomic Bomb

### **1. Aims and context of this research**

The aims of this research are to examine the problems and issues surrounding peace education in Japanese schools, to introduce the current situation of peace studies and peace education based on teaching materials related to the atomic bomb in schools, to situate such studies and education in an overall context, and to explore their role, thereby examining current issues related to peace education in schools, and prospects for its future.

Peace education in Japan is generally defined as “education which develops democratic sovereign people who build peace” (National Association for the Study of Educational Methods 2004: 193). Peace education tends to be categorized into a broad definition and a narrow definition, or into direct peace education and indirect peace education (National Association for the Study of Educational Methods 2004: 193; Nagai 1986; Kobara 1995). Direct peace education focuses on direct violence, or war, and on related problems, such as problems associated with poverty, oppression and discrimination, which in recent years have been labeled as structural violence (Galtung 1991), and promotes education which encourages action connected to solving these problems. Indirect peace education is more concerned with awareness of human rights and fellow feeling, deals with a wide remit including support awareness

and human relations, and is the education which forms the soil in which direct peace education can take root. Such education may be called peace education, or it may be called peace studies. There is no fixed definition or rules by which the two can be neatly distinguished. The reality is that the terms are used in diverse ways by individual researchers.

The diversity of peace education is one of its features, and another feature is that it has been conducted as an element of democratic education. Democratic education has been the fundamental principle of post-war education in Japan, and remains so today. This education has the following four characteristics:

1. It concerns everyone.
2. It is open to all people.
3. It is not tied to any specific set of values or ideology.
4. It contributes to (the creation of) the nation state and society.

It seems to be necessary to examine peace education from this viewpoint, to grasp the issues faced in the 21<sup>st</sup> century, and to open up the prospects for the future.

### ***1.1. Problems of peace education***

Peace education has been advanced in a multitude of forms in various places. According to Kobara (1995), most peace education can be divided into the following three types of study; (1) demonization type, (2) sympathy type, (3) value inculcation type. The first type, demonization type, focuses on the tragedy of war, emphasizing the seriousness of war and nuclear weapons and the way in which this issue is becoming ever greater, and centres on study which problematizes and demonizes war. The second type, sympathy type, is study which encourages personal

experience of the efforts and results achieved in issues related to war and peace so far. The third type, value inculcation type, identifies the causes of war and focuses on study which instils a specific way of resolving conflict, teaching students the direction that should be taken to resolve the issue in the future. If these types of peace education are considered from the perspective of open democratic education, the following three problems emerge.

The first problem is that peace education until now has been dependent on sentiment and emotion. In all three types of peace education, the teacher determines the qualities considered desirable for peace in advance, then instigates study of war and peace as a means through which to form a pre-specified cognizance in students. This process of developing students' emotional understanding as fixed cognizance of human sadness and misery leads to a neglect of rational understanding.

The second problem is that these types of peace education have tended to be selective in terms of the facts, understanding and ways of living they present, confined to pre-specified understanding, values and ways of living, and excluding others. In order to convey a specific understanding, they have used fixed facts and ways of living, so that this has not been open education. In its true sense, peace education should be open education, not bound by any specific ideology or set of values, and should be in line with education to develop people who contribute to the formation of a democratic nation state and society. In reality, however, it has been an extremely narrow enterprise, mired in its own specific principles.

The third problem has been that, in spite of being called peace education, the central focus has been study of war, or conflict education. Peace tends to be

perceived narrowly as the reverse side of war, linked to direct violence. As a result, the quest for peace has been interpreted as the elimination of war, falling into an extremely illogical area of study (Ikeno 2008). Furthermore, using war-related materials to teach peace education has been seen as a way of promoting peace, whereas it is actually defeating its own aims by teaching war.

Peace education so far is thus problematic in that it is bound by a specific ideology and set of principles, is conducted wholly in accordance with this ideology, and has fallen into the trap of being war education. This is 'closed' education. Peace education in a democratic society has to be a collaborative endeavour with children in an 'open' society if it is to have any meaning or validity. A closed form of education, in contrast, is harmful, and will hinder democracy.

Now, in Japan, there is a need for peace education to be transformed from being closed to being open.

### ***1.2. Issues related to peace education***

In order for peace education to be able to execute its role in this way, a number of new aspects need to be taken into consideration. At present, I would like to point out the following three issues.

The first is that peace education should be split into a number of levels, and the role of each level should be clearly established. It is not effective for all peace education at all levels to be working towards the same objectives. In order to make peace education effective, each level needs to be assigned its tasks and role, and priority issues need to be specified within each level.

The second point is that a common framework within which levels can be determined will facilitate reorganization of the concept of peace education. For this purpose, it will be useful to examine other educational concepts which share common foundations, such as democratic education, or citizenship education, within a common framework, thereby widening the applicability of peace education. School education as a whole covers various particular fields, but across the range of educational materials, the function is the same. That function is to develop competent creators of the nation state and society, a function based on 'being open', the fundamental concept of democratic society. In order to fulfil this necessary condition, peace education has to be reformed.

The third point is to make peace education 'open' to children and to society through basing it on principles of democratic society. Options that accord with the principle of constituting a society which embraces diversity and are not confined to a particular ideology or set of values should be made available to children and to members of society. To achieve this, it is necessary to break free of peace education which advocates fixed qualities and fixed understanding, turning instead to the possibility of creating an open understanding and awareness of peace.

In order to advance these three issues, I would like to look at the current state of understanding of peace education in Japan. Before that, I would like to return to the first issue, and look at the possibility of improving the effectiveness of peace education through restructuring it in line with other education concepts which share common foundations.

## 2. Restructuring peace education

The conceptual structure of citizenship education is used in this research for the purpose of restructuring peace education. The conceptual structure of citizenship education in Japan has been proposed by Ikeno (2011) in a previous article. In the same way, peace education can also be categorized into four types.

Education		
Peace Education 3		
School Education		Social Education
Subject Education	Extra Activities	Peace Education 2
Peace	Education 1	
Peace Studies		

Figure 1: Restructuring peace education

The first type is Peace Studies as an element of the subjects of social studies, Japanese, music and so on in elementary and junior high school. This comprises part of specific subject content, providing children with knowledge about and understanding of peace at the appropriate school level. In this respect, it is more appropriate to call this peace studies than peace education.

The second type refers to Peace Education 1, which is incorporated into both school subjects and other activities. This involves the provision to children of academic and cultural activities connected to peace by



teachers who have authority. The teacher determines objectives and content, organizes the activities, and evaluates the learning effectiveness for children. An example may be using Integrated Learning or Special Activities curriculum time to look at an issue related to peace, researching and discussing it in class or studying it as a year group.

The third type refers to Peace Education 2, which is peace education as social education. This type involves the provision of opportunities to become keenly and actively involved with society and nature as a form of social education outside school. Many of these opportunities are devised and provided by NGOs, NPOs or local community groups.

The fourth type refers to Peace Education 3, which covers education as a whole. Here, the aim is to create democratic society, which in itself is the pursuit of peace. This type does not involve any special planning or teachers. All members participate in various activities of their own accord. These activities themselves are education. In other words, the activity consists in teaching people that particular problems or circumstances exist, appealing to people's conscience, and leading them to action. These types of activities constitute Peace Education 3. This type of peace education does not have a specific objective, but aims to follow actions which support the principle of constituting society, or actions which newly recreate a society working towards this constituting principle.

In Japan, these four types of peace education exist, but they are confused. They have all been a part of the past 60 years of post-war education history. In concrete terms, I would like to introduce the example of atomic bomb materials, which have been particularly popular in Hiroshima, examine the features of peace education at elementary school level

for each type, and explicate the tasks and role of each.

### **3. Peace studies and peace education through atomic bomb materials**

In this section, I will use the four types of peace education listed above to discuss the ways in which atomic bomb materials have been used in peace studies and peace education, mainly at the elementary school level. The focus of this examination will be the tasks and role of each type.

#### ***3.1. Peace studies through school subjects***

Social studies has the main role to play in peace studies through specific school subjects. In social studies at the elementary school level, peace studies is first introduced in local studies in the third grade. Local studies materials in Hiroshima city include materials related to the atomic bomb, aimed at teaching this as one of the particular features of Hiroshima city. In the supplementary book for 3<sup>rd</sup> and 4<sup>th</sup> grade students, "Our Hiroshima City"(Hiroshima City 2007: 32), there is a section on rivers and shores, in which the Lantern Floating ceremony on the Motoyasu River on 6<sup>th</sup> August is included, thus making children aware of the link between the river and the atomic bomb. Materials related to the nuclear bomb also appear in the section on the historical progression of the World War II. In this section, quotes from elderly people about experiences of life after the war are introduced, along with scenes of the times (Hiroshima City 2007:128-130). These atomic bomb materials are not directly used for the purpose of peace studies, but show the bomb and the experience of it as part of the materials for studying the local region.

The atomic bomb is used as a topic in many of the textbooks for 6<sup>th</sup> grade history. The aim is to teach students about the links between the end of the World War II and the atomic bomb, as well as the horrific damage caused by the bomb (Osakashoseki 2005:104). The purpose here is to teach the horror of war through the atomic bomb.

In subjects other than social studies, peace studies works to deepen understanding of facts by conveying scenes and emotions as well as facts.

The main purpose of peace studies in subjects is to convey facts, along with scenes and emotions, related to the atomic bomb. What is important is not only the atomic bomb and war, but also facts about peace and understanding of the necessity of peace.

### **3.2. Peace education in other activities**

#### *3.2.1. Peace education in Integrated Learning*

Many elementary schools in Hiroshima city include peace education as a theme of Integrated Learning at all year levels. In some cases, this is done as part of the project instigated by the Junior Chamber International Hiroshima, entitled, 'Look! Look! A huge peace picture'. For example, this was the case for 3rd grade students at Itsukaichikannon elementary school in Hiroshima city

([http://a-bombd2.pcf.city.hiroshima.jp/kids/cgi-bin/mypeace\\_j/mypeace\\_jlist\\_1.html](http://a-bombd2.pcf.city.hiroshima.jp/kids/cgi-bin/mypeace_j/mypeace_jlist_1.html)). They made pictures appealing for peace to hang in Hondori Shopping Arcade and Kinzagai Shopping Arcade in Hiroshima in August. They also took origami cranes (paper cranes) to the Peace Park, as an appeal to the people of the world as 'Hiroshima children' with a 'huge' desire for peace. Other examples include

'Messages for peace' (Hitonose elementary school, Etajima city) and 'Peace declaration' (Kurose elementary school, Higashi-Hiroshima city) ([http://a-bombd2.pcf.city.hiroshima.jp/kids/cgi-bin/mypeace\\_j/mypeace\\_jlist\\_1html](http://a-bombd2.pcf.city.hiroshima.jp/kids/cgi-bin/mypeace_j/mypeace_jlist_1html)).

These kinds of activities are clearly designed to promote direct action for peace. However, they do not spur political action or social action. They are actions which children can do naturally. Creating pictures and messages, appealing for peace and issuing peace declarations are ways of showing their own determination and of raising awareness and understanding of peace.

### *3.2.2. Peace education in Special Activities*

In addition to the above, issues related to the atomic bomb can also be incorporated into the morning meeting before classes begin, or into reading time. Another occasion is the Peace Assembly on 6<sup>th</sup> August, when children present their opinions of the atomic bomb and their thoughts about peace. For example, at Suzuhari elementary school in Hiroshima city, students started preparing origami cranes a month in advance, and as well as expressing the importance of 'life' (living), each year group presented the results of their studies on peace(Chugoku Shimbun 2008).

Peace education in areas of the curriculum outside the subjects currently aims to promote activities to further develop the present state of peace. In order to promote action, it is necessary to have an accurate understanding of the facts that lie at the root of peace. Extolling the concept of peace without having an understanding of the facts is an empty enterprise which fails to take into consideration the path to the realization of concepts. What is necessary is not

merely random ideas, but clear foundations and reasons based on facts.

### ***3.3. Peace education in society***

Hiroshima city and Hiroshima prefecture provide a number of educational materials related to the atomic bomb. For example, Hiroshima city provides a handbook entitled, "The heart of Hiroshima into the future" for use on visiting school trips ([http://www.pcf.city.hiroshima.jp/virtual/VirtualMuseum\\_j/tour/tour\\_stdhtm](http://www.pcf.city.hiroshima.jp/virtual/VirtualMuseum_j/tour/tour_stdhtm)), intended as a convenient study tool to be used in schools before the trip to Hiroshima, covering topics such as the history of Hiroshima, damage caused by the atomic bomb, the present situation of nuclear weapons and Hiroshima's efforts for the realization of a peaceful world. The city also provides opportunities to hear eyewitness accounts and accounts of experiences, and lends out or distributes materials relating to the atomic bomb ([http://www.pcf.city.hiroshima.jp/virtual/VirtualMuseum\\_j/tour/tour\\_stdhtm](http://www.pcf.city.hiroshima.jp/virtual/VirtualMuseum_j/tour/tour_stdhtm)).

In addition to this, a wide variety of groups, organizations and individuals provide a wide range of information related to the atomic bomb in a number of different formats, including books, pictures, videos and cartoons. The most representative is the cartoon "Barefoot Gen" by Keiji Nakazawa (1975). This is a story of a boy, Gen, who lives courageously after the war in Hiroshima, and it is based on Nakazawa's own experiences of suffering the nuclear bomb. It is partly fact, partly fiction. All the volumes overflow with 'anger' at the atomic bomb, and the series can be found in much school or class libraries, and has a large number of readers.

Local public bodies and associated organizations and groups thus conduct activities in a way which provides

a direct social message about the atomic bomb through various media, by providing study materials and documents for the purpose of peace education. It is important, naturally, that this support is not biased to a fixed idea, but backs up a wide range of activities, making peace possible in a wider sphere and contributing to a deeper understanding of peace education. It must be realized once again that peace education in society needs to have a constantly updated understanding of the realities that threaten the peace of society, and needs to create a society that aims to make greater levels of safety and peace of mind a reality.

### ***3.4. Peace education through collaboration between school and society***

Furthermore, there are diverse activities related to peace education which are undertaken by schools and society in collaboration. Examples include initiatives in everyday life, such as the 'Hiroshima Peace Calendar' (Hiroshima Institute for Peace Education 2009), as well as specific events such as the peace candles on 6<sup>th</sup> August. Another initiative is study of Hiroshima through DVD materials such as 'Our local traditional culture' (Hiroshima traditional culture materials development committee 2009).

The links from society to school and from school to society are important for the realization of peace. The ultimate goal of peace is world peace, but the process needs to involve peace in the lives of individuals, families, schools, neighbourhoods and local communities, as well as peace in the nations and societies in which individuals live.

It is important that, in the widest form of peace education undertaken by schools and society, students are taught that there are various forms of peace in

various situations, and that there are diverse activities possible to achieve the realization of peace. This is the role of peace education in society. The important thing is to give students a wide view of peace, rather than a fixed view of peace.

#### **4. Issues in and prospects for peace education in schools**

In this paper, I have categorized peace education into four types or levels, and have introduced actual examples of peace education using materials related to the atomic bomb as a means of examining the tasks and role of each type.

As far as the first type, peace studies through subjects, is concerned, it was ascertained that peace studies is conducted through social studies, which focuses on facts, and other subjects such as Japanese and music, which emphasize sentiment and emotions. From the viewpoint of open peace education, it is necessary to be open to diversity, rather than following a fixed understanding and set of values. The second type, other activities in the school curriculum, included peace education in Integrated Learning and Special Activities, with many of these activities promoting action for peace. However, many of these activities are limited to what is possible for children, such as messages for peace and peace declarations, and they are not led in a certain direction or restricted to fixed ideas. This is an important point. Once restrictions or leading begin, there is a danger that education will be used to 'mobilize' students for peace, and this would run the risk of being similar to pre-war ideological education in Japan. The third type, peace education in society, is much more diverse than school. It is not just about preparing for peace education itself, but also involves activities to support it. It provides the resources for peace education in

schools. The fourth type, peace education involving collaboration between school and society, links society and school, and provides a space for children to consider the diverse peace education aimed for in society.

All of these types must strive for the realization of open peace education from now on. At any level, peace education must not aim to instill specific facts and understanding, and a fixed set of values and way of living, but must open up possibilities for children and society to make choices and be able to create new forms of peace. For this purpose, it is essential that each level of peace education fulfills its own mission and that there is collaboration among the various levels. It is not effective for every level to be aiming for the same peace education. It is important that each level carries out its own role, collaborating with other levels from its own stance to contribute to peace education. Factual understanding, awakening of feelings and emotions, support activities, collaborative activities. Making connections between all these is the issue facing peace education in the 21<sup>st</sup> century.

All of these types must strive for the realization of open peace education from now on. At any level, peace education must not aim to instill specific facts and understanding, or fixed sets of values and way of living; but it must open up possibilities for children and society so that they can make choices for creating new forms of peace. For this purpose, it is essential that firstly each level of peace education fulfills its own mission, such as concerning with factual understanding, awakening of feelings and emotions, support activities or collaborative activities. Then, there should be collaboration among the different levels of various missions. Peace education will thus be fully effective in contributing to solve the challenges that we face in the 21<sup>st</sup> century.



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## **P**ART 3

### **COMPARATIVE CULTURAL ISSUES IN PEDAGOGY**

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## **C**HAPTER 22

### **TEACHING FOR THE FUTURE IN JAPAN: ATTEMPTING TO PROVIDE DIRECTION FOR PASSIVE, RECEPTIVE STUDENTS IN ACTIVE, PRODUCTIVE CLASSROOMS UTILIZING AN ONLINE SOCIAL NETWORK**

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#### **Abstract**

It is no secret the Internet is re-defining the roles of student and teacher, and calling into question the methods and content of instruction once considered basic to comprehensive education. With the growth of what has become known as Web 2.0, teachers and students are being asked to move beyond the classroom management models of the past to online collaborative learning. In this chapter we look at the new skills required to make the transition, and some of the challenges faced by students at a Japanese university when asked to take control of their own education using a social network designed by this instructor to



promote "distributed learning." Although self-direction, motivation, and a desire to learn will be the key elements that determine success or failure in the future, these values were difficult for the Japanese students to embrace. Cultural differences in attitudes toward learning and traditional expectations about the role of student and teacher were shown to present formidable obstacles to the introduction of the new teaching methods at the heart this new form of education.

## **Keywords**

Distributed learning – Japanese education – learning cultures – learning management – self-directed learning – social networks

## **An Introduction to Obsolete Pedagogical Assumptions**

Teachers are struggling. They no longer have a clear idea of their role in the classroom. The facts they possess seem outdated and no longer useful to students. Students have a better understanding of new technologies and disruptive innovations than their adult instructors. What can teachers offer to students in a world turned upside down?

The role of technology in extending the human potential and defining the skills required for the 21st century is an important and necessary consideration if we are to adequately understand what will constitute learning in the future. Computers and communications technologies have made possible computations and rapid access to facts our minds could not even have dared to imagine a mere decade or two ago. Therefore, to insist, as do some educational psychologists such as Kirschner, Sweller and Clark (2006: 77), that "the aim of all instruction is to alter long-term memory. If nothing has changed in long-term memory, nothing has been learned," limits the

human potential to an age now long gone. This view also threatens to move teachers back into classrooms dominated by rote learning, and a "return to basics." Pedagogical theories uninformed by technological innovation cannot adequately explain either what education is, or how learning will take place in the future.

As Jensen (2008: 225) has noted, "even though the dictionary definition of learning is quite simple - to gain knowledge and understanding, or skill by study or experience - when we attempt to measure learning, the complexity of the definition emerges." In fact, providing a definition for "learning" is such a difficult task that most textbooks on the subject simply attempt to avoid it. The result is that teachers, and much research on education, commonly fall back on the behaviorist assumption that "children enter school with empty minds, and the role of school is to fill up those minds with knowledge." (Sawyer 2006: 11) This represents an immense error in a world where information is easily available and in vast quantities to both student and teacher alike - in a world where Google and the Internet have the ability to function as our collective long-term memory.

In fact, the basic fallacy of Kirschner, Sweller and Clark and others arguing from a similar perspective is they perceive the role of the teacher as "teaching a discipline as a body of knowledge" (2006: 78), with that body of knowledge organized "in the mind of the teacher." (Shulman 1986: 9) Certainly, there is knowledge and there are skills that our students need to acquire if they are to be prepared to function in society. However, we need to give more thought to what those skills might be, rather than merely accepting that they are the skills once considered to be part of every "good" education. We also need to more clearly define the role of the teacher in a world

where knowledge - the focus of traditional teacher training - becomes obsolete almost as soon as it is created.

## **1. Future Skills and the Learning Process**

In the pedagogical framework provided by Humphrey and Stokes (1999), some of the skills identified as being important to our students in a technology-mediated future) are 1) People skills (including listening and communication skills) 2) Team skills 3) Coaching skills 4) (Business) Analysis skills 5) Continuous improvement skills 6) Computer (technical) skills 7) Project management skills 8) Writing skills 9) Resource management skills. Trilling and Fadel (2009) identify the following more general skills as important for the 21st century 1) Learning and innovation skills (including critical thinking, communication, collaboration skills, and creativity) 2) Digital skills (including information literacy, media literacy, and ICT literacy) 3) Career skills (including flexibility and adaptability, initiative and self-direction, social and cross-cultural awareness and interaction, productivity and accountability, and leadership and responsibility).

In regard to the learning process itself, Hung and Chen (2001) have identified four principles upon which learning must be anchored. They are 1) Situatedness 2) Commonality 3) Interdependency and 4) Infrastructure. The concept of situatedness means simply that most interesting information is socially situated, socially constructed, and thus impossible to merely package into neat units of knowledge that are easily and wholly transferable to another individual. Dewey might have said that "knowledge requires meaning and meaning requires relations between experiences." (Shook 2000: 66) These relations are

impossible, of course, to merely transfer intact from one individual to another.

Hung and Chen's emphasis on the importance of commonality is supported by the observations of Rogoff (1990) and Lave and Wenger (1991) that people construct meaning together, based on and adhering to appropriate cultural norms. Through the process of working together in common areas and interests the participants bond or identify with one another, forming what Lave and Wenger called communities of practice (CoPs). In an educational setting, CoPs are created by groups of people who participate in joint activities in order to create and share knowledge, and are more commonly called "knowledge networks," or "learning networks." CoPs are characterized by 1) a shared domain of interest and a desire to develop competency in that domain 2) community activities through which learning experiences are shared and 3) the development of shared resources. (Anklam, 2007)

Interdependency, the third of Hung and Chen's four dimensions of learning, is important to the learning process because it "connects participants to each other in ways that are diverse and complex," (Wenger 1999: 77) allowing those participants to "interact based on the varying needs, expertise (knowledge and skills), perspectives and opinions" that are to be found within any diverse group. (Hung and Chen 2001: 7) Interdependency within learning communities thus allows each participant to make use of another's abilities. As Hung and Chen note, by utilizing diverse expertise the learning community "can deal with problems and issues that are too difficult for any one individual to handle. An individual learns not just from the activities that they carry out themselves but from different members of the community." (Ibid)

Hung and Chen's ideas about infrastructure, the fourth dimension of their learning framework, imply there must be a means for the environment to engage participants in activities that will facilitate learning, but it is equally important that this learning be driven by appropriate accountability structures. Since it is the participants themselves who create these accountability structures, the instructor must stand ready as a guide to assist in the creation of rules and norms that allow participants to depend upon each other. Bielaczyc and Collins (1999) specifically mention such norms as "sharing principle," "negotiation principle," "respect-for-others principle," and "multiple-ways-to-participate principle," among others, that must operate within the teacher-student environments created in the classrooms of the future.

## **2. The New Role of the Teacher, and an Experiment with a Social Network**

Clearly, the evolving concept of the teacher as guide will move pedagogical theory in new directions, and demand a new set of skills from teachers. In the words of Brown and Duguid, "practice is an effective teacher and community of practice an ideal learning environment." (2000: 127) The future classroom will therefore be a networked, peer-guided learning environment that operates on the principle of what I call distributed learning. Distributed learning is in essence a type of self-directed learning, with the results of the learning to be shared by the community. The teacher, as just another information processor, no longer determines what is appropriate to study, or how information should be processed. Rather, the community, with its shared domain of interest and needs, will determine the course of study, and the teacher will work in parallel with the students to produce a truly collaborative learning experience.

This model, of course, threatens the privileged position of the teacher in the present educational system. It requires us to acknowledge something our present educational system and society has lost sight of; that is, a group and network is only as strong as its membership, not its leadership. This is a theme that Tapscott and Williams (2006), Rheingold (2003), Shirky (2008) and many others have recently re-discovered. The teacher will still be expected to be a strong leader/contributor within the classroom, but all community members have a responsibility to advance the learning process, and to actively work to make it a success. The teacher serves as a guide in moving the learning process in a certain direction, but students must become active learners and take responsibility for their own education.

In an effort to promote this new, self-directed form of learning, I set up a social learning network in the spring of 2006 for my students at a Japanese university in Kobe, Japan. This decision was an organic development from my past work with learning management (LM) and learning content management (LCM) software. After four years of working in a Moodle learning content management environment I had decided to move on to a more collaborative software platform, to Lave and Wenger's (1991) learning through peripheral participation. I felt the new direction would allow me to update my own skills and give my students the benefits of a more authentic learning environment. Over the years I had become increasingly concerned that all of my efforts with LM systems such as Moodle amounted to little more than pouring old wine into new bottles. As Herrington, Oliver, Herrington and Sparrow noted in a conference paper presented to the Australian Society for Computers in Learning in Tertiary Education (2000), traditional top-down education is still alive and well on the Internet, thriving in LM and LCM environments. I

was worried the content-driven, teacher-centered approach to education Cuban (1993) criticized was not providing my students with the learning culture or skills they would need to take with them into the 21st century.

My students were initially impressed with the concept of learning networks, but the excitement rapidly faded when it became apparent they would require a lot of hard work to maintain. After three years of disappointing results in promoting active student participation within the network I began to understand it was not an easy task to grow a vibrant educational community, or change a learning culture. Japan's most successful social network, Mixi, had made growing a network seem so easy, but the more I learned about the secret for Mixi's success, the more I came to understand the limitations of social networking for promoting my original pedagogical goals within the broader Japanese culture.

The social network I was attempting to create among the students at my university was, of course, more than just a means for friends to stay in touch with each other. My intention was to create a distributed or parallel learning community, characterized by self-directed knowledge exchange within the network. The exchange of knowledge was to be facilitated by the ability to post blogs, video and audio resources, initiate forums and discussions, and post other information via the social networking software. The degree to which the network would successfully function as a vehicle for the exchange of knowledge was directly related to the quantity of information published, and its relevance to the lives of the members. I was, unfortunately, extremely disappointed by the failure of my Japanese students to embrace the network as a vehicle for the posting and exchange of information.

Unfortunately, my Japanese students remained directive-motivated. They were not motivated to explore the network and its possibilities on their own, and did not actively use it as a means to engage in information sharing. Little knowledge was created on the network unless it was produced as a result of an assignment required by the teacher. Blog pages remained empty until themes were assigned, forums were deserted, and postings in general were for the most part absent. In short, the network failed to sustain itself and would doubtlessly have failed in the absence of direction provided by the teacher. This conclusion correlates with similar findings on the weak nature of self-directed learning among Asian-American students in research performed by Iyenga and Lepper. (1999)

### **3. Learning Cultures**

The paucity of information generated by the students on their own volition was the major reason I judged my experiment with distributed learning a failure, and the reason for the failure led me to a deeper investigation of the importance of the "learning culture" (or actually its lack) created by the Japanese educational system. The American educational system, although plagued with numerous weaknesses, exhibits great strength in its ability to nourish inquisitive minds that question "known" facts, accepted authority, and commonly held beliefs in a constructive manner. These strengths are, for the most part, entirely lacking in the Japanese educational system. As a result, textbooks are accepted as unerring, teachers as authorities, and questions as signs of either disrespect or ignorance. (Warrington and Jeffrey 2005) These factors all work against the sharing of information and knowledge.

The virtual environment of the online social network can help to ease the inhibitions of the Japanese



student, but it cannot erase them entirely. Likewise, the power structures of the real world do not disappear into total insignificance in a Japanese learning community. In my experience the students were as likely to look to the teacher for direction and “expert” knowledge in the virtual world as they were in the real world. They were also as likely to accord respect (or at least avoid confrontation) as they were in the real world.

This is true because when students enter our classrooms they bring with them their personalities, belief systems and cultures. They do not shed these when they join an online community, though their identities may become more plastic in a world where factors such as race, nationality, and first language do not immediately define who they are. My research has shown that identities are not so much re-defined as amplified in an online community. Few online participants are truly able to leave their real-world culture behind merely as a consequence of joining an online community. Basic cultural assumptions continue in the online world, perhaps because we feel most at ease while operating within the parameters established by the culture in which we were raised. Although there may be a momentary feeling of freedom within an online community, as there is for some people as a result of foreign travel, few people are prepared to leave behind the comfort of the world they know best and actively participate in a community where the culture is radically different from their real-world culture.

### **Conclusions and Implications of the Study for Curriculum, Pedagogy and Attainment in Japan**

One of the great lessons to be learned from globalization is that cultures that readily embrace

change and emphasize their similarities with other cultures prepare their citizens to feel at ease in the broader world, while cultures that stand apart from the outside world and emphasize differences with the rest of humanity prepare their citizens to feel at ease only in the local culture. When confronted with another culture these products of cultural isolation experience uncertainty in negotiating within the new culture and a great deal of unease with an unfamiliar situation, as was true in the case of my students. Unfortunately, the Japanese sense of "haji," or shame, at making a mistake during communication, further shuts down the communication process. (Nakai 2002)

Like species, cultures become dominant or fade into extinction as a result of their ability to adapt to the environment. In a world of global networks and information exchange it is essential individuals and nations examine the degree to which their own culture and personality contributes to global information exchange and internationalization, or fails to embrace emerging trends. It has become, in fact, a strategic necessity for nations and a survival imperative for individuals that they nourish a "learning culture" and seek out lifelong learning opportunities. Cultures that have become insular and closed, as has Japanese culture, will need to transform themselves if they hope to survive in the globally networked society of the 21st century.

In regard to education, it is clear that cultures and teachers that promote active participation in the learning process best serve the interests of their students. Teachers need to abandon their role as "expert," and embrace their role as appointed moderator of the educational process. There is certain to be a great deal of reluctance to abandon a privileged position, but the disruptive technologies

shaking the educational establishment make the outcome a forgone conclusion.

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## **C**HAPTER 23

### **PROMOTING CHILDREN'S PARTICIPATION IN EDUCATION: DEVELOPING A CULTURE OF PARTICIPATION**

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#### **Abstract**

There has recently been a growing emphasis on listening to children's voices in different professional contexts, for example, legal, medical, social and educational. This can be said to have its root in the participatory rights of children, as dictated by the United Nations Convention on the Rights of Child (UNCRC, 1989), commonly referred to as the children's rights movement. Drawing inspiration from this movement, the present research aimed at examining children's perceptions of their school experience. Twelve five- six year old children from a state funded primary school (Key Stage 1) in south-east England formed the sample for the study. To explore their understanding of the school experience, three qualitative participatory research methods: children's drawings, (adapted from Armstrong,

2007); children's pair interviews (adapted from Evans and Fuller, 1998) and finally; photographic/video evidence of different areas of the class/setting, taken/videoed by children themselves (Burke, 2005 and Punch, 2002), were used. Findings from all three methods explicitly suggest that children liked coming to school and enjoyed doing a range of activities with their teacher(s) and friends. It is also evident that they wanted to spend more time outside. These findings are discussed considering children's participation from a social-cultural context and how there is a need to develop a culture of participation, a culture that truly encourages children to participate in decisions affecting all spheres of their lives, including education. References are also made to participation from a pedagogical position and how its implementation intersects with the cultural beliefs and values of a given society.

## **Keywords**

Participatory – children's perceptions – school experience

## **Introduction**

With the ratification of the United Nations Convention on the Rights of the Child (UNCRC, 1989) by almost all countries in the world, the legal position of children has been enhanced significantly, reinstated by the current childhood research which views children not as objects or subjects but participants and social actors. Putting this into education context, children are perceived to be having a part to play in their own educational processes (see children's right to participation in UNCRC articles 12 and 13 which can be accessed from [http://www.unicef.org/crc/files/Rights\\_overview.pdf](http://www.unicef.org/crc/files/Rights_overview.pdf) ). But after reviewing the states parties' reports that ratified the UNCRC through their governments, the United Nations (UN) committee realised that very little information was offered about early childhood. Therefore, the UN Committee on the Rights of the Child (2005), published General Comment No. 7,

clearly stating the implementation of child rights in early childhood. Early childhood, according to this committee, includes all young children- from birth and throughout infancy; during the preschool years; as well as during the transition to school. Drawing inspiration from the General Comment No. 7, the present research aims to explore young children's (5-6 year olds) perceptions of their school experience.

As a consequence of these developments in the children's rights movement, in particular the children's right to participation, there is a growing awareness that knowledge about children should be constituted on the basis of listening and hearing them (Formosinho and Araujo, 2004: 103). Such processes are believed to have long term implications for sustained educational experiences (Pascal and Bertram, 2009). One way of developing these processes is by integrating participatory approaches into our everyday pedagogy, commonly referred to as pedagogy of 'listening' (Rinaldi, 2001). Rinaldi (2001) gives a detailed account of 'listening' as a pedagogic tool and how listening to children helps both, adults as well as children. But before moving into the detail of pedagogical implications, it is first useful to define what participatory approaches are and where they are derived from.

Participatory approach can be defined as a collection of creative methods that act as a tool to assist the participants not only describe, but also give meaning to their experiences (adapted from Veale, in Greene and Hogan, 2005). These are commonly used in participatory research which can be said to be having its root in liberation theology (Chambers, 1997) and can therefore lay the foundation for empowerment (Veale, 2005). Participatory research is clubbed under the big umbrella of interpretive research where a combination of scientific rigor and critical analysis



(with imagination and creativity) is used as a means of coming to an interpretation of people's world within their cultural frames (Fals-Borda, 2001).

But when applied to research with young children, it needs to offer a combination of methods that can allow children to express themselves in a variety of ways. Children also need to be provided with both, the room and space (physical and mental), to be able to make choices and to take the initiative (Pramling Samuelsson and Fler, 2008). Referring to this from a cultural perspective, the degree to which children are given these mental and physical spaces can vary between different countries and communities. These differences are mainly because of the subjective nature of 'participation' which is rooted in the culture and common beliefs of any given society.

Putting this in an English education context, the evidence of child participation can be seen in the introduction of Citizenship classes in secondary education, the Early Years Foundation Stage (EYFS, 2008), Every Child Matters (ECM, 2003) (Her Majesty's Stationery Office: HMSO, 2004) and the Special Educational Needs Code of Practice (DCFS, 2008). The development of policies and frameworks to support and encourage children's participation is definitely a positive step but may not necessarily translate directly into everyday practice. These frameworks seem to be having strengths, but arguably, the approach they dictate to learning may not be the most appropriate for young children (Baldock et al, 2009). Hence there is a need to develop a transient approach between the macro and micro level of education policy and practice and find creative ways of listening and attending to children's voices in education. Some of these methods, which are derived from participatory research approaches, are discussed below. These methods are believed to

help teachers attend to children's multiple voices, ranging from easily comprehensible explicit voices to the more implicit, subtle and quiet voices.

## **1. Participatory approaches to listening to children's voices**

Most methods used in participatory research lend themselves towards the qualitative approach, as the experiences are perceived to be situated within the everyday working practices of those involved (Wimpenny, in Savin-Baden and Major, 2010), which in this case is young children's education. This section of the chapter discusses three qualitative participatory methods: children's drawings (adapted from Armstrong, 2007), paired interviews (adapted from Evans and Fuller, 1998) and photographs and video cameras (Burke, 2005 and Punch, 2002) the use of which are believed to help teachers reach a better understanding of children's perspectives.

In relation to the research conducted, due attention has been paid to ethical considerations where consent is obtained from both, parents and children. Parental permission is taken in the form of written forms and children's consent is collected with the help of easy to comprehend picture cues. They were also given information on to be able to decline their participation, should they wish so, and that this would not affect their school activities in any ways.

### ***1.1. Method 1: Children's Drawings***

Children's drawings have been used to understand varied perceptions of the world around them. Studies like Anning and Ring (2004) and Weber and Mitchell (1995) illustrate how drawings can be used to help educators and other professionals understand the lives of children in school and related settings, for example, to demonstrate teachers' pedagogic styles and

children's achievement in schools (Bonoti et al, 2003). Walker (2007) reaffirms drawings as the 'natural' method of enquiry for school-aged children, "who frequently are given the opportunities and tools to draw 'for fun' in schools or other settings" (pg 99). These schools/settings form part of children's culture, informing their everyday experiences and meaning making (Kendrick and McKay, 2004). Children's drawings can therefore be regarded as a tool to understanding the ways in which they are making sense of their experiences, which in this case is their school experience (Anning and Ring, 2004).

Children participating in research were asked to draw two pictures using a research instrument designed by Armstrong (2007). Armstrong (2007) used depictions of actual and ideal school pictures to understand children's instructional preferences and learning styles. This can be a useful tool for the teachers to differentiate instructions. She believes that this instrument can be used effectively with children, as young as age five. Taking inspiration from this method, picture 1 in my research was about children's 'actual school experience' and picture 2 about their 'ideal school experience'. In the 'actual school experience' they were advised to draw the day-to-day things that they do in the school/class. In their 'ideal school experience' they were advised to use their imagination and draw the things that they 'would like to see themselves doing in the school'. Children's production of the pictures of their own life in a classroom was aimed to act as stimuli to elicit narratives about their perspectives of the learning environment (Formosinho and Arajjo, 2006). In order to avoid losing the true meaning of their pictures, these narratives were tape recorded whilst children were actively engaged in the process of drawing (Roberts-Holmes, 2008). Each participating child was briefed this process beforehand and was given the

time to familiarise themselves with the equipment and the researcher.

The children were made clear that the two drawings could be similar or different and that in both drawings they could put themselves, their teacher, and a friend or two. They were encouraged to talk about what each person in their drawing was doing and also, if possible, label the people in their drawing (Armstrong, 2007). These instructions were aimed to facilitate children's imagination, giving their thinking some cognitive structure.

### ***1.2. Method 2: Children's interviews***

Historically, interviews with young children were seen as a very flawed research method but these limitations to young children's competence as respondents are now generally perceived as the limitations of those who interview them (Brooker, 2004). Interviews with young children (as young as 5) can yield valid results, provided attention is paid to certain preconditions. Firstly, it is important to consider the context in which interviews are carried out, for example, is the interview being carried out in a home environment, classroom, hospital, etc (Formosinho and Araijsjo, 2006). Secondly, the age of children who are being interviewed will affect the methods that could be used during the interview, for example, if very young children, a toy or a puppet could be used as a stimulus to elicit discussion. Thirdly, attention also needs to be paid to the number of questions being asked as persistent adult questioning has been shown to decrease young children's competence in making responses (Wood & Wood, 1998).

In this instance, interviews were carried out with the children in their classroom, giving them a familiar school context. They sat in a corner table with the

researcher. This is perceived to have favoured the interview process as familiar environment elicit better interview utterances (longer, clearer, more complex, more thoughtful) (Brooker, 2004). The child is also able to make an association between the process of interview and evaluation (promoted by school) and, by doing this pays more attention to questions (Formosinho and Araijsjo, 2006).

As the participating children were quite young, they were interviewed in pairs so as to offer (emotional) support to each other, if needed. In order to make it fun for them, a toy telephone was used as an interview medium (Evans and Fuller, 1998). Similar stimuli used in interviews have shown to promote children's interest and thinking (Brooker 2004; Formosinho and Araijsjo, 2006).

Lastly, the interview was kept short of maximum three questions and children's voices were tape recorded to allow the researcher revisit their response at a later stage. The questions asked were as follows:

Why do you come to school?

What do you like about coming to school/class?

If there is anything at all that you do not like about your school/class?

### ***1.3. Method 3: Photographic and video evidence***

There has been an increasing use of technology, such as, cameras and video cameras to engage children in contemporary research. Despite being fun for children, they can yield valid results due to their interactive nature and also due to them being able to capture action, which is not always possible through other methods, such as drawings (Punch, 2002). This method is mainly influenced by the belief that visual methodologies give children the opportunity to record distinctive ways of their seeing (Burke, 2005), a

process that can recognize them as experts in their own worlds.

The children in this research were given disposable cameras to take pictures of different areas within their classroom and school – inside or outside – capturing areas which they particularly liked or disliked. Areas of the school which repeatedly appeared in the photographs were placed into the broad categories of 'learning environment' and were later used as prompts during the interview process. Video cameras were used in a similar manner where children were encouraged to record their favourite (and not so favourite) places in the class/ school. They were advised to record a running commentary, clearly stating the reason(s) for their likes/ dislikes. The running commentaries were then noted carefully, identifying children's likes and dislikes and the reasons behind these. The whole process of taking photographs and video recording was aimed at encouraging children's participation and active involvement in research.

## **2. Analysing and interpreting children's voices: a way to developing reflexive pedagogy**

Interpreting children's (multiple) voices is as important as capturing their views. The best way to analyse children's perceptions is by developing a shared understanding of children's views by having a dialogue and discussion with them. The methods described above have the potential to be adapted into pedagogical documentation which can further instigate reflexive practice among teachers. Reflexivity as a process is primarily aimed at promoting good practice by helping teacher understand not only children's views but also reflecting on his/ her teaching practice and behavioural attitudes.

On a precautionary side, pedagogical documentations (such as drawings, interviews records and photographs/ video recordings) may not always reflect true reality but a representation of social construction where teachers select what they believe as valuable to research and document. Being a teacher puts us in a powerful position to choose various methods to represent children's views, but what we do not choose is also a choice. While doing this we inadvertently 'construct' the children's voice, which may / may not be a true representation of what they want to convey to us. On a critical note, constructing children's voices may appear to be misrepresenting their voices, but while doing so we also construct ourselves as teachers (because the construction is shaped by our own cultural values and beliefs). This construction/ reconstruction of 'self' can lead to introspection, which Dahlberg et al (2006) believe is self-reflexivity, a process through which self- definition is constructed.

Being reflexive can also involve challenging our pre conceived ideas and behaviours and whilst doing so we give ourselves the opportunity to find methods to resist some of the dominant pedagogical discourses, some of which may not act in the best interest of children. Challenging our own socially constructed/ preconceived ideas is not an easy task and requires a lot of experimenting and interpretive work. It may require the teacher to have dialogues with other colleagues, opening up multiple perspectives, each of which could be discussed and confronted (Dahlberg et al, 2006). In this way, reflexivity can lead to problematizing one's own understandings, leading a way to the development of and engagement with higher thinking and meta-cognitive activities.

Therefore, analysis and interpretation can lead not only to understanding children's perspectives but also a critical introspection of one's own practice,

behaviours and attitudes. It is because of this reflexive practice that alternative pedagogies can evolve, offering more opportunities for children's empowerment and the creation of a more interesting and responsive learning environment.

## ***2.1. Analysing Children's drawings***

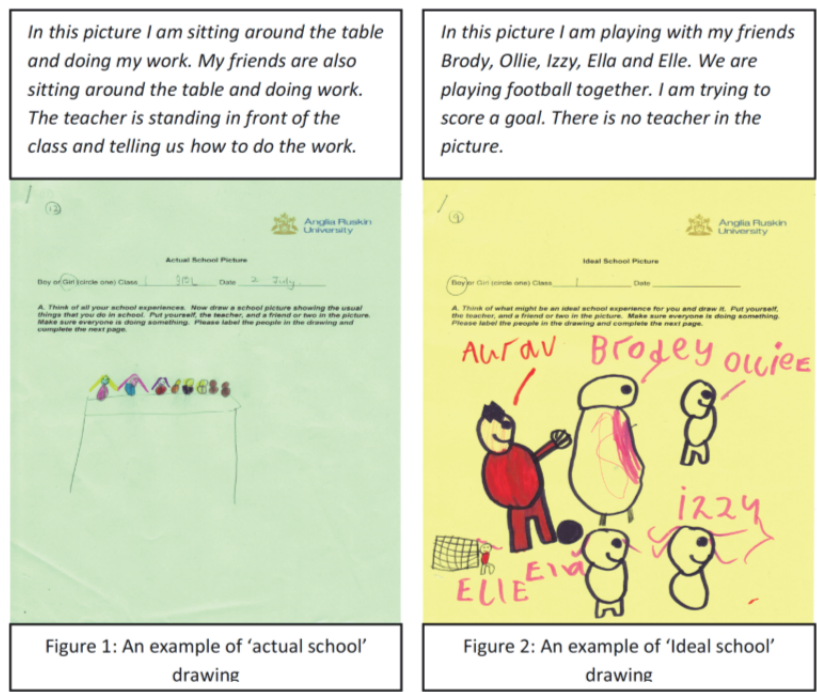
### *2.1.1. Actual school experience drawing*

Children's drawings of 'actual school experience' (example figure 1) show a majority of them being engaged in doing class work, mainly, literacy and numeracy. The experience analysed from the actual school drawings is academic driven and represents a traditional view of classroom, where the teacher takes the authority position and children attend to the instructions (Lodge, 2007 and Weber and Mitchell 1995).

### *2.1.2. Ideal school experience drawing*

Children's ideal school drawings (example figure 2) clearly demonstrate the creative use of their imagination as they created drawings that filled their gap between the 'actual' and 'ideal' school. They managed to fill in their imagination with reality choices, as they all view themselves playing outside in the playground (in the absence/ presence of a teacher). These imaginary representations remind us that children as young as six have knowledge of the symbolic relation of drawings to reality (O'Connor et al., 1981).





To summarise the methodological application of children's drawings, children were quite comprehensive and confident in narrating their drawings to the researcher. They managed to draw contrasting differences between their actual and ideal school experience. This draws us to the conclusion that drawings can be used as an effective tool to promote dialogue between young people and their teachers (Lodge, 2007). Drawings therefore can be seen as rendering themselves to a form of text which can be 'read' and understood (Weber and Mitchell, 1996, in Lodge, 2007). They can act as a powerful pedagogic tool to understand children's perceptions of their learning environment and also as a means to informing curriculum planning and delivery.

## 2.2. Analysing Children's interviews

The questions asked during children's interviews were analysed by categorising their responses in the form of a table as shown below:

Interview question	Categories of description
Why do you come to school	<i>Self-gratifying</i> : to meet teacher and friends
	<i>Practical</i> : to take part in certain activities such as colouring
	<i>Play</i> : to play
	<i>Educational</i> : to learn things
	<i>Better future</i> : it will be good for our future
What do you like about your school/class	<i>Symbolic</i> : activities such as puppet, home corner
	<i>Sensory-motor activities</i> : activities involving the use of materials such as colour, paint, etc
	<i>Gross-motor</i> : running, playing football
	<i>Educational</i> : activities such as reading/writing or other educational and group work, like making a display, ICT
	<i>Extra curricular</i> - activities that involve use of space, like stage
If there is anything at all that you do not like about your school/class	<i>Activities</i> : for example, maths, physical education, assembly
	<i>Aggression (mild)</i> : aggressive acts (like pushing) committed by other children
	<i>Discomfort</i> : do not like sitting on the carpet as it makes us hot
	<i>Structure</i> : more snack time during the day
	<i>Satisfied</i> : there is nothing that we do not like.

Table 1: Children's interview response

On the basis of the interviews (as evident in Table 1), children's perceptions of why they attend school ranged from adult-imposed reasons (better future, parents' wish) to the reasons which might be of benefit to themselves (self-gratifying, practical, educational).

When making a response concerning what they like about their school experience, all the children mentioned particular activities (like, doing work inside, assembly, playing football, the home corner and puppets). Interestingly, when talking about their dislikes, comparatively few mentioned specific activities, instead they were 'satisfied' (liked everything or could not think of anything they disliked), or mentioned factors which might cause them physical or emotional harm (mild aggression and discomfort). These findings concur with those from Evans and Fuller's (1998) research with 4-5 year old nursery children.

**2.3. *Analysing photographic and video evidence***

To analyse children's photographs and video evidence, they were clubbed into broad categories of the learning environment. The following areas appeared repeatedly in their photographs and video recordings, arranged below in the form of a table (not represented in any particular order):

After categorising photographs into the above areas, children were then asked whether they liked /disliked that area or if they were not sure. A majority of the children liked all these areas in the classroom and the outside space with a few not being sure of some displays: as 'they were old', the white board: as 'it may involve reading', peg area: as 'it is boring', phonics area: as 'it involves sounding out letters', puppet area: as 'it is boring', book area: as 'it involves

reading' and work table: as 'it involves studying'. However, there was no resounding dislike for any of the areas. Children's perceptions of why they like these areas was a general like towards activities that underpin the working of these areas, like, colouring, making a display, reading interesting books, playing football and doing art and craft work. Similar response was seen from the video clippings, reaffirming their general like towards all the areas.

S.NO.	CLASS/SCHOOL AREA
1	The white board
2	The book area
3	Phonics area
4	Outside (playground)
5	(Various) class displays
6	Work table
7	Colouring time/ area
8	Craft area
9	Computer area
10	Puppet area
11	Coat peg area

Table 2: Classroom/school areas as photographed or videoed by children

### **3. Summarising research findings from children's drawings, interviews and photographs and video recordings**

To summarise, children's perception of their school experience, based on their drawings, interviews and photographs and video commentaries, is a positive one. They like coming to school and enjoy doing a range of activities with their teacher(s) and friends. They however, want to spend more time outside. It is clear from this research that children's multiple voices (as expressed through drawings, interviews and photographs and video clippings) can effectively be used to facilitate an interactive dialogue between the teacher and children, which clearly has the capacity to inform pedagogy. The interactive dialogue paves way for collective interpretation, enabling the development of a shared understanding between the children and the teacher. This gradually can lead to empowering children, giving them a sense of shared understanding of the usefulness of their learning environment. The methods described above not only lend themselves to be used as a reflective tool but can also give teachers an opportunity to celebrate good practice (as evident from the research findings).

Referring back to reflexive practice, these methods can also render themselves to be offering critical insight into a teacher's role and attitudes that influence his/ her behaviour with children and other colleagues in an education setting. These methods can offer opportunities to challenge some of the preconceived ideas of being a 'teacher', especially the notions attached with the traditional role of a teacher, such as, sitting in an authority position, confining learning experiences mostly to indoor environment, etc. These are the aspects of practice which often go unnoticed and reflected upon. Therefore the teacher may use these tools not only to inform planning and delivery of the curriculum but also as a tool to

understanding his/ her own idea of 'teaching' and pedagogy.

#### **4. Developing a culture of participation**

Participation being a subjective concept can be associated with multiple meanings depending upon the contexts it is being applied to. Referring to this from a pedagogical position, participation and its nature and degree of application will vary based on teacher's own attitudes and beliefs, which are further influenced by its wider cultural framework. This can be theorised using Vygotsky's (1986) socio-cultural theory according to which children's social and cultural knowledge evolves when they actively engage with their environments. The role of the teacher is to affirm these ideas by allowing children to participate in collaborative tools with (more competent) peers and adults around them, within a given safe environment, which in this case is their classroom environment. Here opportunities need to be given for the freedom of expression, where both, the teacher and children take part as active participants (Bae, 2009), sharing knowledge and developing a common understanding of shared experiences. It is thus paramount to give spaces and opportunities for the (gradual) development of participatory skills among children, who, as future adults, will be more likely to be supportive of a truly democratic society, valuing and respecting each other's contribution.

The biggest challenge, however, that teachers might face is attending to children's multiple voices. Bae (2009) stresses this as one of the pitfalls. She states that while giving too much emphasis on views of children as autonomous and competent beings, we may underestimate their vulnerable sides. From a pedagogic position, these practices might stimulate too much self-determination and individual choice,

making it difficult for the teacher to attend to multiple voices at one given time (ibid). Therefore she asserts Moss's (2007) view that the concept of choice can be used in connection with collective decision-making as against the individual choices. This can be researched using the 'collective (participatory) methods' which aim to facilitate a group with shared meanings, interests or experiences to analyse or access those experiences (Veale, 2005 ). However, collective methods can hide inequitable participation and may lead to the generation of false consensus (ibid). This especially needs to be considered while working with bigger group sizes.

Whilst referring to socio- cultural theory, it is equally important to refer to the development of a culture of participation (within education context), giving opportunity not only to children to participate and express their views but also the adults who work in that education institution. Being a good role model will encourage not only the children to replicate these means of communication but also open the opportunity for adults to evolve a truly participative environment where all stakeholders' views are duly respected and attended. It is vital to share common values, attitudes and purposes among different stakeholders, including children, and this potentially can help in the development of a culture of participation. There may be challenges associated with this due to power differentials and the level of influence different stakeholders can have on the running of a school, such as the teachers, other adults, managers, policy makers, etc. Children usually come at the bottom rung in the ladder of hierarchy, but as evidenced earlier in the chapter, they are capable of offering unique insights into their perspectives as important stakeholders of the education system. An interaction and alignment of these values and attitudes of stakeholders involved in

education can hence determine the success or failure of an education institution.

Therefore, as a proponent of the movement of children's rights (especially children's right to participation), I would strongly recommend professionals working with children to encourage child participation in all matters affecting them. The same implies to various services that work in different capacities for/ with children so that a coherent approach can be cultivated, contributing positively in the development of a culture of participation.

## **Conclusion**

The findings from the research demonstrate how children as young as 5-6 years old are able to express their views on the learning environment using participatory instruments. The methods have the potential to be used as a pedagogical and an empowering tool to encourage participation from children. The aim is to develop a culture of participation where there is an opportunity to develop shared understanding and co-construction of meaning making between adults and children.

For future research, a further exploration of children's perceptions in a larger sample of classes may reveal more categories of description and/or different patterns. Similarly, children's perceptions in different types of education provision (e.g., state and private school) would give a broad understanding of the influence of education structures and policies on everyday experiences of children.



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## **C**HAPTER 24

### **ATTITUDE AND ITS EFFECTS ON EDUCATION**

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#### **Abstract**

The main purpose of this study was to examine the relation between attitude towards science in biology courses and Iranian students' biology achievement. A total of 185 (age 17-18 years) 12th grade students in Isfahan city answered to a 30-item questionnaire provided by authors based on STAQ-R inventory. The results showed that among attitude towards science dimensions, only "biology is fun for me", have meaningful and positive relation with Iranian students' achievement in biology. Also there was no significant difference between males and females in attitude towards biology, although girls had better achievements in biology in comparison with boys. The results show that for 12th grades students that involved in this study, the most important factor that attract them to the biology is the fun nature of biology. Other factors in this regard are not so

important to make positive attitudes toward biology between Iranian students and have not more effects on their achievements in biology.

## **Keywords**

Attitude towards science – Achievement in biology – Biology education

## **Introduction**

With global scientific and technological growth occurring rapidly, declining student interest in science courses and careers is a worldwide concern that has prompted science education reform efforts on an international scale. Since student attitudes toward science effect course and career choices, measuring the impact of reform efforts on student attitudes is important and will require measurement tools with robust psychometric properties (Owen et al 2008). Attitudinal studies in science education area are mostly pertinent to elementary, middle and high school students', and in some cases college students' attitudes towards science (Turkmen 2007). As science has become ever more deeply embedded in our everyday life, how ordinary people perceive science has attracted growing attention not only from the scientific community, but also from social scientists (Bak 2001). A significant amount of research in science education is devoted to understanding ways we can improve the quality of science education and increase enrolment in science courses and degrees. One of the key factors in learning science is students' attitudes and the development of positive attitudes toward science can motivate student interest in science education and science-related careers (George 2006).

However definition or concept of attitude towards science is vague and ambiguous, but attitude is

concept that defines emotional trends in response to affairs, persons, locations, events or ideas Therefore phrases as "I like science" or " I enjoy science courses" enumerate as attitude (Simpson and Oliver 1990).

There are many factors that influence attitudes and achievement among adolescents. Some of the factors are associated with parental background and family environment. Other factors relate to individual characteristics such as self-concept, locus of control, and achievement motivation. Still other variables are associated with schools influences such as class climate, teachers, and administrative styles (Talton and Simpson 1985). According to Osborne et al (2003), Studies have incorporated a range of components in their measures of attitudes to science including: the perception of the science teacher; anxiety toward science; the value of science; self-esteem at science; motivation towards science; enjoyment of science; attitudes of peers and friends towards science; attitudes of parents towards science; the nature of the classroom environment; achievement in science; and fear of failure on course.

As Osborne et al (2003) cited in their review, However, Gardner's research (1995) offered little support for any strong relationship between attitude and achievement, Schibeci (1984) draws a stronger link between the two, quoting studies that show a correlation of 0.3-0.5. However, he also cites studies that show no relationship. The current position is best articulated by Shrigley (1990), who argues that attitude and ability scores can be expected to correlate moderately. Likewise, the measures used in the TIMSS study, albeit somewhat unsophisticated, have found a consistent relationship between attitude and achievement (Beaton *et al.* 1996). Weinburgh's (1995) meta-analysis of the research suggests that there is



only a moderate correlation between attitude towards science and achievement. Longitudinal study of Oliver and Simpson (1988) shows a strong relationship between the three affective variables - attitude towards science, motivation to achieve and the self-concept that the individual has of their own ability - and their achievement in science.

Though many of researches on attitude towards science have dealt with science in general, but there are some researches that examine this concept in specific science courses as physics or chemistry and so on. For example Krogh (2005) assessed secondary students attitude towards physics and also Howe and Durr (1982) and Bennett (2001), did some similar researches on chemistry. Regarding the importance of attitude towards science between adolescents, in this paper, attitudes of secondary students towards biology and its effects on student achievements in biology courses were examined.

Based on the theoretical background, the research questions of this study were:

1- Is there any relation between attitude towards biology and students' achievements in biology courses at following dimensions?

- a. Motivating Biology Class;
- b. Self-Directed Efforts;
- c. Family Models;
- d. Biology is Fun for Me;
- e. Peer Models.

2- Is there any significant difference in students' attitude towards biology in terms of gender?

3- Is there any significant difference in students' biology achievement in terms of gender?

## 1. Method

A questionnaire containing 30- item was used for this research which was based on Simpson-Troost Attitude Questionnaire-revised (STAQ-R). STAQ-revised is a revised form of Simpson-Troost attitude questionnaire that was developed by Owen et al (2008) to assess adolescent commitment to and achievement in science. STAQ has 22 Likert items that examines attitude towards science but we added 8 items to it regarding cultural and ethical properties of our country Iran. This instrument has 5 dimensions that each one includes from 4 to 9 items (Table 1). These inventory subscales that evaluate attitudes towards biology in 12 grade secondary students are: motivating biology class; self-directed efforts; family models; biology is fun for me; and peer models. We added some demographic questions as gender and economical class and collect student's scores in biology from high schools from which students had been chosen.

Table 1. Questionnaire subscales, number and sample of questions

subscales	Number of questions	Sample of questions
Motivating Biology Class	9	I consider our biology classroom attractive and comfortable
Self-Directed Efforts	6	I try hard to do well in biology
Family Models	5	My family watches biology programs on TV
Biology is Fun for Me	6	I really like biology
Peer Models	4	My best friend likes biology

After pilot implementation of instrument, reliability coefficient (Cronbach's alpha) was 0.85 that showed

questions have strong internal correlation. Then a total of 185 grade 12 students (age 17-18 years) from secondary students of Isfahan were chosen to participate in research who answered to 30-item questionnaire that assesses their attitudes towards biology. After inventory implementation, data were analysed with the statistical software, SPSS version 16.00.

2. Results

The study proposed to examine attitude towards biology in secondary students and its effects on students’ achievements in biology courses. Analysis of results indicated no significant difference between attitude towards biology and students’ achievements in biology courses ( $p<0.05$ ,  $r = 0.12$ ). Coefficient of determination showed that there is 0.014 between attitude towards biology and biology achievement (Table 2).

Table 2: Correlation coefficient between attitude and achievement

Variable	r	R <sup>2</sup>	Sig.
Attitude and achievement	0.12	0.014	0.08

Correlation coefficient between “motivating biology class” and students’ biology achievement was 0.025( $p<0.05$ ). This coefficient between “self-directed efforts” and biology achievement was 0.091( $p<0.05$ ). Correlation coefficient between ‘family models” and biology achievement was 0.036( $p<0.05$ ) and between “peer models” and biology achievement was 0.067( $p<0.05$ ) .But this coefficient between “biology is fun for me” and biology achievement was 0.304( $p<0.05$ ), that showed among all of attitudes towards biology dimensions, only this dimension has

positive and meaningful relation with students' biology achievements (Table 3).

Table 3: Correlation coefficient between dimensions of attitude and achievement

Variable	r	R <sup>2</sup>	Sig.
Motivating Biology Class	0.025	0.0006	0.735
Self-Directed Efforts	0.091	0.0082	0.218
Family Models	0.036	0.0013	0.624
Biology is Fun for Me	0.304	0.09	0.000
Peer Models	0.067	0.0045	0.362

Also regression analysis results of attitude dimensions and students' achievements in biology (Table 4) showed that there is a positive and significant relation between "biology is fun for me" and students' achievements.

Table 4: Regression analysis of attitude' dimensions and achievement

Model	t	St. deviation	Sig.
Total Mean	9.851	1.242	0.000
Peer Models	0.089	0.040	0.929
Biology is Fun for Me	4.221	0.046	0.000
Family Models	0.986	0.050	0.325
Self-Directed Efforts	0.871	0.045	0.385
Motivating Biology Class	0.422	0.012	0.673

To examine second question T-test for independent means was used. According to the results of this test, there is no significant difference between girls and boys on attitude towards biology ( $p < 0.05$ ) (Table 5).

Table 5: Results of t-test for independent means of attitude towards biology in terms of gender

variable	sex	Mean	Std .deviation	df	t	Sig.
Attitude towards biology	girl	115.56	10.94	184	1.72	0.08
	boy	110.98	22.32			

Also results of used independent T-test indicated that girls have better achievements in biology comparing with boys ( $p<0.05$ ) (Table 6).

Table 6: Results of t-test for independent means of biology achievement in terms of gender

variable	sex	Mean	Std. deviation	df	t	Sig.
Attitude towards biology	girl	16.40	2.10	184	3.92	0.00
	boy	15.15	2.19			

### Conclusion

One of the usages of attitude study instruments in science education is assaying students' attitude towards science at elementary and secondary levels. Attitude towards science affects course and career choices of students and it is important to examine its different aspects and reinforce weak aspects through designing different educational programs. Biology as an important branch of science plays a substantial role in attitude towards science.

This study examined relation between attitudes towards science in biology courses and students' biology achievement. However results of this study showed that there is no statically significant difference between attitude towards biology and students'

biology achievements but among five dimensions of attitude towards biology only "biology is fun for me" has meaningful relation with students' achievements. It means that considering fun aspects in biology is an important issue in biology education. In other words, when students sense that biology courses and educational materials in biology make a fun atmosphere in class, school and home, their positive attitudes towards biology have increased and this results in better achievement in biology.

Sex is one of the important variables related towards pupils' attitude to science. Some researchers have shown that there is no relation between gender and attitude towards science (Greenfield 1997), and results of this research are consistent with these studies. However, numerous of research studies have shown that boys have a consistently more positive attitude to school science than girls, although this effect is stronger in physics than in biology and girls' attitudes to science are significantly less positive than boys (Osborne, et al. 2003). This study confirms these studies. Nonetheless results indicated that girls' achievements in biology are significantly better than boys that this is normal in terms of better achievements of Iranian girls.

The educational implementations of this study are that we should make biological curriculum fun for students. It may suggest that we implement fun materials, texts and instruction methods. We can also inform biology teachers in in-service educations that have further more emphasis on this aspect of attitude towards biology.

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## **C**HAPTER 25

### **ADDRESSING STUDENT SATISFACTION AND STUDENT MOTIVATION IN THE CONTEXT OF CREATING A STUDENT-CENTRED EDUCATIONAL ENVIRONMENT**

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#### **Abstract**

This paper addresses student satisfaction and student motivation in the framework of developing a student-centred educational environment. In the customer-driven education context, it is crucial to identify who the students - the consumers of the educational services - are and what they really need. Education managers should take into account the fact that students, being education stakeholders and active members of the academic community, perceive the educational environment and assess service quality depending on their requirements, values and attitudes. Student satisfaction and student motivation are the result of students' interactions with the environment; they are

associated with students' emotional experience in education. The purpose of the study conducted in two higher education institutions of Latvia – Latvian Technical University (RTU) and Transport and Telecommunication institute (TSI) – was to assess various aspects of the educational environment in the context of language learning from students' perspective. The environment was assessed against students' needs and expectations. The students selected were distributed representatively from different faculties to obtain a constituent and comprehensive view from within the TSI and RTU.

## **Keywords**

Student-centred educational environment – Student satisfaction/motivation –Evaluation model

## **Introduction**

In recent years, European higher education institutions have been concerned with the issue of providing their students with an integrated and motivating educational environment, which is vital in the context of constructing the European Higher Education Area that is expected to provide citizens of the European Union with broad access to high-quality higher education (Bologna Declaration 1999; London Communiqué 2007).

To develop an effective strategic plan aimed at tertiary-level school improvement in the customer-driven education context, it is essential to identify who the students – the consumers of the educational services – are and what they really need. Students, being education stakeholders and active members of the academic community, assess service quality depending on their requirements, values and attitudes.

Rowley cited in Voss et al. (2010) emphasises that education managers should focus their efforts on revealing the key quality dimensions from a learner's

perspective. The detailed knowledge of the learners' experience in education and their needs, approaches and beliefs is a crucial factor for the success of an educational organization. Value perceived by students then can be termed as a general evaluation of a service's usefulness (Zeithaml and Bitner cited in Chitty and Soutar 2004).

Collecting information related to student satisfaction and student motivation, as the main outcomes of students' interactions with the educational environment, can contribute to the development of an educational environment conducive to learning.

This paper addresses student satisfaction with the educational environment and student motivation for further studies in the framework of creating a student-centred educational environment. The purpose of this paper is twofold. An Firstly, to provide an overview of the learner-centred educational environment evaluation model. Secondly, to present the results of the study performed in two higher education institutions of Latvia for assessing various aspects of the educational environment in the context of language learning with the aim to foster learner-centred customization of the ESP (English for Specific Purposes) course.

## **1. The learner-centred educational environment evaluation model (EEEM)**

Now, student evaluations are being used in many higher education institutions as an element of their quality assurance systems (Timpson and Andrew; Kwan cited in Crumbley and Reichelt 2009).

We suppose that education managers can successfully employ student evaluations in various contexts, provided that they are used in the framework of a

wide-ranging evaluation of the integrated educational environment, where the focus is put on student satisfaction with the educational environment (the offered educational services) and student motivation for further studies. Student satisfaction and student motivation are the result of students' interactions with the educational environment; they are associated with students' emotional experience in education.

Astin (1993) considers student satisfaction to be a key outcome of higher education. Student satisfaction is likely to be connected with student motivation - the intention to continue their studies in a university. Student's experience in education influences student satisfaction with the educational environment and student motivation for further studies. In turn, students' post-learning behaviour is supposed to be guided by their values. Values are manifested in students' educational attitudes - the way students perform in a certain situation. Students' positive educational attitudes contribute much to improving the reputation of a university and to increasing student retention and achievement. Collecting student feedback in the form of regular educational environment evaluation can be a valuable source of analytical input in the process of creating the integrated student-centred educational environment, which is founded on shared values, and which is conducive to developing in young people positive attitudes toward learning.

We assume that a thorough educational environment evaluation should be carried out in the framework of an all-embracing model of managing the educational environment resources that is associated with managing the educational environment as an integrated multi-level supersystem (Stukalina 2010/1). This model is based on the typology of management and leadership models adapted by Bush

from Bush and Glover (Bush 2003). It presumes that education managers deal with the educational environment resources, which are related to the four fundamental educational environment subsystems (aspects): the physical and technological environment, the instructional environment, the psychological environment, and the executive environment (Ibid.).

The learner-centred educational environment evaluation model (EEEM) should take into account students' viewpoint about the quality of the educational environment. EEEM is based on seeking constructive feedback from students for creating a learner-centred educational environment. Analytical data are generated through the use of regular student surveys. Student evaluations in the form of student surveys - a perceptive methodological procedure that presupposes "the systematic collection of data from populations or samples through the use of the interview or the self-administrated questionnaire" (Denzin 1970) - is supposed to be one of the main methods of collecting information necessary for performing a wide-ranging evaluation of the educational environment.

The holistic approach to management of the educational environment presupposes that developing a scheme for the environment evaluation we should not overemphasise one aspect at the expense of others, even though we deal with one particular subject included in the study programme. Consequently, the educational environment evaluation model must embrace all four basic aspects of the environment. We presume that in their attempts to create a constructive educational environment in a university, education managers have to analyse the relationships between various educational environment subsystems that are supposed to support language learning. This would allow us to use the available

resources in the most efficient way. EEEM must include a set of the evaluation indicators, which can be employed for assessing various aspects of the educational environment as perceived by students.

## **2. Evaluation indicators and the related pedagogical dimensions**

Evaluating the quality of the educational environment from students' perspective raises some methodological problems related to the criteria to be employed for evaluation. We assume that the learner-centred environment evaluation model, which takes into account students' viewpoint about the quality of the educational environment, should focus on qualitative attributes rather than on quantitative characteristics (Stukalina 2010/2).

The qualitative approach is quite popular due to an increasing acknowledgment of the importance of philosophical considerations for methodological topics and concerns; they better reflect the uniqueness of humans (Bryman 2008). According to Bertolotti & Tagliaventi (2007), qualitative research is expected to enrich academics' and managers' knowledge of organizational settings owing to its potential to provide a thorough understanding of social dynamics. In our view, it is especially important when we deal with the educational environment as an intellectual community where social relationships are created in the process of multi-level communication.

The academic literature postulates that positive perceptions of service quality can result in student satisfaction (Marzo-Navarro et al.; Helgesen & Nasset cited in Voss 2009). Gallardo et al. (2007) consider satisfaction as the central mediator of post-learning behaviour. According to Elliott & Shin cited in Voss (2009), student satisfaction has a positive impact on

student motivation. In turn, bringing in more motivated students “may be the only viable way of substantially raising achievement” in the context of continuous improvement of an educational institution (Fiddler 2002).

We assume that student experience in education may be expressed in terms of a) student satisfaction with educational services provided; b) student motivation for further studies. Student satisfaction and student motivation can be regarded as the result of student interactions with the educational environment in the form of students’ perceptions of the environment.

Since the author teaches ESP in a higher education institution, the questions addressed in this paper are the following:

- “What educational environment aspects must be evaluated in relation to language learning?”
- “What indicators can be used for the educational environment evaluation in relation to language learning?”

According to Edwards (2001), it is generally accepted that “favourable attitudes and positive motivations” are fundamental for successful language learning. According to Harmer (2004), in terms of language learning, there are three areas where our behaviour can directly influence our students’ motivation: learning goals, learning environment (physical appearance of a classroom and the emotional atmosphere at the lesson), and interesting lessons. The above mentioned factors are requisite elements of the integrated educational environment. We presume that student motivation/satisfaction is supposed to be shaped by four related educational environment subsystems: a) the physical and technological environment (physical appearance of a classroom, the



use of ICTs for supporting language learning, etc.); b) the instructional environment (teaching materials, etc.); c) the psychological environment (the emotional atmosphere at the lesson, support from people engaged in the learning process, etc.); and d) the executive environment (interesting classes (how lessons are organised, the teaching methods we use, etc.).

In terms of the learning goal orientation we should identify what skills are essential for our graduates in the context of job-market customisation and life-long learning. In terms of the learning environment, we should identify the classroom equipment needed to support language learning and the role of ICTs in this process. In terms of the lessons organisation, it is vital to identify what learning methods should be applied to provide language learning, what teaching materials may be helpful in this process, what communication schemes can be used to establish contacts between learners and instructors, etc. Therefore, for assessing the four fundamental aspects of the educational environment in the context of language learning we suggest utilizing a set of quality-related evaluation indicators (Fig.1).

The suggested evaluation indicators symbolize some qualitative attributes, which are abstract in nature; they have been conceptualized for customer requirements that refer to the expectations of students (Stukalina 2010/2). They represent no more than *student's perception of the educational environment quality* and are not based on any scientifically developed criteria.

It should be mentioned that such theoretical concepts as the quality of conducted lessons/quality of acquired skills, etc. have to be put in more plain words in student evaluation questionnaires. For this reason, in

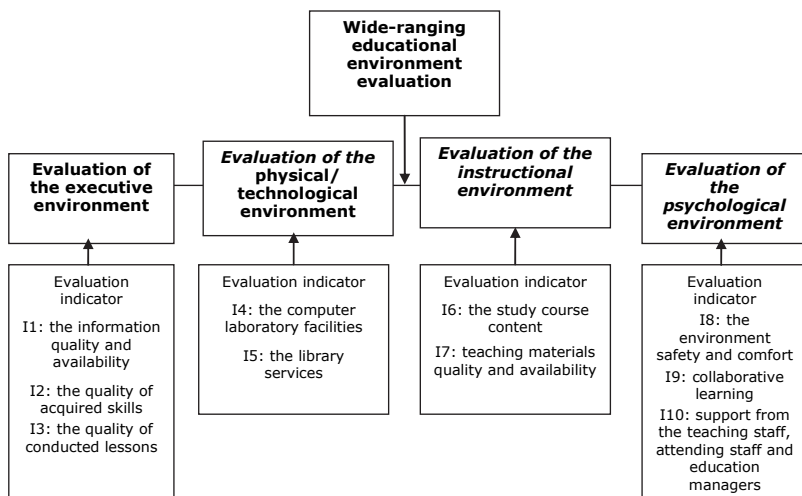


Figure 1: The proposed educational environment evaluation model (EEEM)

the questionnaire, every indicator is exemplified by a set of items - statements or questions. For example, the statements related to the quality of ESP lessons (Indicator 3) as it is perceived by students may be the following: *the ESP lessons held my interest; the ESP lessons were well-planned and organized; the ESP lessons enabled free communication; the ESP lessons were enjoyable; the ESP lessons aroused my curiosity, etc.*

These statements describe the learning effects students expect to perceive from the educational environment, the anticipated effects being associated with certain pedagogical dimensions (PDs). Normally, educators employ different pedagogical dimensions to investigate various aspects of the learning process (Yi & Hwang; Agarwal & Karahanna; Davis & Venkatesh; Laitenberger & Dreyer; and Hubona & Geitz cited in Toral Marin et al. 2005): application-specific self-efficacy and enjoyment, focused immersion, curiosity, playfulness and willingness, user friendliness, usefulness, behavioural intention and use, etc.

The basic pedagogical dimensions, which we suggest to associate with language learning, are the following: PD 1 – usefulness; PD 2 – efficiency; PD 3 – curiosity; PD 4 – enjoyment; PD 5 - appropriate level of interactivity; PD 6 – availability; PD 7 - user-friendliness; PD 8 - cooperation; PD 9 – safety; PD 10 - comfort.

Thus, each evaluation indicator is supposed to be related to a number of pedagogical dimensions (Fig.2).

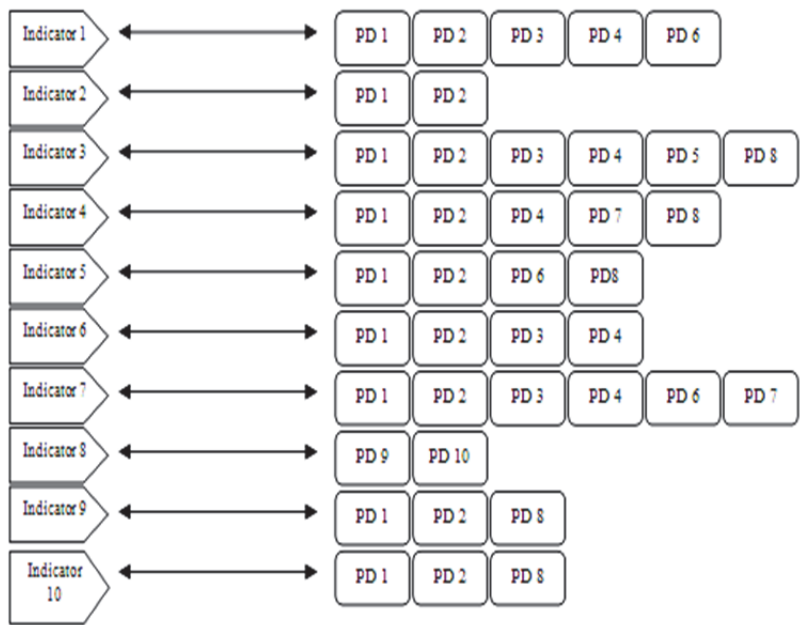


Figure 2: Evaluation indicators and the related pedagogical dimensions

The ten qualitative evaluation indicators associated with four higher order dimensions (the basic aspects of the educational environment) are essential elements of managing the integrated educational environment resources in accordance with an essential principle - managing the educational environment

through student feedback and involving students in participative decision-making (Stukalina 2010/1). Students' values and attitudes, needs and expectations are reflected in how students assess their educational environment.

### **3. Testing the learner-centred educational environment evaluation model**

#### ***3.1. Methodology and hypotheses***

The educational environment evaluation model was tested in two higher education institutions of Latvia: Transport and Telecommunication Institute (TSI) and Riga Technical University (RTU) in 2008/2009 academic year. A post-course evaluation survey was administered to students as part of a wide-ranging evaluation of the educational environment. In TSI, 210 students enrolled in the ESP course participated in the survey. In, RTU, 214 students enrolled in the ESP course took part in the survey. The students selected were distributed representatively from different faculties.

We have developed a comprehensive evaluation questionnaire containing four parts associated with the four fundamental educational environment aspects.

The questionnaire contains 73 items grouped into 10 qualitative evaluation indicators representing four higher order dimensions (the executive environment, physical and technological environment, instructional environment, psychological environment):

six items (evaluation statements) for I1, I2, I3, I6, I7; five items for I8, I9, I10; four items for I4 and I5. Satisfaction and motivation associated with every indicator are presented by separate items: I1 - 6 (satisfaction)/7 (motivation), and I2 -

S15/M16, I3 - S23/M24, I4 - S29/M30, I5 -  
S35/M36, I6 - S43/M44, I7 - S51/M52, I8 -  
S58/M59, I9 - S65/M66, I10 - S72/M73  
accordingly.

Students were asked to rate the items on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = partly agree or disagree, 4 = agree, 5 = strongly agree).

The hypotheses that this paper attempts to test are as follows:

H1. The ten qualitative evaluation indicators representing four higher order dimensions (the executive environment, physical and technological environment, instructional environment, psychological environment) used in the framework of the educational environment evaluation model are positively related to student satisfaction and student motivation.

H2. Student satisfaction with the educational environment is positively related to student motivation for further studies.

### ***3.2. Analysis and Results***

For analysing the obtained data, the standard tools and procedures of SPSS 17 software package programme were employed. Measurement scale reliability was evaluated using Cronbach alpha. The reliability check shows that all measures satisfied the requirement for Cronbach's alpha reliability (Table 1).

Table 1: Distribution and reliability for the ten qualitative evaluation indicators

<b>Indicator</b>	<b>Number of items</b>	<b>Cronbach alpha</b>
I1: The information quality and availability	6	0.817
I2: The quality of acquired skills and competences	6	0.837
I3: The quality of conducted lessons	6	0.849
I4: The language laboratory facilities	4	0.846
I5: The library services	4	0.806
I6: The study course content	6	0.871
I7: Teaching materials quality and availability	6	0.860
I8: The environment safety and comfort	5	0.804
I9: Collaborative learning	5	0.867
I10: Support from the teaching staff, attending staff and education managers	5	0.851

Correlations and factor analysis were employed to test the two hypotheses. Since students evaluated items and not indicators, factor analysis was used to generate summated scales on an objective basis, and for determining the numerical value of the correlations. Table 2 provides the Pearson correlations between each evaluation indicator and student satisfaction/student motivation in relation to TSI data. Table 3 provides the Pearson correlations between each evaluation indicator and student satisfaction/student motivation in relation to RTU data.

Table 2: Correlations between the ten evaluation indicators and student satisfaction/student motivation (TSI)

	S7	M8	S15	M16	S23	M24	S29	M30	S35	M36	S43	M44	S51	M52	S58	M59	S65	M66	S72	M73
I1	.537	.448	.522	.534	.540	.501	.357	.329	.408	.303	.465	.486	.492	.608	.432	.419	.402	.509	.424	.443
I2	.483	.546	.671	.638	.640	.616	.347	.392	.319	.312	.520	.568	.483	.585	.386	.354	.468	.533	.397	.430
I3	.580	.497	.631	.634	.653	.625	.356	.297	.369	.313	.550	.571	.591	.628	.481	.421	.473	.509	.530	.507
I4	.332	.450	.393	.458	.379	.446	.703	.686	.464	.520	.403	.382	.422	.509	.273	.355	.364	.405	.374	.453
I5	.383	.351	.288	.375	.295	.366	.390	.387	.709	.662	.420	.347	.504	.419	.440	.403	.362	.404	.518	.410
I6	.548	.574	.576	.608	.646	.686	.418	.453	.400	.401	.633	.747	.612	.710	.457	.436	.463	.597	.489	.510
I7	.521	.510	.564	.492	.581	.509	.358	.349	.439	.359	.540	.556	.702	.749	.464	.421	.430	.523	.498	.472
I8	.418	.334	.307	.361	.334	.382	.239	.263	.463	.355	.436	.398	.522	.539	.648	.527	.386	.416	.438	.492
I9	.405	.397	.396	.493	.456	.539	.362	.405	.379	.319	.532	.568	.497	.556	.428	.392	.751	.776	.455	.566
I10	.505	.380	.446	.512	.456	.439	.376	.402	.486	.465	.531	.464	.571	.602	.456	.458	.563	.581	.673	.667

Correlations all significant at the 0.01 level (2-tailed)  
S – satisfaction; M - motivation

Table 3: Correlations between the ten evaluation indicators and student satisfaction/student motivation (RTU)

	S7	M8	S15	M16	S23	M24	S29	M30	S35	M36	S43	M44	S51	M52	S58	M59	S65	M66	S72	M73
I1	.650	.545	.526	.472	.563	.502	.359	.311	.237	.272	.422	.489	.381	.444	.342	.316	.245	.346	.291	.213
I2	.459	.435	.619	.601	.588	.564	.288	.234	.187	.291	.592	.553	.434	.520	.355	.375	.285	.424	.378	.382
I3	.568	.471	.598	.567	.716	.608	.267	.254	.311	.279	.578	.512	.519	.519	.345	.320	.449	.428	.283	.300
I4	.195	.177	.245	.220	.254	.300	.691	.548	.169	.209	.158	.197	.231	.238	.127	.148	.414	.489	.389	.412
I5	.273	.254	.255	.277	.288	.329	.312	.290	.696	.660	.402	.340	.212	.368	.403	.384	.445	.439	.347	.221
I6	.554	.563	.611	.597	.671	.610	.245	.294	.263	.356	.714	.695	.549	.618	.396	.423	.378	.409	.361	.334
I7	.467	.463	.442	.466	.516	.526	.270	.339	.258	.282	.498	.551	.644	.641	.239	.379	.217	.198	.141	.168
I8	.252	.238	.306	.241	.283	.324	.228	.251	.396	.392	.395	.342	.304	.381	.687	.631	.246	.308	.224	.376
I9	.384	.412	.487	.483	.513	.438	.235	.304	.294	.295	.470	.470	.427	.470	.526	.505	.279	.183	.255	.202
I10	.292	.423	.396	.409	.391	.421	.275	.401	.297	.399	.473	.473	.405	.479	.465	.464	.283	.282	.296	.398

\*\* Correlation>0.176 is significant at the 0.01 level (2-tailed)  
\* Correlation between 0.140 and 0.176 is significant at the 0.05 level (2-tailed)  
S – satisfaction; M - motivation

The results presented in Tables 2 and 3 indicate that correlations between the ten evaluation indicators (the independent variables) and student satisfaction/student motivation (the dependent variables) are statistically significant. The results suggest that on the whole, the ten evaluation indicators are significantly positively related to student satisfaction and student motivation. A positive relationship in this context signifies that, in general, higher scores on one variable tend to be paired with higher scores on the other and that lower scores on

one variable tend to be paired with lower scores on the other. The higher the number of the positive correlation, the stronger is the connection. It means that the two variables are likely dependent; they are related in some way and one affects the other. Thus, hypothesis one (H1) that relates the evaluation indicators with student satisfaction and student motivation is supported.

These results imply that there is a strong connection between students' perceptions and various aspects of the educational environment, as the ten evaluation indicators represent four higher order dimensions (the executive environment, physical and technological environment, instructional environment, psychological environment). From these results we may conclude that students perceive the educational environment as an integrated system containing a variety of interconnected and interrelated subsystems.

From Table 2, one can see that four indicators with the strongest relationship to TSI student satisfaction (the numerical value was approximated to two numbers) are the following:

- *I7 - teaching materials quality and availability* (the numerical value of the correlations is 0.70)
- *I4 - the computer laboratory facilities* (the numerical value of the correlations is 0.70)
- *I5 - the library services* (the numerical value of the correlations is 0.71)
- *I9 - collaborative learning* (the numerical value of the correlations is 0.75).

From table 3, one can see that the indicator with the strongest relationship to RTU student satisfaction (the numerical value of the correlations  $r=0.71$ ) is *I6 - the study course content*.



From Table 2, one can see that two indicators with the strongest relationship to TSI student motivation (the numerical value of the correlations is  $< 0.7$ ) are the following:

- I6 - the study course content (the numerical value of the correlations is 0.75)
- I7 - teaching materials quality and availability (the numerical value of the correlations is 0.75).

The indicator with the strongest relationship to RTU student motivation is I6 - the study course content, the numerical value of the correlations being 0.70 (Table 3).

Consistent with H2, a positive relationship between satisfaction and motivation was found (Table 4 and Table 5). The Pearson correlation coefficients range from 0.42 to 0.68 (TSI), and from 0.50 to 0.65 (RTU); the numerical value was approximated to two numbers.

1. *TSI data*/on descending order (Table 4):

- for collaborative learning (I9)  $r=0.68$
- for support from the teaching staff, attending staff and education managers (I10)  $r=0.61$
- for the quality of conducted lessons (I3)  $r=0.66$
- for the computer laboratory facilities (I4)  $r=0.66$
- for teaching materials quality and availability (I7)  $r=0.62$
- for the library services(I15)  $r=0.58$
- for the quality of acquired skills (I2)  $r=0.53$
- for the environment safety and comfort (I8)  $r=0.53$
- for the study course content (I6)  $r=0.51$ .
- for the information quality and availability (I1)  $r=0.42$

## 2. RTU data/on descending order (Table 5):

- for support from the teaching staff, attending staff and education managers (I10)  $r=0.65$
- for the environment safety and comfort (I8)  $r=0.64$
- for collaborative learning (I9)  $r=0.64$
- for the quality of acquired skills (I2)  $r=0.61$
- for the study course content (I6)  $r=0.61$
- for the library services(I5)  $r=0.57$
- for the quality of conducted lessons (I3)  $r=0.57$
- for the computer laboratory facilities (I4)  $r=0.54$
- for teaching materials quality and availability (I7)  $r=0.53$
- for the information quality and availability (I1)  $r=0.50$ .

Table 4: Correlations between student satisfaction and student motivation (TSI)

	S7	M8	S15	M16	S23	M24	S29	M30	S35	M36	S43	M44	S51	M52	S58	M59	S65	M66	S72
S7	1	.420**	.519**	.437**	.495**	.439**	.354**	.300**	.356**	.274**	.427**	.399**	.424**	.485**	.377**	.340**	.332**	.352**	.402**
M8	.420**	1	.446**	.566**	.458**	.513**	.260**	.344**	.314**	.357**	.332**	.465**	.392**	.525**	.356**	.318**	.308**	.420**	.310**
S15	.519**	.446**	1	.526**	.644**	.547**	.319**	.302**	.283**	.236**	.405**	.444**	.486**	.491**	.327**	.313**	.335**	.375**	.390**
M16	.437**	.566**	.526**	1	.524**	.578**	.297**	.286**	.293**	.328**	.439**	.548**	.451**	.568**	.310**	.332**	.403**	.428**	.393**
S23	.495**	.458**	.644**	.524**	1	.655**	.320**	.321**	.296**	.260**	.453**	.519**	.507**	.529**	.272**	.323**	.322**	.409**	.432**
M24	.439**	.513**	.547**	.578**	.655**	1	.387**	.447**	.302**	.360**	.427**	.619**	.466**	.521**	.350**	.404**	.422**	.502**	.328**
S29	.354**	.260**	.319**	.297**	.320**	.387**	1	.659**	.357**	.408**	.383**	.376**	.372**	.421**	.206**	.326**	.349**	.396**	.258**
M30	.300**	.344**	.302**	.286**	.321**	.447**	.659**	1	.348**	.472**	.283**	.411**	.342**	.398**	.273**	.471**	.385**	.482**	.312**
S35	.356**	.314**	.283**	.293**	.296**	.302**	.357**	.348**	1	.582**	.328**	.297**	.420**	.367**	.410**	.327**	.344**	.404**	.469**
MM	.274**	.357**	.236**	.328**	.260**	.360**	.408**	.472**	.582**	1	.359**	.332**	.387**	.401**	.315**	.386**	.347**	.397**	.360**
S43	.427**	.332**	.405**	.439**	.453**	.427**	.383**	.283**	.328**	.359**	1	.512**	.567**	.546**	.301**	.306**	.410**	.457**	.368**
M44	.399**	.465**	.444**	.548**	.519**	.619**	.376**	.411**	.297**	.332**	.512**	1	.476**	.594**	.384**	.498**	.409**	.595**	.376**
S51	.424**	.392**	.486**	.451**	.507**	.466**	.372**	.342**	.420**	.387**	.567**	.476**	1	.618**	.446**	.420**	.409**	.425**	.496**
M52	.485**	.525**	.491**	.568**	.529**	.521**	.421**	.398**	.367**	.401**	.546**	.594**	.618**	1	.462**	.478**	.389**	.561**	.454**
S58	.377**	.340**	.332**	.352**	.402**	.310**	.332**	.403**	.428**	.393**	.328**	.502**	.328**	.402**	1	.511**	.431**	.438**	.318**
M59	.340**	.332**	.352**	.403**	.428**	.393**	.428**	.393**	.428**	.393**	.428**	.393**	.428**	.393**	.428**	1	.551**	.439**	.318**
S65	.332**	.352**	.403**	.428**	.393**	.428**	.393**	.428**	.393**	.428**	.393**	.428**	.393**	.428**	.393**	.428**	1	.684**	.422**
M66	.352**	.402**	.310**	.390**	.393**	.432**	.328**	.258**	.312**	.469**	.360**	.368**	.376**	.496**	.454**	.367**	.383**	.422**	.439**
S72	.402**	.310**	.390**	.393**	.432**	.328**	.258**	.312**	.469**	.360**	.368**	.376**	.496**	.454**	.367**	.383**	.422**	.439**	1
M73	.328**	.323**	.398**	.387**	.405**	.455**	.353**	.399**	.363**	.397**	.393**	.490**	.445**	.470**	.412**	.516**	.482**	.560**	.608**

Table 5: Correlations between student satisfaction and student motivation (RTU)

	S7	M8	S15	M16	S23	M24	S29	M30	S35	M36	S43	M44	S51	M52	S58	M59	S65	M66	S72
S7	1	.497**	.404**	.378**	.453**	.367**	.175*	.179**	.143*	.213**	.323**	.384**	.364**	.392**	.267**	.249**	.245**	.346**	.291**
M8	.497**	1	.355**	.562**	.468**	.504**	.180**	.288**	.211**	.372**	.418**	.602**	.372**	.432**	.229**	.299**	.285**	.424**	.378**
S15	.404**	.355**	1	.611**	.638**	.462**	.248**	.216**	.236**	.287**	.580**	.475**	.378**	.362**	.330**	.333**	.449**	.428**	.283**
M16	.378**	.562**	.611**	1	.496**	.601**	.203**	.273**	.156**	.274**	.472**	.653**	.410**	.524**	.305**	.366**	.414**	.489**	.389**
S23	.453**	.468**	.638**	.496**	1	.569**	.230**	.228**	.253**	.297**	.631**	.513**	.447**	.449**	.355**	.329**	.445**	.439**	.347**
M24	.367**	.504**	.462**	.601**	.569**	1	.215**	.319**	.139*	.344**	.463**	.600**	.383**	.545**	.313**	.375**	.378**	.409**	.361**
S29	.175**	.180**	.248**	.203**	.230**	.215**	1	.543**	.290**	.264**	.223**	.224**	.188**	.232**	.193**	.200**	.217**	.198**	.141*
M30	.179**	.288**	.216**	.273**	.228**	.319**	.543**	1	.165**	.374**	.241**	.376**	.185**	.303**	.171*	.345**	.246**	.308**	.224**
S35	.143*	.211**	.236**	.156**	.253**	.139**	.290**	.165*	1	.571**	.417**	.216**	.245**	.289**	.266**	.335**	.279**	.183**	.255**
M36	.213**	.372**	.287**	.274**	.297**	.344**	.264**	.374**	.571**	1	.372**	.387**	.229**	.342**	.316**	.445**	.283**	.282**	.296**
S43	.323**	.418**	.580**	.472**	.631**	.463**	.223**	.241**	.417**	.372**	1	.614**	.467**	.469**	.359**	.393**	.399**	.345**	.416**
M44	.384**	.602**	.475**	.653**	.513**	.600**	.224**	.376**	.216**	.387**	.614**	1	.453**	.579**	.318**	.440**	.399**	.489**	.444**
S51	.364**	.372**	.378**	.410**	.447**	.383**	.188**	.185**	.245**	.229**	.467**	.453**	1	.532**	.283**	.354**	.375**	.400**	.237**
M52	.392**	.432**	.362**	.524**	.449**	.545**	.232**	.303**	.289**	.342**	.469**	.579**	.532**	1	.340**	.506**	.432**	.497**	.423**
S58	.267**	.229**	.330**	.305**	.355**	.313**	.193**	.171*	.266**	.316**	.359**	.318**	.283**	.340**	1	.642**	.455**	.407**	.398**
M59	.249**	.299**	.333**	.366**	.329**	.375**	.200**	.345**	.335**	.445**	.393**	.440**	.354**	.506**	.642**	1	.435**	.510**	.435**
S65	.245**	.285**	.449**	.414**	.445**	.378**	.217**	.246**	.279**	.283**	.399**	.399**	.375**	.432**	.455**	.435**	1	.639**	.322**
M66	.346**	.424**	.428**	.489**	.439**	.409**	.198**	.308**	.183**	.282**	.345**	.489**	.400**	.497**	.407**	.510**	.639**	1	.380**
S72	.291**	.378**	.283**	.389**	.347**	.361**	.141*	.224**	.255**	.296**	.416**	.444**	.237**	.423**	.398**	.435**	.322**	.380**	1
M73	.213**	.382**	.300**	.412**	.221**	.334**	.168*	.376**	.202**	.398**	.314**	.495**	.292**	.390**	.313**	.496**	.264**	.433**	.652**

\*\* . Correlation is significant at the 0.01 level (2-tailed)

I1 - S6 (satisfaction)/M7 (motivation), I2 - S15/M16, I3 - S23/M24, I4 - S29/M30, I5- S35/M36, I6 - S43/M44, I7 - S51/M52, I8 - S58/M59, I9 - S65/M66, I10 - S72/M73

Correlations allow us to use the value of one variable (satisfaction) to foresee the value of another (motivation). The positive correlation coefficients indicate that as the score for student satisfaction with the educational environment increases, so does the rating for student motivation for further studies. These findings support hypothesis two (H2).

Conclusion

A learner-centred model for performing a wide-ranging evaluation of the educational environment was proposed in this paper. The suggested scheme contains a set of qualitative assessment indicators; it can be employed in various contexts.

This model was tested in two higher education institutions. The study reflects the empirical results showing a) the relationships between students' perception of different aspects of the educational

environment and student satisfaction/student motivation; b) the relationship between student satisfaction with the educational environment and student motivation for studying languages.

One of the main findings of this study is that in the context of language learning, all basic aspects of the educational environment - the physical and technological environment, instructional environment, executive environment, psychological environment - presented by a set of qualitative indicators are strongly related to student satisfaction with the environment and student motivation for further studies. This highlights the importance of employing the holistic approach to management of the educational environment: it presupposes that when attempting to provide students with favourable learning conditions in conformity with their values, attitudes, requirements and expectations, education managers must create an integrated educational environment. Moreover, the student-centred educational environment must be evaluated as an integrated system even if we deal with only one study course.

The study has also empirically shown that student motivation for further studies grows when students are satisfied with their educational environment. Students with a high level of satisfaction are more inclined to continue their studies in a particular university; students' positive educational attitudes, as the manifestation of their values, add a lot to improving the status of the university and to increasing student retention.

It is expected that the obtained results will be used to foster learner-centred customization of the ESP course. There may be several degrees of course customization, from revising the course content and

teaching materials, to complete course customization including technical and psychological support. The degree of customization depends on how students assess their educational environment based on their needs and requirements, values and attitudes. Taking into consideration the results of the educational environment evaluation, we can identify what aspects of the environment demand more attention from education managers. The results of the study show that all factors that might have impact on student satisfaction/motivation should be considered in the framework of the integrated educational environment as interrelated and interdependent.

There are some limitations that need mentioning. The sample in this study incorporated two higher education institutions of Latvia. A larger sample would raise the consistency of the results. Another limitation is that since it was an investigative study, some factors may have been not considered. The learner-centred educational environment evaluation model could be improved further; therefore future research is needed to test this model.

We hope that whatever lessons this study provides will be useful to education managers who are interested in investigating the impact of different aspects of the educational environment on student satisfaction and student motivation for further studies.

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## **C**HAPTER 26

### **THE IMPACT OF TEACHERS LOCUS OF CONTROL ON STUDENTS' PERCEPTION OF TEACHERS WITHIN SELECTED URBAN SCHOOLS IN JAMAICA**

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#### **Abstract**

The purpose of this study was to examine the variation in students' perception of their teachers using two variables : teacher care and commitment and teachers' locus of control. Copies of a modified version of the Rose and Medway (1981) teacher locus of control scale was administered to 248 high school teachers and copies of the student perception questionnaire were administered to 386 high school students. The findings contradict the literature in that from students' perspective teachers with external locus of control outweighed teachers with internal locus of control in their commitment levels ; in addition the results indicate that there is no statistically significant difference in the levels of teacher care as perceived by students.



## **Keywords**

Locus of Control, teacher commitment, teacher care

## **Introduction**

Students' perception provides suggestions and possible direction for teachers' future improvement. Unlike other stakeholders students provide an insider's perception of teachers as professionals in the teaching-learning process. Teachers according to Ahmad and Aziz (2009) can use information gathered from students to refine their teaching and to look for ways of improvement. In examining students' perception of their teachers this study provides a glimpse into the educational perceptions of high school teachers and the influence of teachers' locus of control on students' perception of teacher using two variables: teacher care and commitment.

Students' perspective on teacher care and commitment may be an important factor in improving students' performance in school. Bae, Holloway, Li and Bempehat (2008) noted that "all too often, what gets overlooked and left out in the dialogue relating to the issues of academic underachievement and equal opportunities for education is the students' own perspectives on learning and school achievement (p.211). It is important that research aimed at influencing policies and practices involve students' views on various aspects of the teaching-learning process.

Teachers' disposition towards their jobs and inferences made about their students' future behaviour and academic performance can eventually influence their students' academic performance in a confirmatory way. Budai (2005) noted that teachers' beliefs and background can influence their interactions with their students. Teachers should be aware of themselves and

nurture an understanding not only of their subject matter but also of their personal beliefs, perceptions and feelings, and reflect on how these variables affect their professional lives in the classroom. If the teacher does not believe "...in a direct relationship between what they do and what their students learn, then learning may be perceived as the result of random events for which the teacher has no responsibility" (Sherman & Giles, 1981, p.139). It is important for teachers to recognize that their effort can make a difference once they, as teachers, accept responsibility in the classroom. Teachers who take responsibility for their actions in the classroom are more likely to refrain from unwarrantedly putting the blame on the students, hard luck or the hostility of circumstances, and admit to their own inadequacies. When teachers take personal responsibility for promoting change in their students, they can improve their effectiveness in the classroom (Rose & Medway, 1981; Parkway et al., 1988; Sherman & Giles, 1981;).

Teachers' locus of control (TLOC) is defined as teachers' perception of their personal control and responsibility for students' academic and behavioural outcomes (Kremer & Lifmann, 1981; Rose & Medway, 1981). Teachers' locus of control evolved from the concept of Locus of control, a widely used concept that concerns individuals' beliefs about who or what influences important outcomes in their lives. This personality construct, locus of control, first identified by Julian Rotter in 1954, referred to the extent to which an individual believed that his or her behaviour determined certain life events. LOC is considered relatively stable overtime and can be measured by an instrument developed to measure locus of control. Kremer and Lifmann (1982) noted that teachers with internal and external LOC displayed different teacher characteristics in their professional work. According to

these authors, an internally-oriented teacher would make a remark such as, "if you work harder, you'll get better results", whereas an externally-oriented teacher may not direct his/her efforts at all towards low achievers because s/he may attribute students' achievements to external forces.

Kremer (1982) cited studies which showed that internally-oriented teachers, to a greater degree, display the following characteristics more than teachers who are rated as externals: they were more guided by inner sources, face challenges with more persistence, seek for new information with regard to innovation, use new information and try to induce change in the classroom. In other words, internally-oriented teachers are more flexible in their methods and materials used in the classroom. The externally-oriented teachers tend more to attach importance to authority; therefore they will exert their own authority; they are not decision-makers but are guided in decision-making by their superiors; they will tend to attribute failure to outer sources such as curricula, students, and situational constraints rather than to themselves.

According to Kremer (1982), the behaviour and attitude displayed by internal teachers are consistent with the progressive views of education, whereas the attitudes and behaviour of the externally-oriented teachers are in accord with the traditional approach to teaching. The writer concluded from his results that external and internal loci of control were found to significantly explain the variance in traditional and progressive attitudes respectively. Table 1 illustrates the results from Kremer's studies. One will observe from the table that internals score higher than externals on progressive teaching.

Table 1: Differences between Externals and Internals re teaching and attitudes

		X Bar	S.D.	t
Progressive Teaching	Externals	35.42	5.27	-3.5*
	Internals	60.21	17.97	
Traditional Teaching	Externals	60.92	12.53	4.57**
	Internals	34.21	9.03	
Progressive Attitudes	Externals	36.71	4.16	-1.90
	Internals	44.85	2.54	
Traditional Attitudes	Externals	46.28	3.25	3.64*
	Internals	27.42	13.31	

d.f.:12      \*:  $p < 0.1$       \*\*:  $p < 0.001$ 

Source: L. Kremer (n. d.) Page 5

Table 1 shows that 'externals' score higher than 'internals' on traditional teaching and on traditional attitudes. The only non-significant difference is in the area of progressive attitudes.

Parkway et al. (1988) also noted a study by Ashton, Webb and Doda (1983), which demonstrated that teachers who were internal in their LOC tended, to a greater degree, to take responsibility for students who were unmotivated and who were low achievers. In this experiment they used the TLOC scale that was developed by Rose and Medway (1981). These researchers observed a significant correlation between teachers' belief that they can succeed with difficult or unmotivated students and the teachers' tendency to accept personal responsibility (internality) for students' success ( $r = .31$ ,  $p < .05$ ) and the teachers' tendency to accept responsibility for students' failure ( $r = .36$ ,  $p < .01$ ).

These attitudes displayed by teachers could very well affect their pupils' perception of themselves as academic performers. An internally-oriented teacher is likely to take responsibility for a student's failure and therefore may be apt to strive to improve his/her teaching, whereas the external, who is not likely to take responsibility for a student's failure, is not likely to strive to improve his/her teaching. In other words, external teachers are likely to be more inflexible and more mechanical in their methods.

Previous researches have reported a connection between LOC and stress experienced by teachers on the job (Crothers, 2010; Parkway, Greenwood, Olejenik and Proller 1988). For example, Parkway et. al who were internal in their TLOC reported low stress on the job; they had better relationships with their colleagues, students and superiors, and fewer intrapersonal conflicts. Crothers et al. (2010) concluded that the participants in Western culture with increased levels of external locus of control reported high levels of job stress and job pressure, as well as the perception of severe lack of organizational support. Bein, Anderson and Maes (1990) concluded from their results that teachers who were more internal in their LOC experienced higher levels of job satisfaction. They explained that a greater sense of personal control in the school environment contributed to an overall feeling of satisfaction with teaching as a career.

Cheng's (1994) findings agreed with the results from Parkway et al.'s (1990) study that internals believed that they had greater control over their working environment and therefore were more committed to their school. They had more power in a situation because they perceived a greater number of alternatives than did externals in a situation of choice,

and additionally, internals tended to have a more satisfied relationship with their colleagues.

Cheng's (1994) study examined the role of LOC in differentiating teachers' attitudes and perceptions of organisational influence. Cheng (1994) sought to examine teachers' LOC orientation within the school environment. He concluded from his study that although teachers' LOC could shape their job attitudes and organizational perceptions, the reverse relationship was also possible. The following were some results from Cheng's study: Internals had more positive attitudes and feelings toward their job than externals; and internals found extrinsic and intrinsic awards more satisfying than externals.

Therefore, externals found extrinsic rewards less satisfying. Cheng's (1994) explanation was that externals felt powerless to achieve greater extrinsic rewards and consequently might be dissatisfied with what they had. On the other hand, teachers who were internally oriented in their LOC tended to believe that extrinsic rewards matched their efforts resulting in an enhanced feeling of satisfaction. Teachers who believed that success and failure were dependent largely on their behaviour tended to be self-motivated. Therefore internals, according to Cheng's (1994) research, possessed more positive attitudes than externals; they were more highly motivated, tended to place a higher value on their professional role as teachers and thereby would have higher expectations of what they were able to do in the classroom.

Lunenburg and Cadavid (2001) reported that teachers with an external locus of control orientation perceived obstacles as insurmountable compared to internals who perceived these obstacles as generally surmountable. Their results suggested that the more

internal a teacher was, the more s/he reacted constructively towards frustration while the more external the individual, the less constructive was the reaction. The results of the study supported the authors' hypothesis that individuals with an external LOC had fewer coping strategies or perceived past reinforcement strategies as outside their control.

Literature on the relationship between the teachers' demonstration of care and their LOC is almost non-existent. However it is possible to examine the attributes of a caring teacher and then to extrapolate based on the teachers' locus of control studies on expectation of the caring attributes of the two categories of teachers, those who are internal and those who are external. Teachers are called to the duty of care. With this duty of care they are given not only power but also responsibilities (Wragg, 1999). The teacher has the power to withhold or to give care and they also have the responsibility to help students develop the capacity to care (Noddings, 1992). A caring relation is completed when the student receives the teachers' effort at caring. Caring relationship is the capacity to help others to grow; it is engrossment with, it is recognition of and it is response to. Engrossment: "When I care I really hear, see, and feel what the other tries to convey" (Noddings, 1992).

There are different kinds of care. There is the care for ideas and objects and there is the care for people and other living things. If we are to produce teachers who care and who in turn will produce students who care, then we, in demonstrating care, are helping others to grow (Alder, 2002). Care in the classroom discourages highly manipulative and dogmatic methods that communicate that students must learn what the teachers choose with a total disregard for the interests and purposes of the students: caring teachers listen and respond differentially to their students (Noddings,

1992). Caring consequently, impacts on both the cognitive and the affective development of the learner.

Caring teachers can be described as persons who are interested in helping others to grow (Alder, 2002). These are individuals with "high performance expectations, advocacy, and empowerment of students as well as by their use of pedagogical practices that facilitate success" (Morris & Morris, 2002, p. 121). Several studies have reported a high correlation between teachers who portrayed the above attributes with high internality in their teachers' locus of control orientation (Kremer, 1981; Northington, 1999; Sisson, 2003). One student, Monique in Alder's (2001) study responded in an interview "You can tell if a teacher cares for you because they won't let you settle for something. They'll push you, they'll work you hard, they'll hassle you, they'll punish you..." (p.251). Another student, Samantha shared her experiences. If (Mrs. Apple didn't care she wouldn't talk to my Mama..." (253).

Morris and Morris (2002) also noted that teachers demonstrated care for their students when they interacted with their students outside of class time. In this study, students reported that the teachers who demonstrated care became their personal advisors because they felt confident to share personal matters with them. Alder (2002) also confirmed that talk couldn't be overemphasized as an expression of care. It is through talk that children revealed their lives and teachers support and nurture them.

Cook (2007) interviewed and observed teacher who were internal and external in their locus of control orientation. Cook's study demonstrated that both categories of teachers expressed care to their students but they differ in this expression. The internal teacher



focuses not only on the class but on the individual students. The internal teacher tended to care for the student by establishing a psychological connection whereby they are able to empathize more with the students. Internal teachers sought to establish relationships with their students (see exemplary excerpts from interview with participants 90 and 42)

The above were revealed in the following statement by participant 90:

... No I do not relate to the class as a group, no class that I teach I relate to as a group. I try to see them on an individual basis. As I tell them, I see them first as students and then as my kids, perhaps, and then at the end point deal with them as a group. The reason I do this is that as they say students learn at different rates and if I teach them as a group then there might be a child who is struggling that I may overlook or one that may be lost in the system so I deal with them on an individual basis so that I can attack the individual needs of the students (internal 90,interview, 9.05.05) (Cook,2007,p.196).

Participant 41 reiterated this:

I'm playing a dual role. I'm a student too...that's my thing, I'm always a student. I'm a teacher but I am sitting in that seat as a student. I can relate to my experience and I know what works for me. I know that it may not work for everyone. I know that it's important that students are guided and that they create some sort of structure and I know that that helped me so it is important to me that they do well and I know sometimes they do not know even at that stage what is best for them...and I think that over a time they have come to trust me and trust my judgment and so there is very little resistance despite the fact I encourage them to

have different views (Internal 41)  
(Cook,2007,p.196)

The external teachers on the other hand tended to refer to the class or groups rather than individuals. Externals tended to be demonstrated by a set of specific behaviours(see exemplary excerpts from interview with participants 113 and 217).

If they are having problems then they are supposed to find the teacher, the teacher will arbitrate and help them to straighten it out but they remain as a group (external, 113)  
(Cook,2007, p.207)

...I have good rapport with them (referring to parents)...sometimes I threaten them in terms of I know where you live, I know your mother...I keep good relationship with the parent ..in terms of good relationship I call them regularly to give them feedback you know and the behaviour pattern and all that so I guess that may make a difference..., they know I'll call their parents and tell them exactly what they are doing and they don't really want that (external, 217)  
(Cook,2007, p.207) .

Several studies (Igbeneghu and Popoola, 2011; Munir and Sajid, 2010; Cheng, 1994; Bein, Anderson and Maes, 1990; Kremer and Lifmann,1982) found a positive correlation between internality and educators' high level of commitment to teaching. Commitment can be divided into organizational commitment and professional commitment. Cheng (1994) for example, stated that his findings demonstrated that teachers who had a greater propensity of commitment attributed the success or failure of an event to their own behaviours rather than to external and uncontrollable factors and they seemed more committed to their school.

Organizational commitment was characterized by three factors: a strong belief in and acceptance of school goals and values; a willingness to exert considerable effort on behalf of the school; and a strong desire to maintain membership in the school (Cheng, 1994). Teacher commitment is characterized by internal motivation; their feelings are closely linked with how well they performed. In Cheng's study (1994) teachers with low internal motivation suffered from feelings of alienation with their negative behaviours including absenteeism, expenditure of low effort and outright defection.

## **1. Method**

### ***1.1. Participants***

From the 42 high schools, 12 high schools were randomly selected using a table of random numbers. A sample of 248 was the goal representing 8% of the total teacher population of approximately 3019 in the Kingston and St. Andrew in Jamaica. Within each randomly chosen school, teachers were selected using convenience sampling based on availability and willingness of the teachers to participate in the study. Because this section of the research was conducted towards the end of the school year, only 225 teachers were able to respond to the questionnaire; of these 225 copies of the questionnaires, 20 were incomplete and excluded from the study.

The sample consisted of 175 females and 50 males with a mean age of 32 years. This sample of teachers had an average of 9 years teaching experience. The teachers were all high school teachers, specialising in different subject areas such as Mathematics, Literature, History, Spanish, and Technical Drawing. Table 2 gives a profile of the participating teachers' professional qualifications. It can be observed from the

table that most of the teachers were trained teachers (75%) with the remaining 25% being pre-trained teachers with Bachelor's degree only.

Table 2: Professional Qualifications of Teachers

Professional Qualifications	No. Of Teachers	% Of sample
Diploma in Teaching (only)	67	32.7
Bachelor of Education (only)	51	24.9
Diploma in Teaching & Bachelor of Education	59	28.8
Teachers' certificate, Diploma in Teaching & Bachelors of Education	4	2.0
Master of Education, Certificate of Education & Diploma in Teaching	4	2.0
Certificate of education & Diploma in Teaching	9	4.4
Master of Education & Bachelor of Education	4	2.0
Certificate of Education (only)	4	2.0
Missing	3	1.5
Total	205	100

The targeted number consisted of 24 teachers (representing 12% of the larger sample), 12 Externals and 12 Internals. These teachers were selected from the extremity of the Internals and Externals, the Constants, using the mean TLOC Location score of individual teachers. Teachers with the highest mean TLOC score and lowest standard deviation were categorised as Internals and Externals.

Twenty-four teachers were selected because of the probability of dropout over the extended time of the study. Participation in this phase of the study was strictly on a voluntary basis. Only 12 teachers of the

24 teachers agreed to participate in this study. The average age of the members of the reduced sample was 32 years, with an average of 6 years teaching experience. These teachers were all high school teachers, specialising in different subject areas such as Mathematics, Social Studies, and Technical Drawing. See Table 2 for the demographic profiles of the reduced sample.

## **1.2. Measure**

This study was conducted using two measures: Teachers' locus of control instrument and student perception of teachers' questionnaire.

### *1.2.1. Teacher locus of control (TLC).*

The TLC (Teachers' Locus of Control instrument) questionnaire which was developed by Rose and Medway (1981) to measure the extent to which teachers held themselves responsible for students' success and failure in the classroom. This instrument was geared only for the classroom teachers and so far has been utilised only in the classroom (Cook & Bastick, 2004; Northington, 1998; Rose & Medway, 1981; Stanton, 1982). This questionnaire, with modifications, was used to measure teachers' belief in their control over the professional environment, student achievements and classroom behaviours and to ascertain teachers' reasons for externality or internality in their TLC orientation.

The teachers were asked to choose between three options (a, b or c). The modified TLOC questionnaire consisted of 21 forced choice items. Each question was scored as follows:

"-1" was given for each external answer; and,

" 1" was given for each internal answer.

The Alpha for TLC instrument was 0.70. Bastick and Matalan (2003) noted that a Cronbach Alpha 0.70 and greater is acceptable.

### *1.2.2. Student Perception of Teachers (SPT).*

Eighteen items from the student perception of teachers scale were used to assess students' perception of their teacher and to determine the relationship between students' perception of teachers and teacher locus of control. These items are based on the literature on teacher commitment and care (Cook, 2007; Alder, 2002; Morris & Morris, 2002; Wragg, 1999; Cheng, 1994; Noddings, 1992; Bein, Anderson and Maes, 1990; Kremer and Lifmann, 1982). Student rate on a 5 point Likert scale that ranges from 1 (strongly disagree) to 5 (Strongly Agree) how well each statement describe the student's perception of their teachers. The two aspects of teacher disposition which were examined were: teacher care of students and teacher commitment from the perspective of the students. The validity of SPT was examined using factor analysis and reliability using Cronbach Alpha.

## **2. Research Findings**

The reporting of the results is guided by the research questions. The Kolmogorov-Smirnov test generated for both subscales, teacher expectation and teacher commitment, yielded non-significant values (Teacher Commitment,  $p = .000$ , and teacher expectation,  $p = .022$ ), thus the data were well suited for non-parametric analyses.

*RQ1. Are the dimensions teacher care of students and teacher commitment to teaching learning underlying dimensions of the STP scale?*

Initially the factorability of the 18 items for the student perception of teachers questionnaire was examined. The Kaiser- Meyer-Olkin measure of sample adequacy was 0.839 above the recommended value of 0. 6, and Bartlett’s test of sphericity was significant ( $\chi^2 (153) = 1298.078, p<0.05$ ; see Table 3). Principle component analysis was used because one of the purposes of this study was to identify the underlining factors of the instrument used in this study. The initial Eigen values showed that two factors explained 33% of the variance: the first factor 24.58% of the variance and the second factor 7.99% of the variance. These two factors were examined using varimax rotations of the factor loading matrix. The two factors, teacher commitment and teacher care had factor loadings above .3 (see Table 4).

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy. .839		
Bartlett's Test of Sphericity	Approx. Chi-Square	1298.078
	df	153
	Sig.	.000

Table 4a: Factor loadings on 'Teacher Commitment' based on the Principle Component Analysis with Varimax Rotation

Q8.My teacher makes effort to see that we understand what he. /she teaches us	.649
Q6. My teacher always prepares well what he/she teaches us	.604
Q19. I am bored in my class.	.588
Q11. My teacher provides opportunity to work on challenging task during classes	.563
Q15. My teacher says negative comments frequently during classes.	.509

Q13. My teacher has favourites in the class.	.457
Q7. My teacher does not come to teach us most of the time	.422
Q9. My teacher always marks the assignment he/she gives us	.420
Q5. My teacher is always late to our lessons	.378

Table 4b: Factor loadings on 'Teacher Care' based on the Principle Component Analysis with Varimax Rotation

Q16..My teacher talks with me outside of class time.	.663
Q17. I can talk to my teacher about personal matters after classes.	.653
Q18. My teacher contacts my parents when I am not doing well in my lessons	.593
Q14. I am one of my teacher's favourite.	.584
Q 20.When my teacher punishes me I know that she cares for me.	.518
Q12. My teacher encourages me to persist when I encounter difficult problems in my lessons.	.494
Q 21. My teacher listens to me during class time.	.432
Q10.My teacher believes that I can do my work.	.395
Q4. My teacher always comes on time to the lessons he/she teaches us	.317

*Note.* in Tables 4a and 4b factor loadings < .3 are suppressed

Internal consistency for each of the subscales was examined using Cronbach Alpha. The Alphas were moderate consistency 0 .68 for Teacher Commitment (9 items), and .62 for Teacher Expectations. A substantial increase in Alpha for Teacher Expectation subscale was achieved by eliminating item 14 (Alpha increased to .725). Subsequent analysis was carried out minus item 14.

*RQ 2: What is the current level of students' perception of teachers using teachers' care and commitment dimensions?*

The mean score for students perception of teacher commitment was 37.09 ( standard deviation = 5.18); and for teacher care was 29.06 (standard deviation =



5.44). The distribution of the scores for the dimensions of student perception is negatively skewed with most of the scores being on the higher ranges (see table 5).

Table 5: Descriptive for Students’ Perception of commitment & Teacher Care

		Students' Perception of Teacher	
		Commitment	Care
N	Valid	386	385
	Missing	6	7
Mean		37.0933	29.0675
Mode		39.00	32.00
Std. Deviation		5.18956	5.44151
Skewness		-1.096	-.525
Std. Error of Skewness		.124	.124

*RQ 3: Is there a significant difference in students’ overall perception score of their teachers based on the teachers locus of control orientation?*

Based on table 7 there is a statistical significant difference in the STP scores measuring teacher commitment for teacher with internal and external locus of control ( $Z=-3.93, p< .05$ ) and no statistical difference in the SPT scores measuring teacher care for the two categories of teacher ( teachers with external and internal LOC) (  $Z =-1.601, p = .109$ ). Table 6 indicate that the externally oriented teachers had the highest mean rank of the SPT score on the dimension of teacher commitment (mean rank = 204.27) versus internal teachers with a mean rank of 147.33. Though there was no statistically significant difference between the two groups of teachers on the SPT dimension for teacher care the internals had the higher mean rank of 211.74 versus the external teachers with a lower mean rank of 188.62.

Table 6: Mean Rank for students Perception of teachers' commitment and care

	LOC Orientation	N	Mean Rank	Sum of Ranks
Students' Perception of Teacher Commitment	External	313	204.27	63936.00
	Internal	73	147.33	10755.00
	Total	386		
Students' Perception of Teacher Care	External	312	188.62	58848.00
	Internal	73	211.74	15457.00
	Total	385		

Table 7: Mann-Whitney U: Student Perception of commitment & care

	Students' Perception of Teacher	
	Commitment	Care
Mann-Whitney U	8054.000	10020.000
Wilcoxon W	10755.000	58848.000
Z	-3.935	-1.601
Asymp. Sig. (2-tailed)	.000	.109

*a. Grouping Variable: Teacher Locus of Control Orientation*

*RQ 4. What is the relationship between the two categories of teacher locus of control and student perception of their teachers using an item on the commitment dimension?*

Crosstab was used to compare the categories of TLOC with an item on the commitment dimension that had the highest factor loading. A chi-square was not generated because the data violate the required assumption. Seventy-two per cent (71.7%) of the teachers with external TLOC were rated very high by students on the commitment item, *My teacher makes every effort to see that we understand what he/she teaches*, while fifty-three per cent (53%) of the

teachers with internal TLOC were rated very high on the same item.

*RQ 5. What is the relationship between the two categories of teacher locus of control and student perception of their teachers using an item on the care dimension?*

Similarly to research question 4 crosstab was used to compare the categories of TLOC with an item on the care dimension that had the highest factor loading. A chi-square was generated as the data satisfied the required assumption. Seventeen per cent (16.5%) of the teachers within the external TLOC category were rated very high by their students on the item on the care dimension- *My teacher talks with me outside of class* , while twenty-eight per cent (28%) of the teachers within the internal TLOC category were rated very high on the same item

The Chi-square results in Table 8 showed that there was no significant difference in students ratings on this item for the teachers with internal or external TLOC ( $\chi^2 = 7.199$ ,  $p > .05$ ).

Table 8: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.199 <sup>a</sup>	4	.126
Likelihood Ratio	7.205	4	.125
Linear-by-Linear Association	.833	1	.361
N of Valid Cases	391		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.33.

*RQ 6. What is the relationship between the two categories of teacher locus of control and student perception of their teachers using an item on the commitment dimension?*

Crosstab was used to compare the categories of TLOC with an item on the commitment dimension that had the highest factor loading. A chi-square was not generated because the data violate the required assumption. Sixty-nine per cent (69%) of the teachers with external TLOC were rated very high by students on the commitment item, *Commitment Dimension: My teacher always prepares well what he/she teaches us*, while sixty-three per cent (62.7%) of the teachers with internal TLOC were rated very high on the same item.

*RQ 7. What is the relationship between the two categories of teacher locus of control and student perception of their teachers using an item on the commitment dimension?*

Fifty per cent (50.3%) of the teachers with external TLOC were rated very high by students on the commitment item, *My teacher says negative comments frequently*, while forty – one per cent (40.6%) of the teachers with internal TLOC were rated very high on the same item. The Chi-square results (Table 9) show that there was significant difference in students' ratings on this item for the teachers with internal or external TLOC ( $X^2 = 10.693, p < .05$ ).

Table 9: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.693 <sup>a</sup>	4	.030
Likelihood Ratio	9.249	4	.055
Linear-by-Linear Association	8.471	1	.004
N of Valid Cases	390		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 4.36.

The results from this study indicated that from students' perspective teachers with external locus of control outweighed teachers with internal locus of control in their commitment levels to the teaching-learning process; this does not corroborate with findings of Igbeneghu and Popoola, (2011); Munir and Sajid, (2010); and Cheng, (1994). Research by Igbeneghu and Popoola in a University teaching hospital in Nigeria demonstrated that there is relationship between work locus of control and organizational commitment of medical records personnel. The authors stated that their study demonstrated that there is "a significant inverse relationship between work locus of control and organizational commitment of medical records personnel in university teaching hospitals in Nigeria. This suggests that medical records personnel in university teaching hospital in Nigeria have external work locus of control beliefs and so their organizational commitment declines with increasing degree of externality. In other words, the more external the medical records personnel are in their work locus of control beliefs the less committed they become" (p.19). Also at the tertiary level of the education system Munir and Sajid concurred to with Cheng 1994 study at the secondary level of the education system that, university professors with more internal locus of control were more likely to have high commitment levels to their organization. Professors with internal locus of control are likely to stay with an organization because they want to and they believe that they should since internals perceive that they have the potential to influence their environment and their action can affect what happens in the organization. According to Munir and Sajid individuals with external locus of control can demonstrate high levels of commitment to an organization but for different reasons. The externals are likely to be committed to an organization because

they perceived that they lack alternatives, so they stay with the organization because they should.

The results on the commitment item My teacher says negative comments frequently indicate that the students perceived that the teacher with internal locus of control said less negative comments in the classroom compared to the teacher with external locus of control. This concurred with Parkway, Greenwood, Olejenik and Proller (1988) who reported a connection between LOC and stress experienced by teachers. Teachers who were internal in their TLOC reported low stress; they had better relationships with their colleagues, students and fewer intrapersonal conflicts. Internals seem better able to manage stressful situation. Crothers et. al (2010) compared the locus of control orientation of educators in the United States with educators in Zimbabwe. The researchers noted that locus of control was predictive of how teachers dealt with job stress in America but was not predictive of how Zimbabwean teachers dealt with stress on the job - "while LOC is highly related to Americans' perceptions of their work environment, among non-

Westerners there is a weaker relationship between LOC and perceptions of the work

environment." (p. 665). The authors concluded that their results confirmed previous studies which suggested that the individualistic culture in America contributed to the positive relationship between externality and the severity of job stress amongst educators; in western society individuals are often encouraged to see themselves as having direct and immediate control over their environment.

The results in the present study indicates that there is no statistically significant difference in the levels of

teacher care as perceived by students (see table 7). This finding is similar to Cook's (2007) conclusion, that both categories of teacher expressed care for their students in the classroom but in different ways and with different goals. The findings in this present study also demonstrated that a smaller percentage (16.5%) of the teachers within the external TLOC category who were rated very high by their students on the item on the care dimension- My teacher talks with me outside of class, compared with twenty-eight per cent of the teachers within the internal TLOC category were rated very high on the same item. Cook noted that internals tended to focus more on the individual student and emphasized building a relationship whereas externals focused more on the class and were more interested in demonstrating the behaviour to the students and hence less likely to help students develop the capacity to care. The internal teachers focus on the individual and are more likely to listen and respond differentially to their students.

## **Conclusion**

The findings in this present study demonstrated that externals from the perspective of the students are viewed as being just as committed to the teaching-learning process as the teacher with internal locus of control and just as expressive in their care for students. Also from the students' perspective teachers with external locus of control express higher levels of negative comments in the classroom.

Teachers should avoid making inappropriate comments to students even when students' behaviours are challenging. Teachers should seek to avoid the expression of toxic emotions in the classroom. It is indeed necessary for teacher training programs to involve the training of teachers in practical ways of dealing with their own negative

emotions which can arise in their interactions with students and exposure to techniques which classroom teachers can utilize in showing students correct ways of dealing with anger and frustration; such training should not be restricted to the school counsellors.

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## **C**HAPTER 27

### **BUILDING CAPACITY IN SECONDARY PROJECT-BASED INSTRUCTION**

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#### **Abstract**

This longitudinal mixed methods study examines the development of expertise in project-based instruction (PBI) implementation among practicing second and third year teachers who had participated in a course on PBI as part of their preservice teaching program. Historical data sources from the larger longitudinal study comprise survey data from program graduates, three years of interviews and observations of four novice teachers implementing PBI at a rural PBI high school, and two years of interviews of seventeen high school students engaged in PBI. This chapter examines PBI-trained inservice teachers in their third year of teaching. Three key findings include: (a) the preservice PBI course as instrumental in early adoption of PBI, (b) a third-year shift from teachers' focus on mechanics of PBI toward to factors affecting student successes, and (c) management of student groups remains

a key PBI concern among teachers and students beyond teachers' third year of inservice teaching.

## **Keywords**

Project-based instruction — STEM — High School — Teacher expertise — Longitudinal

## **Introduction**

We identify four primary stakeholders in this research: (a) inservice high school teachers who implement PBI, (b) high school students in PBI learning environments, (c) high school administrators in PBI schools, and (d) teacher educators. Teachers implement PBI for a variety of reasons. Many have constructivist teaching philosophies that align well with PBI instruction. Others are frustrated with how they learned science or their students' lack of success in traditional science environments. The teachers in this study identified the aforementioned reasons as well as exposure to a university preservice teaching PBI course as reasons for adopting PBI. Because students are central to the PBI process, their views about how PBI affects their learning and how they function in PBI environments matter. Students in this study elected to attend a PBI high school instead of a traditional high school. Some students were attracted to the technology available at the PBI school, while others wanted to experience a different way of learning. While we do not directly address administrators in this study, the administration of the school plays a key role. The principal recruited his initial mathematics and science faculty from the preservice PBI course that is the focus of this study. He continues to hire teachers from the same preservice program because he recognizes the importance of the preservice training in PBI in his school's success. The principal also recognizes the limitations of novice teachers – namely issues of classroom management that can often impede success

in PBI classrooms. The researchers/authors are both teacher educators and approach the research from the perspectives of evaluating their own practice and supporting the induction process as necessary step for novice teacher success and growth.

Project-based instruction (PBI) centers learning around an open-ended question, called a driving question that students collaboratively answer over a period of weeks or months. PBI utilizes collaborative learning communities, long-term investigations, ongoing authentic assessment with the opportunity for student revisions, and connections to real-world problems and practice. Because the driving question frames and guides students' learning over time, it is vital that the question align with Krajcik, Czerniak, and Berger's (2002) five characteristics of an effective driving question. These characteristics include: (a) feasibility (Can the project be accomplished with available resources?), (b) worth (Does the question address substantial content in terms of quantity and depth?), (c) meaning (Is the question meaningful to students?), (d) context (Does the project have meaning outside the school walls?), and (e) sustainability (Can the inquiry be sustained over weeks while addressing substantial content?). PBI promises to offer a means for addressing inquiry in secondary education (Marx, et al., 2004) and increasing student achievement (Baumgartner & Zabin, 2008; Geier, et al., 2008; Kanter & Konstantopoulos, 2010; Schneider, et al., 2006; Strobel & van Barneveld, 2009); however, PBI can be difficult to implement and thus, is not widely adopted (Frank & Barzilai, 2004; Polman, 2000). Teachers with strong content and pedagogy backgrounds are more likely to implement projects in their classes than teachers who lack formal training in education (Toolin, 2004). Toolin also finds that even first-year teachers with no background in PBI can successfully implement

project-based units provided they have one-on-one professional development and supporting workshops. Berliner (2001), contends that teachers develop competence in their third year of inservice PBI teaching and expertise in their fifth year of inservice PBI.

While research on the effects of PBI on student achievement and the difficulties associated with implementing PBI is plentiful, there is a dearth of longitudinal research examining teachers' professional growth as they implement PBI over time. Our study begins to fill this gap in the literature. Polman (2000) observes earth science teachers transitions to project-based instruction over the course of a year. Likewise, Toolin (2004) examines teacher implementation of PBI over the course of a year. Boaler (2002) observes student growth over four years at two schools, one problem-based and the other traditional. This study presents a unique examination of teachers' growth from preservice through the third year of teaching in a project-based environment.

## **1. Research Questions**

Our research questions were:

- What features of a preservice course on project-based instruction do teachers implementing PBI perceive to be most useful?
- What is the progression of expertise in PBI instruction among novice teachers?

## **2. Methodology**

### ***2.1 Setting and Participants***

This study takes place within the context of a larger nine-year study covering two educational settings: a

preservice teacher preparation program at a large research university and a project-based high school in a rural school district. The preservice teacher preparation program primarily serves undergraduates, but it also has an accelerated track for post-baccalaureate students. The program advocates inquiry strategies in all of its courses and culminates with a project-based instruction course prior to student teaching. The project-based instruction course consists of four key elements: readings about PBI, PBI unit design, observations of established PBI classrooms, and team-teaching a short PBI unit (Dickinson, Summers, & Jackson, 2010). The program graduates about seventy secondary STEM teachers per year.

The Southwestern U.S. school district that served as the field site for inservice teacher observations in this study had an ethnically diverse student population (See Table 1). The district had two high schools: one utilizing a PBI curriculum and the other utilizing a traditional curriculum. The project-based high school in this study opened in 2007 with 156 freshmen and sophomores selected based on their interest in PBI. In 2008 and 2009, the school admitted an additional 100 freshmen per year and currently serves just over 300 total students. We included preservice teachers who took teaching positions on the PBI campus because this setting uniquely allowed us to examine the development of these teachers' expertise and student outcomes within the context of project-based instruction.

The inservice teacher participants ( $n = 30$ ) were graduates of a university PBI-infused teacher preparation program. We selected a purposive subset of the inservice teacher participants for the longitudinal qualitative portion of this study ( $n=4$ ). These four case study teachers purposefully chose an



Table 1. Student demographics of the pbi high school and the field site district.

	African American (%)	Asian (%)	Hispanic (%)	White (%)	LEP* (%)	Low Income** (%)
District	26.0	2.3	59.1	12.4	30.6	79.0
PBI High School	21.9	1.9	44.1	32.2	6.1	59.9

\*State-labeled as Limited English Proficiency; English Language Learners

\*\* State-labeled low socioeconomic status based on free and reduced-price lunch

educational environment that supported PBI. This study tracked these participants from preservice training through their third year of teaching, totalling four years of ethnographic observation and interview data. We assigned pseudonyms to all participants. We utilized purposive selection to identify and invite the case study teachers to participate based on their completion of a PBI preservice teacher preparation program and because graduates from this particular program constituted the majority of the science teachers at the field site. All teachers we invited agreed to participate in the study. Three of the participants completed the PBI preservice teacher preparation program as post-baccalaureates, while one participant completed the program as an undergraduate. Samantha completed the program as a non-degree seeking post-baccalaureate with a BA in biology. Sage earned her master’s degree in biology while completing the program. Jackie was a Ph.D. candidate in physics and Pam was an undergraduate biology major. Samantha, Sage, and Pam were White, while Jackie was Filipina. When the PBI school opened, Samantha, Sage and Jackie represented three-fourths of the science teachers at the school. The campus hired Pam a year later; thus, our sample represented four-fifths of the science teachers at the school.

## **2.2 Data sources**

To ascertain the transition from preservice training to inservice practice, we mailed program evaluation surveys to a random stratified sample ( $n = 30$ ) of graduates from the university PBI program. Two-thirds of the respondents ( $n = 20$ ) completed the program as undergraduates. The remaining respondents ( $n = 10$ ) completed the program as post-baccalaureates. The respondents had been teaching an average of 2.45 years ( $SD = 1.35$ ). The survey had a 100% response rate.

Further, we qualitatively engaged inservice teachers ( $n=4$ ) over a period of three years and interviewed them at the end of their second and third years of teaching. We informally observed teachers during their first year and conducted formal observations during their second and third years of inservice teaching. The researchers observed each teacher four times in each academic year. We also surveyed and interviewed a random stratified sample of high school students ( $n=17$ ) from these teachers' classes at the end of the school's second and third years to determine the students' perceptions of the project-based environment. The response rate for the student survey was 100%.

## **2.3 Analyses**

We transcribed and coded interview data per Merriam's (1998) case study methodological approach. We recorded all observations via validated observation protocols and corresponding researcher-written thick descriptions. We analyzed interview and observation data uncovering five emergent themes to describe teacher expertise in PBI. These themes included: (a) transfer of skills learned in preservice PBI course to inservice practice, (b) perceived value of PBI course components and suggestions for

improvement, (c) public schooling contexts and barriers to embracing change, (d) changes in teacher focus between the second and third years of inservice teaching, and (e) student perceptions of teacher practice and efficacy. We utilized descriptive statistics to analyze the student survey due to the small sample required to triangulate these quantitative data with the corresponding student participants' qualitative interview data.

### **3. Results**

#### ***3.1 Perceived Value of Preservice PBI Course***

Both the surveyed and interviewed teachers indicated that they would never have known about PBI without the inservice teaching course. One first-year teacher we surveyed said, "I try to make PBI as much part of my teaching as possible, and I would not have known how to do that without the PBI course." All case study teachers signified that their preservice PBI course opened their eyes to the possibilities of PBI. Jackie surmised, "I would say from a big picture point of view I was always in a traditional classroom growing up so the fact that I got exposed to something different and got to see it work is a big deal. Cause, had that intermediate experience not happened, I never would have made the leap to PBI even though now it makes perfect sense."

According to the inservice teacher participants, based on both survey and interviews data, the most useful aspects of the preservice PBI course were development of a PBI unit, production of an anchor video (Dickinson & Summers, 2010), and use of the textbook, *Classroom Assessment Techniques* (Angelo & Cross, 1993). The inservice teachers we observed kept copies of *Classroom Assessment Techniques* in their classrooms for ready reference and mentioned

using it often. Clearly, les bons outils font les bons ouvriers (good tools make good workers).

Interestingly, teachers indicated that observing PBI courses was not effective for inservice acquisition of PBI because they were unable to piece together a holistic picture of PBI from sporadic observations. C'est en forgeant qu'on devient forgeron (only through forging horseshoes does one become a blacksmith). Meaning, it took both time and practice to acquire PBI expertise. Sage remarked that the current group of preservice teachers who were observing her classes needed more direction to make use of the observations. She stated that the preservice teachers "need to talk to the students, talk to me"—not just sit there passively. Teachers also perceived that observing PBI classes required for graduation would make a better case for implementing PBI than observing elective PBI classes. Sage suggested, "I think the opportunity to, at least in video or something, have some examples of content. Yes, you can teach science, you can teach math, you can teach English. This really does actually work." Pam suggested having preservice teachers observe project presentations as a means to develop the big picture. She noted that preservice teachers who observe her class on presentation days have deeper questions than those who come out while the project is in progress. However, Samantha noted that preservice teachers need to recognize that students are learning throughout the project and the final product is a culmination of ongoing learning as opposed to a report tacked on to the end of a unit.

The state where the field site is located restricts undergraduate programs preparing secondary preservice teachers to eighteen semester credit hours of pedagogical and field courses. Thus, the PBI course constituted one-sixth of the preservice teacher

preparation credits in the program under study (See Table 2). Additionally, preservice teachers found the PBI course to be challenging. Some participants complained that the preservice PBI course did not reflect the practice of most schools in the area. This led to debate among program faculty about the value of the course for students. Some faculty contended that since most preservice teachers end up teaching in traditional environments, that perhaps they would benefit more from a different course such as one on special student populations. Most program faculty felt that while it was important for the university to acknowledge the constraints of typical practice, the university also had a responsibility to challenge practices that run counter to empirical evidence and to present new, research-based best practices to the profession.

Table 2. Preservice program course sequence

Undergraduate Course Name	Semester Credit Hours
Step 1 : Introduction to Teaching	1
Step 2 : Introduction to Teaching in the Middle School	1
Knowing and Learning	3
Classroom Interactions	3
Project Based Instruction	3
Student Teaching	6
Student Teaching Seminar	1

**3.2 Transfer of Skills Learned in PBI course**

Although 22 of the 30 (73%) program graduates surveyed indicated they used PBI in their teaching, many respondents also identified problems with implementing PBI. Most identified potential classroom management issues and lack of planning time as their primary concerns. The four case study teachers reiterated these concerns. During her second-year

interview Sage shared, "I mean especially with projects, you need long periods of uninterrupted [planning] time and it ends up being at home. I knew that but I didn't *know* that. I mean I knew it but I wasn't prepared for exactly how much time it was going to be and how long the hours are." The other three teachers in the case study portion of the study shared Sage's sentiments. These results mirror the findings of Marshall, Petrosino and Martin (2010) who found that preservice teachers identify the lack of instructional time as a barrier to PBI implementation.

### **3.3 Public Schooling Contexts**

A key concern of inservice teaching was a perceived pressure to conform to cultural norms of a traditional school. One survey respondent stated, "There is not very much room for individuality where I work. Everyone is required to teach the same thing as the other teachers each day. Time is also an issue." Another stated, "My colleagues have discouraged me from implementing activities that take *time*; however, there is a lot to be covered in the biology curriculum so this factor must be considered." Jackie observed that whole school commitment to PBI contributes to both teacher and student success, "Cause everyone's forced to do it, I don't have to play that game of 'why are we doing this here as opposed to the other classes?' If I were to try to implement PBI at a school where not everyone was doing it, I'd get a lot of resistance." Preservice teachers in Marshall, Petrosino and Martin's (2010) study identified various aspects of school culture including specified curricula, resistance of colleagues and administrators and state testing requirements as barriers to PBI implementation.

Since the field site district wanted to expand PBI to its middle and elementary schools, all four case study teachers served as mentors for other teachers

implementing PBI at the elementary and middle schools in their district. Samantha and Sage noted that the district selected the most promising teachers to receive training and mentoring but that those teachers were isolated at their schools. Since all four case study teachers identified collaboration as key to their success in implementing PBI, isolation was a major concern for them. Samantha lamented her mentees' lack of progress stating, "If I was all alone at a school and there was not another teacher, PBI would not work." Toolin (2004) noted that the opportunity to collaborate and co-teach with other teachers promoted PBI adoption.

### ***3.4 Third-year transitions***

As teachers transitioned into their third year of inservice teaching, they shifted from focusing on producing units and struggling with PBI as a method to strategically targeting skills they felt would have the most impact on student success. Samantha perceived that her focus during her first two years of inservice teaching was being true to the PBI instructional method. Pam also described her focus during her first years of PBI teaching was being true to the PBI method. Pam stated, "Last year I was still worried about 'what does PBI mean?' and sticking to it." In the third year of inservice PBI teaching, both Samantha and Pam felt comfortable enough with PBI to begin integrating other methods within their PBI projects. Samantha observed she was better able "to seamlessly integrate labs" during her third year and that she "no longer feels guilty" if she needs to direct teach concepts.

Jackie and Sage identified rubrics as a key to students' PBI academic success. Jackie concentrated on aligning her rubrics with state content standards, stating, "And I get really anal about it to the point that per rubric on

the left column, I'll say what the [state standard] is and I really think deeply about proficient and advanced." She continued, asking, "Is it really demonstrating the skill that is described in that [state standard]? And if that rubric is solid, then I can almost be guaranteed that all of the support materials I'll prepare to get them to satisfy the rubric will be aligned as well." Sage concurred by adding, "I think one of the things I tweak a lot now is the unsatisfactory column. Instead of putting, 'did not do this, did not do that,' I find myself putting mistakes I expect them to make there like 'confuses genotype and phenotype.' Those are things you can check against. I tell them to make sure they don't do the things in the unsatisfactory column." Samantha also noted that she was also getting better at assessing students. She stated that she was implementing "more frequent assessments that help me actually adjust what I'm doing. I'm doing better at recognizing what they need."

Pam emphasized that attaining rigor in her projects was difficult. "Coming from my own high school background and student teaching where it was just worksheets made it really difficult [to achieve rigor]. At the beginning I was just scratching the surface and now I feel like I'm digging deep." Interestingly, both Pam and Samantha indicated that it was difficult initially to come up with long projects saying they "compartmentalized things too much". Neither participant majored in chemistry so lack of content knowledge may hinder their seeing the big picture. Rich (1993) found that subject matter proficiency was key for expert behavior in novel situations. Both Pam and Samantha expressed pride at finally implementing several big projects as opposed to lots of little ones.

Managing student groups was a struggle for all case study teachers even through their third year of



inservice PBI teaching. Pam surmised, "I still feel frazzled with the group dynamics—managing the appropriate use of time." Samantha admitted, "One thing I need to get better at is using their group contracts to make them accountable." Group contracts were formally written PBI agreements students created using a template. The goal of the contracts was to give students guidance about their behavior in the group and to empower students to hold each other accountable. Groups could "fire" unproductive members who then needed to find another student group or work alone. Sage concurred, "I lose track of time. We get to the end of the project and haven't had a collaboration evaluation." Even in her third year of teaching, Pam admitted, "I can't picture it in my head. I see groups who use it well and those that don't and I can't figure for the life of me how to tell those who don't [use group contracts well] how to do it."

Like Rory, the teacher in Polman's (2000) case study, our teachers also struggled with level of structure needed for students. Many of the teachers expressed feeling guilty if they provided too much structure for students. Samantha noted, "One of the misconceptions in PBI is that you just give the students an entry document and they will work independently. Teachers think they're doing something wrong if that doesn't happen. Really, they're just kids and they need guidance." Pam reflected a similar attitude when she described her perfect project as one in which the students "could do whatever the task was without asking me and know that they were right". The inservice PBI teachers were beginning to realize that they needed to differentiate the level of support for younger students. Samantha added, "It's almost like there's too much freedom for them at first. It seems like the younger you have them, the more you need to micromanage the process for them or scaffold."

Samantha continued, "You almost have in your mind that you present this project to them and let them go and with the younger kids, it doesn't work. I have in my mind that if I micromanage, I'm doing something wrong. I'm finding with the sophomores that there's more micromanaging that I should be doing." She suggested aligning project-related skills to increase student success in the PBI environment. "What I would like to do is look at a vertical alignment. By the end of freshman year we want them to be at this point with using the group contract and by the end of sophomore use it."

### ***3.5 Student perceptions of Teacher Practice***

Even though this chapter concentrates on the third year PBI teachers, it is important to take their students' understandings of PBI into account. We found four main themes among the student interviewees. Students (a) liked the PBI environment, (2) recognized the importance of rubrics for their success, (3) identified group contracts as important, but they also noted varying success with implementation of the group contracts, and they (4) struggled with consistently connecting curricular content to real-world practice, especially for the freshman PBI students.

All the students signified we interviewed liked PBI and many PBI students said it was their favorite part of class. Shelby, a freshman, shared, "For me, science is fun and the projects actually make sense". Another freshman, Emma found, "Even though it's in the morning and we're tired and everything, we have this upbeat class. It's so fun to be in. It get's you ready for your day." Enrique, a sophomore, noted his increased success in the PBI environment, "Back in middle school I was like really bad at science because I didn't learn it that much. Everything I just blew off. I didn't

understand anything. But ever since I came here, I've gotten like everything in science class. It's really helped a lot."

During our second year of interviews corresponding to the inservice PBI teachers second year of teaching, few students mentioned rubrics; however, in the third year interviews corresponding to the PBI teachers' third year of inservice teaching, many students mentioned rubrics as playing a significant role in their success. Payton, a freshman student, appreciated the structure provided by rubrics, expressing, "we could check everything off that we need to do and everything that we have done." Shelby also felt the rubrics made things clear for her. Students appreciated the increased structure provided by other project assessments in Samantha's high school STEM PBI classes. During focus groups, Samantha's students appreciated the increased quizzes. Her students shared, "I like all the quizzes" on project reflections. Jasmine, another of Samantha's students, indicated that "structure helped project groups succeed". Samantha, one of the case study teachers, theorized, "Sometimes they think they understand but realize they don't when they take the quiz." The increased student performance on state accountability measures in the teachers' third year of inservice BI teaching reflected the PBI teachers' increasing ability to assess PBI. When the school opened in 2007, eleventh grade students throughout the field site district were performing poorly on the state science assessments (see Table 3). Within one year, the PBI campus was outperforming the district's other high school that did not use PBI. Additionally, the first graduating class from the PBI high school achieved 100% college acceptance rates. The PBI campus' second graduating class achieved 97% college acceptance. Table three includes the passing rates for the field site PBI high

school, the field site district's othe, non-PBI high school, and the state in which the field site is located.

Table 3. Passing Rates for 11th Grade State Science Assessments

	2007	2008	2009	2010
PBI High School	*	80%	86%	91%
Other District High School	64%	54%	47%	70%
State	77%	83%	85%	91%

\*no data; the campus had no 11<sup>th</sup> grade students in 2007.

Nearly all of the PBI high school students liked working in groups even though they viewed group dynamics as a challenge. Mario, a sophomore, disclosed, "I like working in groups more because that way you can cooperate with other students and see what they know and if they can help you with stuff that you don't know and vice versa." Most students felt that accountability within the group was difficult to achieve. Enrique, a sophomore observed, "I like working in groups because you get to interact more with other people and you learn from them and you actually get to know more people sometimes." He balanced this with telling us that, "I like working as an individual sometimes because sometimes you're paired up with people that you can't really trust that much because they're not as a good of a worker as you might think."

Jasmine, a freshman, identified her biggest PBI challenge as "entrusting my grade to other students." Other students like Timoteo, a sophomore, complained that group members often did not share the work equally. He exclaimed, "The downs would be working with a partner would be that you have a slack off partner that doesn't do the work." Leandro , also a sophomore, concurred, "It's kind of complicated because instead of just being in a group of like in a pair, you're with like three other people and the

materials it just gets too many hands in one section of the lab.” Emma, a freshman and Nina, a sophomore, both identified the group contract as key to her success. Nina described her science teacher’s use of rubrics stating, “She makes everything she like breaks it down to a point where it’s easy for us to be doing.” However, Payton, another freshman, noted that firing her peers was difficult and she had never done so. Shelby, also felt the interpersonal aspects of group work were difficult. She felt clear rubrics facilitated development of effective group contracts. “Once we get our rubric, if I understand that, then I know what to put in the group contract...to make the group work together.”

Although most students in their sophomore, junior, or senior year had no difficulty in identifying real-world applications of science, the freshmen PBI students struggle with this. For example, Mario, a sophomore, easily related science coursework to his everyday life. “Some problems when my parents were sick I actually found out why they were sick ‘cause we had gone over it in class.” Nina related her learning in science to her career goal of becoming a marine biologist, saying, I really like science and I’m really interested in the sea and fish and everything so I would like to be a marine biologist.” She supported her response by adding, “Things like that in biology make me really interested in what we’re learning and I just want to learn more and in my own time I research other stuff like the Great Barrier Reef and other stuff like that and I research how corals grow and how fish reproduce.” In contrast, when asked how science relates to the real-world, Payton, a freshman, could not identify any real-world applications of biology even though she aspired to be a paediatrician and gave detailed descriptions of her biology projects. Although all students provided detailed descriptions of recent class projects, many freshmen could not describe how those projects or the

subject area in general related to their everyday lives. Shelby identified “how the global and community fits into it” as the most difficult aspect of PBI.

## **Conclusions and Implications for Practice**

Introducing teachers to PBI in their preservice teaching program was important because it exposed them to inquiry methods advocated in educational research. Foregrounding PBI reinforced the university’s mission to introduce the teaching profession to effective research-based practices. Some preservice teachers adopted PBI methods even though they had not previously considered them. However, PBI adoption was relatively low among program graduates because most did not work in environments that supported PBI.

We found that even by their third year of inservice PBI teaching, the PBI-trained and practicing teacher case study participants continued to struggle with classroom management and the level of structure necessary to foster inquiry without stifling it. Polman (2000) identified the tension between structure and free exploration as important to both students and teachers. The student participants in our study appreciated the increased structure provided by teachers and acknowledged the importance of that structure for their success. According to our findings, the majority of survey and case study inservice PBI teacher participants perceived that increased focus on group management skills in the classroom interactions, project-based instruction, and student teaching courses could have helped to address this weakness. Moreover, based on our observations, increased attention to scaffolding within PBI training, alongside an overt emphasis on the scaffolding as an essential ingredient for student success eased the tension that some PBI teachers felt.

Inservice PBI teachers valued aspects of the PBI class that had immediacy in their teaching practice including unit development, anchor video production, and resources for assessment. Participants' perceived that observations of PBI classrooms needed to more guided interactions to help preservice teachers make contextual sense of the PBI environment. Our study concentrated on cohorts of teachers with formal university preservice PBI training. We know from our historical studies that the vast majority (73%) of PBI-trained teachers acquired proficient PBI teaching skills; although, future research should examine if PBI-trained teachers who are in isolation of similarly trained colleagues fair as well with PBI transmission and the maintenance of PBI skills. PBI instruction remained relevant to teachers and students' successful acquisition of professional thinking and authentic problem solving skills within classroom contexts. Thus, if we want students and teachers to think like scientists, historians, and other professionals within classroom settings, we know that PBI offers us this though its proven preservice and in-practice results.

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## **C**HAPTER 28

### **MORAL JUDGMENT COMPETENCE LEVELS IN RELATION TO PERSONALITY TYPE PREFERENCES**

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#### **Abstract**

Morality is not purely a matter of having right moral attitudes or knowing moral principles, but that morality is a “competence” which needs to be developed and measured, in much the same way as other competences are developed and measured. Kohlberg (1965) defined moral judgment competence as the capacity to make decisions and judgment which are moral and to consistently act in accordance with such judgments. The dual-aspect theory of moral development also depicts a person’s description of moral behavior that both affective and cognitive properties need to be considered (Lind, 2001). Besides, there is a growing question of whether personality would be related to an individual’s moral principles, attitudes, reasoning and behavior. The question implies that personality types could somewhat account for a person’s competence in moral judgment. Hence, this study investigated the relationship

between moral judgment competence levels, as measured by Moral Judgment Test, and personality type preference, as measured by Myers & Briggs Type Indicator (MBTI) of the 181 high-academic performing students at high school levels. Since most extraneous factors, such as age, gender, cognitive ability, and educational backgrounds, had been controlled for the internal validity and generalizability, the general conclusion could be made from the findings that personality-type preferences differentiate moral judgment competence levels. Recommendations were also given for the future research, and concrete application and/ or implementation of the findings specifically to the subjects of the study.

## **Keywords**

Morality - Moral judgment competence - Personality types - MJT - MBTI.

## **1. Introduction: Background of the study**

In the midst of progression of modern sciences and technologies of the present time, moral controversial issues have been enlarged and widely discussed. The discussion especially center on moral matters such as: making decisions on what is right or wrong when confronted with moral issues, questions on what norms to use in judging behaviors and actions over moral situations, role of individual conscience and social consensus in moral determination, and other related and relevant issues to morality (Arthur, 1996; Boss, 1999; Liszka, 1999; & White, 1997).

Some instances of such controversial issues on morality that our modern society is facing are: cloning and genetic engineering, organs selling, abortion, euthanasia and assisted suicide, justice, punishment and death penalty, gender differences, racism, multiculturalism, among others. These issues cut across advanced as well as developing countries in Asia, Africa and Latin America. In poverty stricken

many countries, moral judgment and behavior seem to have been complicated by the very situation of poverty and the struggle to survive, if not combat it. Specific moral issues are: corruption in all levels of the government, armed struggle as a means to fight poverty and injustice, engagement in enterprises allied with genetically manufactured plants and organisms to feed the rich and poor alike, exploitation of the environment, flesh trade, abortion, and many others.

Apparently, within our complex society with high technological advances, the more progressive it has become, the more moral questions have been broadening and still the less satisfied solutions are obtained. Consequently, in indirectly dealing with those complicated moral dilemmas and finding ways to justify disputed solutions, human behaviors and personality have become a target of interest in studies more than ever in the recent years. There is a growing question of whether personality would be related to an individual's moral attitude, moral reasoning, moral judgment competence, and moral behavior. These questions seem to imply that personality types could somewhat account for a person's competence in moral judgment. This interest on moral behavior in fact contributed to the emergence of a new field in psychology called Moral Psychology. This new field has built upon earlier branches of psychology like Developmental Psychology, Cognitive Psychology, Educational Psychology and Personality Psychology.

Since the last three decades, many reliable psychological measurements have been constructed and employed based on both classical and modern theories in all branches of psychology. Within this decade, a good number of researchers in fields of psychology and education have been interested in

doing correlational and comparison studies to examine the relationship between moral and personality theories in a range of aspects of studies with a variety of types of subjects (McMillan & Schumacher, 2001).

In an attempt to finding an answer to the question regarding the relationship between moral judgment and personality, as many researchers have done in the past, the present study is interested in exploring some specific theories on personality and morality, and in employing some appropriate and suitable measurements that may significantly help explain the relationship as such. The following presentations in connection with those theories and measurements serve as the foundation and background of the present study.

Interestingly, among those studies on theories of personality, Carl Jung's Theory of Psychological Types, despite current crucial controversies, remains to have given a strong impact on psychological testing and measures of personality (Cantrell, 2000). Likewise, the Kohlberg's Moral Theory is most likely to be referenced and applied in many research and studies concerning morality and moral behavior and development (Lind, 2002).

According to the Jung's Typology, there are two fundamental or Basic Attitudes that underlie human behaviors: Extraversion (E) and Introversion (I) (Jung, 1964). Jung pointed out that people are not purely introverted or extroverted. Instead, each person has both aspects which involve complex variations as dominant or inferior sides in a fashion of compensating for one another. In addition to the two basic attitudes, Jung postulated the existence of the "Four Functions of Way/Thought" in which people related to the world: Thinking (T), Feeling (F), Sensing (S) and

Intuiting (N) (Ryckman, 1993; Limpingco & Tria, 1999).

According to Jung, Thinking and Feeling are called the "*Rational Functions*" since they involve making judgments about experiences, whereas Sensation and Intuition are called the "*Irrational (non-rational) Functions*" because they involve passively recording experience without evaluating or interpreting it (Limpingco & Tria, 1999). These rational and irrational functions are articulated or differentiated to varying degrees within the psyche (Ryckman, 1993). Jung, however, focused on the combination between the two basic attitudes and the four functions to form the eightfold classification scheme of psychological types, i.e., the extraverted thinking type (E-T), the introverted intuition type (I-N), etc.

Based on the Jungian Theory of Psychological Types, the popular Myers-Briggs Type Indicator (MBTI) had been developed and modified a forced response test (Myers & McCaulley, 1985), in which the sixteen personality types of preference from the four pairs of the two opposite poles are formed: Extraversion (E) – Introversion (I), Sensing (S) – Intuition (N), Thinking (T) – Feeling (F), and Judging (J) – Perception (P). Samples of the sixteen of personality types of preference assessed by the MBTI are ESTP, ENFJ, INTP, ISFJ, etc.

In the sphere of Jung's Theory of Psychological Types, a person's uniqueness and differentiation of way of thinking and attitudes, which is principally formed by the two basic attitudes and the four functions, depends upon the degree to which those six aspects are combined. Accordingly, an individual person proceeds and reveals moral principles, attitudes, thoughts, judgments and behaviors as part of his/her

distinctive personality in different ways and circumstances (Ryckman, 1993). Hence, a question arises whether or not types of human personality preference is related to and then differentiate moral attitudes, thoughts and behaviors. If it is so, then what underlying factors would make the differences. In dealing with this question, the following related aspects, perspectives and theories on morality are examined.

From the viewpoint of modern psychology, Lind (1992), asserts that morality is a matter not only of attitudes towards moral principles but also of people's competency to utilize those principles in their moral thoughts and behavior. Along this line, Jean Piaget and Lawrence Kohlberg have revolutionized the way we are looking at moral thought, reasoning and behavior (Lind, 2000).

Lawrence Kohlberg (1969 & 1975) developed the Theory of Moral Development based on Piaget's moral realism (i.e., Rules are absolute and can't be changed) and morality of cooperation (i.e., People make rules and people can change them.) Kohlberg described three main levels of moral development with two stages in each level

In Kohlberg's studies, this theory was used to examine and assess how people made moral reasoning or judgment for their moral action. With this, Kohlberg defined moral reasoning as judgment about right and wrong and defined a person's level of moral reasoning from the reasoning used to defend his/her position when faced with a moral dilemma. However, Kohlberg thought that this is more important than the actual choice made, since the choices people make in such a dilemma are not always clearly and indisputably right (Woolfolk, 2000).

Later Kohlberg's moral theory development was modified by James Rest (1979), who constructed the famous "Defining Issues Test" (DIT), which is extensively applied to measure matters concerning moral issues in many studies and researches. Also, several tests for measuring and assessing a person's moral reasoning ability were constructed on the bases of various moral perspectives for use in different age groups, for instance, the Kohlberg's Moral Judgment Interview (MJI), the Moral Development Scale (MDS) based on Piaget's moral perspective, the Bronfenbrenner's Moral Dilemma Test (MDT), etc.

Parallel to the bloom of moral studies and moral measurements, there was another school of thought led by Georg Lind (1998) who critiqued the classic/traditional measures of moral reasoning, asserting that they were more likely to measure only a person's moral attitude/opinion aspect and hardly applied to his/her moral behavior. Lind (2002) argued that, essentially from the concepts of Piaget and Kohlberg, morality is not, as so many had assumed, purely a matter of having right moral attitudes or knowing moral terminology/principles, but that morality is a "*competence*" which needs to be developed and measured, in much the same way as other competences are developed and measured. Hence, the term moral competence was introduced in the measurement and testing sphere.

Consequently, Lind developed the "Dual-Aspect Theory of Moral Behavior and Development" as outlined by Piaget, Kohlberg and Lind. That is, for Piaget (1976) *"affective and cognitive mechanisms are inseparable, although distinct: the former depends on energy, and the latter depend on structure."* Accordingly, Kohlberg (1984) meant the "Stage Model of Moral Development" to be described in terms of both the



affective and the cognitive aspects of moral behavior. Lind (2000) further explicated this theory and analyzed its implication for the measurement and stimulation of moral cognitive development.

Further, the Dual-Aspect Theory of Moral Development states that for a comprehensive description of moral behavior both affective as well as cognitive properties need to be considered. A full description of a person involves (1) moral ideals and principles that informs it, and (2) the cognitive capacities that a person has when applying these ideas and principles in his/her decision making processes (Lind, 2000). In view of that, Lind (2000) has constructed the "Moral Judgment Test" (MJT) in 1975 to assess a person's moral judgment competence in accordance with Kohlberg's definition which states that moral judgment competence is *"the capacity to make decisions and judgment which are moral (i.e., based on internal principles) and to act in accordance with such judgments"* (Kohlberg, 1969).

The MJT is conversely a test of subject's ability to judge controversial arguments in a discussion about moral problems on the basis of moral principles and orientations rather than on the basis of other criteria like opinion-agreement or opinion domain. The *"encounter-arguments"* presented in a given moral dilemma are the central features of the MJT to measure how a person consistently make his judgment (Lind, 2000). Hence, the MJT is completely different from the Rest's Defining Issues Test (DIT) even though both have been constructed based on the six stages of moral reasoning of Kohlberg's Moral Theory.

In comparison and correlational studies of personality and morality, which, in fact, indirectly applied to Jung's Theory of Psychological Type and Kohlberg's

Moral Theory, a good number of researchers interestingly investigated and examined the relationship and/or the causal-effect between subjects' moral reasoning, moral attitudes or moral judgment and their personality type preferences in various groups of subjects. In their studies, most of them were more preferably to utilize the Defining Issues Test (DIT) (Rest, 1997) or the Moral Judgment Interview (MJI) (Kohlberg, 1974), and the Myers-Briggs Type Inventory (MBTI). Along with this, they have found such relationships in some degrees in various types and groups of the samples.

Since perspectives and theories of personality and moral development in the field of psychology still vary, in an examination of the relationship between moral judgment competence and personality type preference, the underlying theories in which the two constructs (moral judgment and personality) are rooted should be clearly specified (O'Brien, 2001). Hence, in the present study, Jung's Theory of Psychological Type and the Dual-Aspect Theory in Moral Development (based on Piaget, Kohlberg and Lind) are specifically considered and particularly made as foundation.

### ***1.1. How does the present study link those two theories in examining their relationship?***

In the Jungian theory of psychological types, Jung focused on the two main aspects that differentiate a person's personality type: Basic Attitudes (Extroversion and Introversion) and Functions of thought (Rational and Irrational). The combination among them form different types of personality (Ryckman, 1993). At the same time, a person's moral judgment competence depends on the person's capacity of making decision and judgment which are moral (Kohlberg, 1964). In addition, according to the

Dual-Aspect Theory of Moral Development, such a capacity is based on the person's moral development and functioning of both affective (i.e. moral attitude) and cognitive (i.e., moral reasoning) aspects (Lind, 2000). That is, both the functions of thought (rational and irrational) and the basic attitudes play their roles in a person's judgment and perception (Mcmahon, 1992). The present study, thus, uses such underlying role factors of a person's decision-making as the linkage of the two theories, and using this as a point of departure to investigate the relationship between personality type preference and moral judgment.

By and large, most studies of such relationship which utilized the MBTI to measure subjects' personality types had not assigned them in a typology or classification provided by the Jungian personality theory, but in accordance with the interpretation of Myers and Briggs. However, the present study chiefly focuses and particularly examines on those differences in Jung's rational functions (Thinking and Feeling) as the cognitive aspects in their moral judgment competence. If the difference exists, there will be a further investigation of whether the attitude aspects (the two basic attitudes: Extraversion and Introversion) and irrational functions of thought (Sensation and Intuition) play their role in moral judgment.

Furthermore, since the MJT has not been used in any correlational studies in this regard before and it was constructed based on the Dual-Aspect Theory of Moral Development and used the C-index to measure and signify the degree of cognitive-structural properties of persons' moral judgment competence, this study will be a pioneer. Still further, the present study is primarily interested in using a homogeneous group of subjects in order to control the probable threats to

internal validity (extraneous factors) of the study as much as possible. Thus, the present study had selected only the Ateneo High School's high-academic performing male students who are in the middle adolescence stage (third and fourth year high school levels) from the honor sections as subjects of this study to respond to the two standardized tests: the MJT and the MBTI.

### ***1.2. Research and studies on the Relationship between Morality and Personality.***

In research and studies on the relationship between morality and personality, many types of instruments to measure these two constructs were employed and various groups of subjects were used to investigate such a relationship in both more specific perspectives and broader areas. The following studies are selected to compare with the present study:

Redford (1993) explored the relationship between Jungian typology and Kohlberg's moral development. The question of interest was whether those persons in high and those persons in low levels of principled moral reasoning differ in their distribution of psychological type. The study examined sixteen psychological types described by the MBTI. The subjects were 148 college and non-academic adult participants. Results indicated that the ISFJ and the ISTJ were over-represented in low and under-represented in high P- scores. Supplementary analysis results indicated the Sensors (S) was over-represented in low and under-represented in high P-scores, and the Intuitors (N) and the Introverted-Perceivers (I-P) were over-represented in high and under-represented in low P-scores. Conclusions followed that the actual judgment process (T or F) was apparently not as influential as the other preferences, particularly the perceptive preference (S or N).

Redford, McPherson, Frankiewicz and Gaa (1995) investigated the relationship between the sensing (S) - intuition (N) dimension of the MBTI and moral development using two group samples of 74 subjects (aged 18 years old and above) each from Houston-Clear Lake, Texas, the USA. The results supported the hypothesis that, of the four personality dimensions of the MBTI (E-I, T-F, S-N, and J-P dimension), the S-N dimension would be the only one to have a positive relation with subjects' level of moral reasoning.

Faucett, Morgan, Poling and Johnson (1995) investigated relationships between MBTI preferences and Kohlberg's postconventional stages of moral reasoning (using DIT). The subjects were 214 undergraduates of the University of Arkansas, the USA. It found that postconventional moral reasoning scores of Introverts (I) were higher than those of Extroverts (E); scores of Intuitors (N) were higher than those of Sensors (S); and scores of Perceivers (P) were higher than those of Judgers (J). However, Thinkers (T) and Feelers (F) were not significantly different. The postconventional reasoning scores of N-Ts and N-Fs were significantly higher than scores of S-Ps and S-Js. Results suggested that different personality types may prefer different kinds of moral reasoning and that differences in developmental stages of moral reasoning may, to some extent, reflect type preferences.

O'Brien (2001) examined the relationship between pre-service teachers' personality type preference and moral judgment using the DIT and the MBTI, using 124 subjects (aged 18 years old and above) from Florida State. The study found significant differences in moral judgment ability between groups of individuals with different personality type preferences (according to the MBTI's classification). Specifically, those who preferred Intuition (N) as their means to

perceive information had a higher P score than those who preferred Sensation. Additionally, when looking at the Sensation-Intuition (S-N) and the Thinking-Feeling (T-F) simultaneously, the main effect for the S-N and the T-F subscales were significant. There was also a significant interaction between the S-N and the T-F factors. This preliminary research has indicated that personality type preference may play a key role in moral development.

Cantrell (2000) investigate whether or not there are significant differences in the level of moral reasoning and in personality preferences of gifted students as compared with the normative population. The study also investigated if a significant relationship existed between various personality preferences and the level of moral reasoning. Two-hundred gifted students (rising 6th through rising tenth-grade students) were administered the Murphy-Meisgeier Type Indicator for Children (MMTIC) to assess personality preferences and the DIT to assess moral reasoning. The MMTIC is a self-report instrument designed for personality and psychological type assessment in young people (grades 2-12). The MMTIC assessment can help children understand themselves better, and give parents and teachers better tools and insights to reach children with different learning styles. The findings of this study revealed significant differences in the level of moral reasoning and in personality preferences as compared to the normative population. These findings suggested that the personality of the gifted has a tendency to be stabilized and more clearly defined at an earlier age than non-gifted peers and indicated that the level of moral reasoning among the gifted is more highly developed than that of their non-gifted peers. Analyses examining the relationship between personality preferences and the level of moral reasoning were non-significant for the most part. The

results suggested that personality preferences among gifted students were not related to the level of moral reasoning.

Mcmahon (1992) investigated the relationship between moral development and year in school, gender, and personality type for university undergraduates. Moral development was measured by the DIT and personality was assessed using the MBTI. The sample consisted of 320 freshmen, sophomores, juniors, and seniors enrolled as full-time students at the University of Iowa. From this sample, 188 (36.9%) students returned usable questionnaires. This random sample, stratified according to undergraduate class and gender, was provided by the university registrar. Subjects completed and returned a mailed questionnaire booklet containing the DIT and the MBTI. Significant gender and year in school effects were found when analyzing the P-score of moral development level. Women scored significantly higher than men and seniors scored significantly higher than freshman, sophomores, and juniors. The Feeling (F) dimension of the MBTI was found to be significantly associated with gender (females). Finally, the Stage 4 score was found to be significantly related to the Sensing (S) and Judging (J) dimensions of the MBTI. The P score was found to be significantly related to the Intuitive (N) and Feeling (F) dimensions of the MBTI. These results confirmed earlier studies in which a significant relationship was found between year in school and moral development level. The gender effect had been theorized and found in some studies but is unusual when using the DIT. The significant relationship between different dimensions of the MBTI and Stage 4 and P moral development scores had not been previously reported in the literature.

Relationship between morality and personality. Several findings are related to the present study. For

instance, as measured by the DIT, the ISF were over-presented and IST type were under-represented in high P-scores; Thinking-Feeling (T-F) factor was not as influential as the Sensing-Intuitive (S-N) factor (Redford, 1993), and especially, the S-N were positively related to moral judgment (Faucett, Morgan, Poling and Johnson, 1995). However, there was no significant difference on moral judgment between Thinkers and the Feelers. But, P-scores of the N-T and the N-F types were higher than the S-type (Faucett, Morgan, Poling and Johnson, 1995). Likewise, the N-type had P-scores higher than the S-type. Further, some found that there were main effects of the S-N factor and the T-F factor, and also interaction effects between these two factors on moral judgment (O'Brien, 2001).

The related literature and studies as presented are substantial and sufficient to establish or postulate an assumption that there exists a relationship between moral judgment and personality type preferences despite the fact that such relationships are grounded on different perceptions or perspectives of theories either on moral development or personality; and diversely employed types of psychometric instruments for measurements. However, in an attempt to investigate moral judgment competence level in relation to personality type preferences, the present study, in particular, utilized the dual-aspect theory of moral development, as rooted in Piaget's and Kohlberg's theories of morality, and Jungian personality theory. There also exist the key underlying and related factors that link between these two theories in both theoretical and conceptual aspects.

In study of the relationship of those two constructs, the present study utilized the two standardized tests:



the MBTI and the MJT. The former was constructed based on Jung's Theory of Psychological Types, and the latter was on the Dual-Aspect Theory of Moral Development, founded on Piaget, Kohlberg and Lind's theories.

The present study is significant in terms of the contribution it shall make to the fundamental question whether the moral judgment is related to personality and in advancing research on the exploration of the existence of such relationship. If this relationship is established in the present study, this finding may be used as an indicator in prediction of moral judgment competence levels given particular personality type based on Jung's typology. Moreover, since this is the first study on the Dual-Aspect Theory of Moral Development and the use on the MJT correlated to the Jung's theory of personality, the findings can provide substantial reference to the study on the theories of personality and moral development to this particular measurement, the MJT.

## **2. Research Objectives and Statement of the Problems**

The present study aims to explore the relationship between the moral judgment competence level (as measured by the MJT) and the Jungian personality-type preference (as measured by the MBTI) of the Ateneo high-academic performing students. Specifically, it seeks to answer the following questions:

- 1) Is there a difference in moral judgment competence level between those who have the Thinking (T) and the Feeling (F) personality-type preferences?
- 2) Is there a difference in moral judgment competence level between those who have the Extraversion (E) and the Introversion (I) personality-type preferences?

- 3) Is there a difference in moral judgment competence level between those who have the Sensation (S) and the Intuition (N) personality-type preferences?
- 4) Taken by pairs, do the combinations of these three factors: particularly, between the Basic-Attitude (Extraversion and Introversion) and the Rational-function (Thinking and Feeling); and between the Rational-function (Thinking and Feeling) and the Irrational-function (Sensation and Intuition) factors, differentiate moral judgment competence levels?  
And,
- 5) Taken simultaneously, do the combinations of these three factors: the Basic Attitude (Extraversion and Introversion), the Rational function (Thinking and Feeling) factors, and the Irrational function (Sensation and Intuition), differentiate moral judgment competence levels?

### **3. Method**

#### ***3.1. Participants***

There are some criticisms about gender bias in the Kohlberg's Moral Theory on which the MJT is based (Woolfolk, 2000), and there are differences of adolescent cognitive development in each stage: early, middle and late (Seifert & Hoffnung, 2000). Also, with the developmental nature of moral judgment during the past twenty-five years, a good number of research revealed that moral judgment was related to some factors, such as age, levels of education, gender, religion, socio-economic status and certain life-experiences (Newburn, 1992). So as to restrain some extraneous factors, such as, gender differences, intellectual ability of using language, educational background, stage of adolescent development, religious belief, etc. that may affect and become threats to the internal and external validities of the study, the homogeneity of the selected subjects was

primarily considered. Therefore, only 181 male students in the third- and fourth-year students of the Ateneo de Naga High School, Naga City, the Philippines, who are in the same middle adolescent stage (15-17 years old), who have their high-academic performance (in the honor classes), and who are Catholics, are chosen to be the subjects of the present study.

### **3.2 Design and Procedure**

The present study is a non-experimental (descriptive and quantitative) research. The design and methodology of the study are as follows:

In examining differences in moral judgment competence levels between those who have (1) the Thinking (T) and the Feeling (F) personality-type preferences, (2) the Extraversion (E) and the Introversion (I) personality-type preferences, and (3) the Sensation (S) and the Intuition (N) personality-type preferences, Analysis of Variance for one dependent variable by one or more factors, was used.

In examining personality-type preference factors that affect the moral judgment competence levels, when taken simultaneously by pairs: between the Basic attitudes (Extraversion and Introversion) and the Rational functions (Thinking and Feeling); and between the Rational functions (Thinking and Feeling) and the Irrational functions (Sensation and Intuition), the ANOVA for one dependent variable by one or more factors was used. If the interaction effects exist in any paired-factor group, the pairwise comparison tests among groups was employed. Thereby, the first paired-factor groups are the E-T, the I-T, the E-F and the I-F; and the second paired-factor groups are the S-T, the S-F, the N-T and the N-F.

In investigating the three personality-type preference factors that affect the moral judgment competence levels, when taken simultaneously the Basic attitudes (Extraversion and Introversion), the

Rational functions (Thinking and Feeling), and the Irrational functions (Sensation and Intuition), the 2×2×2 Factorial Analysis of Variance was employed in view of the fact that there are three factors (independent variables), and each factor has 2 levels. Also, the eight groups of students' personality-type preferences: the EST, the ESF, the ENT, the ENF, the IST, the ISF, the INT and the INF were also examined in terms of their effects when taken the personality-type as an independent factor, and then compared their differences of levels of moral judgment competence.

### **3.3 Measures**

Two types of standardized psychological test were primarily employed and administered to collect data and information as follows:

#### **3.3.1. *The Moral Judgment Test (MJT)***

The MJT has been constructed to assess subjects' moral judgment competence as it has been defined by Kohlberg. Essentially, the MJT assesses moral judgment competence by recording how subject deals with counter-arguments, that is, with arguments that oppose his/her position on difficult problem. The counter-arguments represent the "moral task" that the subject is confronted with two moral dilemmas and with arguments pro and contra the subject's opinion on solving each of them (Lind, 1998). The two dilemmas are the Worker's Dilemma and the Doctor's Dilemma. Subjects are asked to judge arguments for their acceptability. These arguments present different levels of moral reasoning, six supporting the decision that the protagonist in the story made, and six arguing against one's decision. In each dilemma, the respondent is to judge twelve arguments. In the standard version of the MJT, there are then twenty-

four arguments to be rated. The main score, the C-index, of the MJT measures the degree to which a subject's judgment about pro- and con- arguments are determined by moral viewpoints rather than by non-moral considerations like opinion-agreement. Each subject will have the C-index from the MJT to indicate his moral judgment competence score which can be classified in to four categories (levels): very high (above 50), high (30-49), medium (10-29), and low (below 10) (Cohen, 1988; Lind, 2000). This measures cognitive aspects according to the dual-aspect theory. Besides this cognitive variable, the MJT measures subjects' moral ideas or attitudes. Also, it can be scored for other aspects of subject's moral judgment behavior like most preferred stages of reasoning (Lind, 2000). The validity of the MJT is supported (a) by the theoretical construction principles, and (b) by empirical validation studies. Moreover, the MJT is not submitted to traditional item analysis. That is, no items are selected to increase the correlation of the C-index (Lind, 2002). Most important, the items are not screened either to maximize stability of scores (reliability) at the expense of the test sensitivity for education-induced change, or to maximize sensitivity for change at the expense of theoretical validity (Lind, 2002).

### *3.3.2. The Myers-Briggs Type Indicator (MBTI) Form M.*

The MBTI is constructed and modified based on the Jungian Psychological Type. There are four pairs of preference types: Extrovert (E)/Introvert (I), Thinking (T)/Feeling (F), Sensation (S)/Intuition (N) and but the fourth pair: Judging (J) and Perceiving (P) which the developers had added to the Jung's typology. One can be either one of those pairs. For instance, the T-type or F-type, but cannot be both T and F types. It is a forced-item response test in which the subjects

select a choice from each of the 93 items to assess their preferences, that collectively, make up their personality type. The types of preference are designated by four letters. Each type of personality preference (T or F, S or N, E or I, and J or P) has total scores of preference. After completing and scoring the test, one can have the type of personality preference, for example, ESTJ, but not EIJP. Based on the MBTI, the sixteen types of personality preferences are ISTJ, ISTP, ISFJ, ISFP, ESTP, ESTJ, ESFP, ESFJ, INFJ, INFP, INTJ, INTP, ENFP, ENTP, ENFJ and ENTJ. It is reported to have a consistency reliability coefficient between 0.7-0.88 in various forms of the MBTI (Myers & McCaulley, 1985). The present study employed the MBTI-Form M, to measure and identify the personality-type preference of the subjects.

### **3.4 Data Collection**

The high-academic performing male students of the Ateneo de Naga High School of the Philippines, the subjects of the study (181 students), were given the MBTI, and later a couple of days, the MJT with standardized test administrations. In the process of data collection, all extraneous variables were controlled as much as possible.

## **4. Results**

The results initially revealed that the main effects of the Rational-function (T & F) factor upon moral judgment competence (MJC) levels from the two groups: the T-type and F-type were statistically significant,  $F(1,179) = 8.209$ ,  $p = .005$ : and it was more likely for those who preferred the Thinking type to have a mean of moral judgment competence levels higher than those who preferred the Feeling type (mean difference = 5.838,  $p = .005$ ).

In addition, there were neither statistically significant main effect of the factors of Basic-attitudes (E & I) nor that of Irrational-functions (S & N) on moral judgment competence levels (MJC) of the subjects of this study. That is, there were no significant mean difference in MJC levels between the Sensors (S-type) and the Intuitives (N-type), and between the Extraverts (E-type) and the Introverts (I-type).

However, when taken by pairs, first, the Rational-function (T & F) and the Basic-attitude (E & I) factors, there were statistically significant interaction effects between these two factors,  $F(1, 177) = 9.851, p = .002$ . That is, when they were considered together, they had more effects on MJC mean than when they were considered individually. Hence, mean differences between the Thinkers (T-type) and the Feelers (F-type) can be further explained when these two personality types were both extraverted (E-T & E-F), the mean MJC of the Extraverted Thinkers (27.964) was much greater than that of the Extraverted Feelers (15.963) (see Table 1). On the contrary, when the Thinkers and the Feelers were both introverted (I-T & I-F), the Introverted Thinkers' mean MJC (18.865) was slightly less than that of the Introverted Feelers (19.072) (also see Table 1). Therefore, there was an interaction between the two factors (Basic-attitudes and Rational-functions) on mean C-index.

Table 1: Mean MJC of Jungian Psychological Types (Attitudes &amp; Rational Functions)

Jungian Psychological Types (Attitudes & Rational Functions)	Mean C-index	N	Percent of N	Std. Deviation
Extraverted – Thinkers (E-T)	27.964	29	16.02	13.561
Extraverted – Feelers (E-F)	15.963	68	37.57	12.074
Introverted – Thinkers (I-T)	18.865	31	17.13	14.053
Introverted – Feelers (I-F)	19.072	53	29.28	11.706
Total	19.293	181	100.00	13.104

Dependent Variable: C- INDEX

Furthermore, when taken by other pairs and then all three-factors simultaneously, no other interaction effects on the MJC within other combinations of the two-different factors, or the three-factors were statistically significant. Therefore, the mean difference of MJC between Thinkers and Feelers were not affected by Irrational-functions (S & N). That is, whether they both were also either in the Sensing or Intuitive types, their mean MJC were insignificantly different. Likewise, when the three factors (Basic-attitudes, Rational-functions and Irrational-functions) were considered together, there was still insignificantly different in mean MJC between the Thinkers and the Feelers.

Still, based on the results from the interaction effects between the Rational-function and Basic-attitude factors, the effects of the first four Jungian psychological types (the E-T, the E-F, the I-E and the I-F type) on the MJC of the students was further investigated. It was found that when these different type preferences were treated as one independent



factor, and taken simultaneously for analysis, there were statistically significant main effects on the MJC for these four personality-type preference groups ( $F(3, 177) = 6.209, p < .001$ ). It indicated that personality-type preference factors, in this case, the four Jungian psychological types (a combination between the two Basic-attitudes and the two Rational-functions), had effects on the MJC mean. Thus, there were significant differences in MJC mean among the students' personality type preferences of this category.

Still further, when examined by a method of pairwise comparisons among these four psychological type-preference groups, the MJC mean differences ( $md$ ) of each pair were statistically significant, namely, between the E-T type and the E-F type ( $md=12.001, p < .001$ ), between the E-T type and the I-F type ( $md=8.893, p = .003$ ), and between the E-T type and the I-T type ( $md=9.099, p = .006$ ), (see Table, 2).

Moreover, when these four Jungian psychological type preferences, which was treated as one independent factor, were taken simultaneously with the Irrational-function factor (S & N), there were no statistically significant interaction effects on the MJC mean among these four particular types with the Irrational-function factor in this analysis.

Hence, the results were more likely to confirm the assumption that the MJC mean difference of the T-type and the F-type groups was due to an interaction only with the Basic-attitude factor, not with the Irrational-Function factor.

Additionally, when four-function personality types (S-T, S-F, N-T, and N-F types) were taken together as an independent factor (a combination of the Rational

Table 2: Pairwise Comparisons of the MJC Mean Differences between the Jungian Psychological: Combination between the Basic Attitudes and the Rational Functions

Jungian Psychological Types	(BASIC ATT. & RAT.FUNCT.)	Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
<b>E-F</b>	<b>E-T</b>	-12.001*	2.788	.000	-17.503	-6.500
	<b>I-F</b>	-3.109	2.303	.179	-7.654	1.437
	<b>I-T</b>	-2.903	2.724	.288	-8.278	2.473
<b>E-T</b>	<b>E-F</b>	<b>12.001*</b>	<b>2.788</b>	<b>.000</b>	<b>6.500</b>	<b>17.503</b>
	<b>I-F</b>	<b>8.893*</b>	<b>2.903</b>	<b>.003</b>	<b>3.163</b>	<b>14.622</b>
	<b>I-T</b>	<b>9.099*</b>	<b>3.247</b>	<b>.006</b>	<b>2.690</b>	<b>15.507</b>
<b>I-F</b>	<b>E-F</b>	3.109	2.303	.179	-1.437	7.654
	<b>E-T</b>	-8.893*	2.903	.003	-14.622	-3.163
	<b>I-T</b>	.206	2.842	.942	-5.403	5.815
<b>I-T</b>	<b>E-F</b>	2.903	2.724	.288	-2.473	8.278
	<b>E-T</b>	-9.099*	3.247	.006	-15.507	-2.690
	<b>I-F</b>	-.206	2.842	.942	-5.815	5.403

Dependent Variable: C- INDEX

Based on estimated marginal means

\* The mean difference is significant at the .05 level.

functions and the Irrational functions), there were no significant effects on the MJC mean for those who preferred a different pair of these two functions across the subjects of this study. It thus means that the students of this category of personality type preferences had no significant differences in mean MJC.

Finally, when the eight personality type personality of preference (a combination of the two basic attitudes and the four functions): the ENT-, the ENF-, the EST-, the ESF- the INT-, the INF-, the IST-, and the ISF-type, were treated as one independent factor and taken simultaneously for analysis, there were

statistically significant main effects on the MJC means among these eight types of personality preferences, ( $F(7, 173) = 2.664, p = .012$ ).

The main effects of these eight (8) particular types of personality preferences on the moral judgment competence levels across the different type-groups is shown in Table 3. Data from the table clearly reveal that the MJC means of personality-type preferences are relatively similar by pairs. The MJC means of a pair of the ENT and the EST were likely much higher than that of a pair of the ENF and the ESF, whereas a pair of the INF and the IST had relatively similar low means, and so did a pair of the INT and the ISF.

Table 3: Statistical Descriptions of the Eight Personality Type Preferences: Combination of the Three Factors

Personality Types	N	Mean of C- index	Standard Deviation	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
ENT	15	<u>28.530</u>	12.087	3.279	22.058	35.002
EST	14	<u>27.357</u>	15.426	3.394	20.658	34.057
INT	13	19.835	16.384	3.522	12.883	26.787
ISF	32	19.657	10.714	2.245	15.226	24.088
INF	22	18.505	13.071	2.708	13.161	23.849
IST	17	17.743	12.815	3.080	11.664	23.822
ESF	26	<u>15.996</u>	13.571	2.491	11.080	20.912
ENF	42	<u>15.942</u>	11.221	1.960	12.075	19.810
Total	181	19.293	13.104			

Dependent Variable: C\_INDEX

However, when an examination of multiple comparisons among these eight personality typed-preference groups were conducted using the mean differences (*md*) of the C- index, only 9 out of 28 pairs were found statistically significant (see Table 4). Accordingly, there were differences between the ENT-type and the ENF-type ( $md = 12.588, p = .001$ ),

between the ENT-type and the ESF-type ( $md = 12.534$ ,  $p = .003$ ), between the ENT-type and the INF-type ( $md = 10.025$ ,  $p = .020$ ), between the ENT-type and the ISF-type ( $md = 8.873$ ,  $p = .027$ ), between the ENT-type and the IST-type ( $md = 10.787$ ,  $p = .018$ ), between the EST-type and the ENF-type ( $md = 11.415$ ,  $p = .004$ ), between the EST-type and the ESF-type ( $md = 11.316$ ,  $p = .008$ ), between the EST and the INF-type ( $md = 8.852$ ,  $p = .043$ ), and between the EST-type and the IST-type ( $md = 9.614$ ,  $p = .037$ ).

Table 4: Pairwise Comparisons of the MJC Mean Differences among the Eight Personality Type Preferences

Personality Types (a)	Personality Types (b)	Mean Difference (a-b)	Std. Error	Sig.*	95% Confidence Interval for Difference(a)	
					Lower Bound	Upper Bound
<b>ENT</b>	<b>ENF</b>	<b>12.588*</b>	3.820	<b>.001</b>	5.048	20.128
	<b>ESF</b>	<b>12.534*</b>	4.118	<b>.003</b>	4.407	20.662
	<b>IST</b>	<b>10.787*</b>	4.499	<b>.018</b>	1.908	19.667
	<b>INF</b>	<b>10.025*</b>	4.252	<b>.020</b>	1.632	18.419
	<b>ISF</b>	<b>8.873*</b>	3.974	<b>.027</b>	1.030	16.717
	INT	8.695	4.812	.073	-.803	18.194
	EST	1.173	4.719	.804	-8.142	10.488
<b>EST</b>	<b>ENF</b>	<b>11.415*</b>	3.919	<b>.004</b>	3.680	19.151
	<b>ESF</b>	<b>11.361*</b>	4.210	<b>.008</b>	3.052	19.671
	<b>IST</b>	<b>9.614*</b>	4.583	<b>.037</b>	.568	18.661
	<b>INF</b>	<b>8.852*</b>	4.342	<b>.043</b>	.283	17.422
	ISF	7.700	4.069	.060	-.332	15.732
	INT	7.522	4.891	.126	-2.132	17.177
	ENT	-1.173	4.719	.804	-10.488	8.142

Dependent Variable: C-INDEX

\* The mean difference is significant at the .05 level.

## Discussion

### ***Moral Judgment Competence and Personality Type Preferences Based on Three Factors (Basic Attitudes, Rational Functions and Irrational Functions)***

It was revealed in the present study that there were significant differences in MJC levels between the Thinkers and the Feelers (F) among the Ateneo high-academic performing male students; no significant differences in MJC level between the Extraverts and the Introverts among the Ateneo high-academic performing male students; and no significant differences in MJC level between the Sensors and the Intuitives among the Ateneo high-academic performing students. Additionally, mean MJC of the Thinkers were significantly higher than that of the Feelers.

Substantial explanations to the findings may be made based on Jungian psychological types and the dual-aspect theory of moral development as follows: With regard to the differences in MJC levels between the Thinkers and the Feelers, Thinking as a function of logical discrimination, according to Jung, is rational (judging). So does Feeling, which is a way of evaluating an individual's likes or dislikes and can be quite as discriminating as thinking. Both Thinking and Feeling are called Rational because they are based on a reflective, linear process that coalesces into a particular judgment (Sharp, 1987). Since they make judgments and evaluations about experiences, or make use of reason, abstraction and generalization (Feist, 1994), they enable an individual to look for lawfulness in the universe (Hall, Lindzey & Campbell, 1998). Thinking function is ideational and intellectual. By thinking, humans try to comprehend the nature of the world and themselves.

On the contrary, Feeling function gives humans their subjective experiences; it is about the valuing of things, whether positive or negative with reference to the subjective (Hall, Lindzey & Campbell, 1998). There are some distinctive qualities associated with these two types. Thinking function relies on principles of cause and effect and tends to be impersonal, analytic, critical, clear and consistent in principles, and emphasis on objective criteria, while the Feeling function is about decision-making by weighing relative values, need for harmony, interest in emotions rather than in ideas, and given emphasis on subjective criteria (Bayne, 1997). Similarly, according to the dual-aspect theory of moral development, the cognitive and affective aspects provide an individual with important information about the nature of a person's moral behavior: the affective aspect gives the direction, whereas the cognitive aspect provides the organization and structure of action in the process of decisions making and judgment (Lind, 2000). Yet, an individual's moral judgment competence is founded on the cognitive aspects even though their developments are parallel and inseparable (Lind, 2002).

By definition, moral judgment competence is a capability of making moral decisions on matters that deal with universality and objectivity rather than that with personal harmony and subjectivity. Additionally, moral judgment competence is characterized by ability on adherence to and consistent application of abstract, universal moral principles, regardless of stages of morality. Hence, the cognitive aspect of moral development and the judging-rational function of personality type development (i.e., Thinking) is more closely complemented to one another than that of the evaluative-rational function (i.e., Feeling) in moral judgment competence. According to Lind (2000), those who are in a high MJC level have their

consistency in applying moral principles in their moral judgments or decisions, as indicated by obtaining higher scores from the MJT.

Moreover, in the MBTI senses, Thinking-type relies on principle of cause and effect and tends to be impersonal, whereas Feeling-type makes decisions by weighing relative values. A difference between the Thinkers and the Feelers is, hence, basically about how values/principles are used and which take priority (Myers & McCaulley, 1985). Since morality deals with abstract, universal principles rather than relative values, those who have more characteristic/function (way of thought) of Thinking function would tend to be in favor of moral judgment competence than Feeling function. Hence, such distinctive qualities of these two types of personality preference may account for the difference in moral judgment competence levels between the Thinkers and the Feelers, as revealed in the present study where the MJC mean (C-index) of the Thinking type is significantly higher than that of the Feeling type.

Contrary results to the present study have been found in the research of Faucett, Morgan, Poling and Johnson (1995) where the Thinkers (T-type) and the Feelers (F-type) were not significantly different, in their investigation of the relationships between the MBTI preferences and L. Kohlberg's post-conventional stages of moral reasoning, as measured by the DIT, using samples of 214 undergraduates of the University of Arkansas in the USA. Factors underlying the opposite directions of the findings from the two studies may be explained by empirical research which indicated that among those personal characteristic viewed as related to moral judgment development were age, education, gender, religion and certain life experiences (Newburn, 1992; Barit, 1985).

Importantly, most of extraneous factors in the present study, such as age, gender, formal education, religion, and life experiences, had been controlled as much as possible. For instance, the subjects were third- and fourth-year, highly-academic performing, and male students in the same age group of middle adolescent (15-17 years old); all were Catholics who were studying in the same Catholic, Jesuit school. Hence, the differences in level of moral judgment competence may most likely be explained only by the factor of personality-type of preferences. In addition, the present study also found that even though both groups were in medium level of MJC, however, the mean C-index of the Thinkers (T-type) were significantly higher than that of the Feelers (F-type).

### ***Moral Judgment Competence and Jungian Personality Types***

The present study conducted a further investigation, by pairing the Rational-function (T and F) with the Basic-attitudes (E and I), and also with Irrational-functions (S and N) to determine whether any pair of these two factors affected the students' MJC. It was revealed that there were significant interaction effects on MJC, but only between the Rational-function factor and the Basic-attitude factor. It means that when the two factors were simultaneously taken into consideration, the difference in MJC between the Thinkers and the Feelers was able to be substantially explained by an influence from their type of Basic-attitudes (E or I). A combination between the two Basic-attitudes and Rational- functions forms four Jung's psychological types (E-T, E-F, I-T and I-F).

Based on these findings, mean C-index of the Extraverted-Thinkers (E-T type) were significantly highest among the other types (E-F, I-T and I-F) in the same category (as shown in Tables 1 & 2),



especially higher than that of the Extraverted-Feelings (E-F type), whereas the Introverted Thinkers (I-T type) were not in the same fashion. Hence, Extraversion attitude was the underlying factor which was significantly accounted for the difference between the T-type and the F-type on MJC levels of the students in this study. However, there was no contribution on a part of the Irrational-function factor in this investigation. Thus, the implication of these findings is that personality type preferences can differentiate on levels of moral judgment competence. Several explanations to the findings can be drawn from the personality type theory and some previous studies as follows:

According to the MBTI sense, in the Extraverted attitude, energy and attention flow out, or are drawn out, to the objects and people in the environment. The individual experiences a desire to act on the environment, to affirm its importance, to increase its effect. Persons habitually taking Extraverted attitude may develop some or all of the characteristic associated with Extraversion: awareness of and reliance on environment for stimulation and guidance; an eagerness to interact with the outer world; an action-oriented, sometimes impulsive way of meeting life; openness to new experiences; ease of communication and social; and a desire to talk things out (Myers & McCaulley, 1985). When the Extraverted attitude combines with Thinking function, the persons in this type (E-T type) have their thought focused primarily on objective data, abstract ideas and principles that are then utilized to assist in the ordering of the external world to search for absolutes, for universal truths (Wallace, 1993). When the Feeling function is paired with Extraversion, those in the E-F types are subjects to traditional or generally accepted standards of value.

Concerned with interpersonal relationship and the impressions they engender, the values extraverts place on objects are highly influenced by the present social standards and can be characterized as fitting, fashionable, or political. In short, they will fulfill aesthetic expectations (Wallace, 1993). On a matter of morality, one of the differences between the E-T and the E-F is evidently in moral principles. The moral principles and ideas are fundamentally universal and abstract. The former holds tight on absolute and objectivity, whereas the latter on relativity and subjectivity: the former holds competence definition on morality, while the latter holds the rule-conformity and good-intention definition (Lind, 2002). Therefore, based on the concept of moral judgment competence (rooted in the dual-aspect theory of moral development) and their characteristics according to Jungian personality types, those in the E-T type would have a tendency to have a higher competence in using moral principles in their moral judgment than do the E-F type, as was found in this present study.

On the contrary, in the Introverted attitude, energy is drawn from the environment toward inner experience and reflection. One desires to stay focused on the internal subjective stage, to affirm value, and to maintain this focus as long as possible. Persons habitually taking Introverted attitude may develop some or all of the characteristics associated with Introversion: interest in the clarity of concepts, ideas, and collective experience; a thoughtful contemplative detachment; an enjoyment of solitude and privacy; and a desire to think things out before talking about them (Myers & McCaulley, 1985). When thinking is the most differentiated function of the introvert, it is always oriented at decisive points to subjective data. Those in the I-T type are concerned with abstractions, the formulation of questions, and the creation of

theories, often without practical purpose. While there is the tendency for the I-T type's to ignore facts that do not fit their scheme, they may use objective data as evidence for their ideas, or at least give others the impression they are doing so (Wallace, 1993). The Introverted Feeling type (the I-F) is principally determined by subjective factors and controlled by subjective preconditions. Those in this personality type tend to be unable to conform to current changes, have a strong defensive posture toward any aesthetic expectations with high egoism, and tend to be stated passively and negatively in the matter of judgment and values (Wallace, 1993). Hence, on the matter of moral judgment competence which requires an ability of applying universal moral principles in an objective manner of judgment, as far as the dual-aspect theory of moral development as well as the personality type preferences are concerned, it is expected that these two psychological types of personality (the I-T and the I-F type) would be rather inferior to the E-T type in moral judgment competence level.

***Moral Judgment Competence and Personality Type Preferences (A combination among two Basic attitudes and four Functions)***

When the eight personality types (ENT, ENF, EST, ESF, INT, INF, IST and ISF) were considered as a single independent factor in the investigation whether there are differences in moral judgment competence among the eight types, the present study significantly found that there were mean differences on MJC among them (as shown in Table 4). The MJC means of the pair of the ENT and the EST were much higher than those of the pairs of the ENF and the ESF, whereas the pair of the INF and the IST relatively had similar lowest means of the MJC, and so did the pairs of the INT and the ISF (as shown in Table 3). Some explanations to

the findings in this present study can be drawn from the Jung's personality theory as follows:

1) In the pair of the ENT- and the EST-types, both are basically the Extroverted-Thinkers. In this study, we found that there were no Irrational-functions which affected their on MJC levels. In other words, whether they (the ENT and the EST) have either kind of their perception (Sensing or Intuition), it (perception) significantly gives no impact on their MJC. Some theoretical explanations have been given about how the E-T type had the highest moral judgment competence among others in the same category in the previous section. Still, it is noticeable that the ENT-type had the highest mean C-index (28.53) among the eight personality type, as shown in Table 3. Based on the Lind's explanation that C-index of 5.00 is psychologically significant and 20.00 is very psychologically significant, the value of 28.53 obtained in this study is, thus, regarded as very psychologically significant (Lind, 2003). This C-index means that those in this type (ENT type) had high moral judgment competence in consistent application of their universal moral principles when they dealt with and made decisions on moral dilemmas, as measured by the MJT. The higher C-index of the ENT type than the other personality types, as established in this study, may be accounted for by the uniqueness of their personality type. Research on type dynamics offers explanation of this result.

Myers and McCaulley (1985) described the characteristics of the ENT as those who use their thinking primarily externally and thus are natural critics. They set their own standards and value, and have intellectual competence. They are likely to be analytical, logical and objectively critical, and also be decisive, clear and assertive in their judgment.

Further, Bayne (1997) who adapted Keirsey's temperament theory in an investigation suggested that Thinking (T) was the most influential factor, especially when it combined with Intuition (N). It influenced the basic motives of the N-T type to have a tendency of developing new theories (ideas, models or systems) with high standards and quality, planning in details, liking analysis, criticism and understanding, and having a clear rationale, judgment competence, and autonomy. Thus, when the E-T and the N-T combined to one another (to be the ENT), both of their characteristics and psychic energy on cognitive ability required for a competency on judgment are complemented and reinforced each other that consequently gave much effect on the MJC level for the ENT personality type, especially the factors of judgment competence and autonomy which are requirements for a mature moral development (Lind, 2000).

2) The EST-personality type is the second highest of mean C-index (27.357) among the others in the same category, as shown in Table 3. It can be interpreted that those in this type had a very high moral judgment competence in consistent application of their universal moral principles when they dealt with and made decisions and judgments on moral dilemmas, as measured by the MJT (since C-index is higher than 20 points). In the MBTI sense, those in the EST-type take an objective approach to problem solving and are tough when the situation requires toughness. They cover all the bases, leave no loose ends and get things done on time. They prefer proven procedures and systems and their orientation is to tasks, action and the bottom line. They are seen as conscientious, dependable, decisive, outspoken and self-confident. They may apply logic even when emotions and impacts on people need primary consideration. Like the ENT-type, the characteristics of the EST are main

factors for cognitive ability. Hence, these characteristics contribute to moral judgment competence according to the dual-aspect theory of moral development.

Some studies indicated some influential psychic energy, when the Irrational functions (S and N) play their roles in personality type. For example, Mill and Parker, (1994) found in their study, using Irish samples, that the gifted adolescent students score highly on Intuition (N), which indicated a preference for matters that are abstract and theoretical. Also, Taylor (1992) argued that the key to developing a learning ability to think critically was found in the order of the learners' preferences for perception (S and N) and Judgment (T). From these two studies, an inference may be drawn to support the explanations why the ENT-type and the EST-type of the subjects of this present study, who are highly academic performing students, had mean C-index much higher than did the others six personality type preferences.

In addition, most personality types of the students in this study preferred mathematics as their favorite subjects. Mills (1984) in a study on mathematically-gifted adolescents in the USA, found that there was a connection between Thinking (T-type) and math ability and between math ability and ways of using information in social activity. The findings as such can be also used as an implication that mathematical ability may be an underlying factor that confirms and supports the high MJC level of those subjects who were in the ENT-type and EST-type in this study. Moreover, the low MJC means of the other three pairs could be theoretically explained by the same descriptions of characteristics of particular types as above-mentioned and with the same explanations given in the previous sections.

## **Conclusion**

Based on the significant findings in the light of Jungian psychology types and dual-aspect theory of moral development in conjunction with the previous studies and others related cognitive and moral development theories in psychology and psychometric measurements, the relationship between moral judgment competence and personality types exists. A primary recommendation is made for future research that there should be comparison studies with regard to moral judgment competence in relation to personality types on gender differences, and on different psychometric measurements to assess underlying theories and/or theoretical effects among them. In addition, future research should be conducted in different samples of different demographic backgrounds, such as, age, education level, career, SES, nationwide, cross-culture and among others.

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## **C**HAPTER 29

### **STORIES, GAMES AND EMOTIONS IN MEDIA-BASED LEARNING**

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#### **Abstract**

We do know from neuroscience, cognitive science and pedagogy as well as from information, communication, and media sciences that learning and remembering something is easier and longer lasting when doing something oneself, or at least when the contents to be learned are linked with emotions. Thus it seems to be reasonable not only to address learners on the cognitive level but also allow them to apply what has to be learned and to make emotional experiences. Converging impacts of digital media as well as recent results from cognitive and neurosciences have led to a broader acceptance of these facts. Inevitably, the ways of how to produce and implement content have to change, focussing on emotional and narrative methods. This overview aims to explain reasons, and attempts to

exemplify production methods for emotionally and narratively interesting learning materials.

## **Keywords**

Media-adequacy, Neuroscience, Constructivism, Media-Based Learning, Emotion-Based Learning

## **Introduction**

In a lot of countries, 'authoritarian' teaching models are still dominant – in 'real school life' as well as in media-based education (Abdazi, 2003). A possible reason for this could be the predominant status of Claude Shannon and Warren Weaver's communication model (1949) among pedagogues, even though current media and social realities seem to point at the superior effectiveness and adequacy of other models. The communication theories of Shannon and Weaver were developed with the aim to standardize the flow of communication in order to find an answer for various (technical) problems in mass communication with the specific character of *point to multipoint* – which of course contains numerous analogies to traditional teaching. Consequently, all too often, unreflective transferences of the theories of Shannon and Weber took place, without true verification of their validity for this specific context.

At first view, of course, the direct application of the communication model of Shannon and Weaver in teaching processes can be seen as logical. It describes a person that initiates communication ('encoder/producer') and a person, or several persons, as the target ('decoder/receiver'). Sometimes, the process of communication between the encoder and the decoder requires an intervening *medium* (from lat. *medium*, middle or midst). The inclusion of the *medium* enables a valid understanding of the encoding-decoding model as a metaphorical concept of

communication. Of course, the traditional scientific theories have continuously analysed the function of the medium, and the conditions that have facilitated or influenced negatively the communication flow.

Media-based learning has usually been considered an element that might help to promote and to enable communication in several situations. In a learning process, this could apply in a situation where a teacher is confronted with perceptual, emotional or cognitive difficulties. In such situations, media support as a complement of teaching seem to probably deliver a certain ease in the learning process, or sometimes even make it possible. In order to ensure the communication flow between 'the encoder' and 'the decoder' in an environment of technical constraints and factors of disturbance, the 'encoder' is frequently forced to standardize the information flow, expecting that a big number of participating 'decoders' will be integrated.

Standardization was a necessary element in Shannon and Weaver's communication model so as to exclude factors of disturbance in the communication process. Here, it seems to enable an adequate reception of learning contents. Furthermore, it creates an 'internal correlation' between the (assumed) validity of the information provided by the 'encoder-decoder metaphor' and the idea of an effective teaching process.

However, even in the times when mass communication media (still) was predominant, it became evident that the 'decoder' showed a differentiated response to media messages. Since the second half of the last century, constructivist learning theories have tried to consider this factor. Recent brain research is now able to explain this phenomenon. Meanwhile, new technical (and

consequently medial) developments offer alternatives to 'authoritarian' approaches in communication strategies.

In the following, further aspects of this development shall be explained in more detail. Digital media is evidently not characterized any more by a *point-to-multipoint* quality. This fact exposes signifying implications of the communication model of Shannon and Weaver and its problematic applications, because of its specific connection to a limited *point-to-multipoint* situation. Giving up the rather authoritarian 'encoder-decoder' communication model opens new perspectives for alternative scenarios that differ from traditional forms of teaching, especially in their attempt to involve narrative, emotional and action-oriented representations of knowledge. Since these developments were initiated by, or were reactions particularly to the use of new (digital) media, this paper refers to media-based teaching situations.

## **1. Background: Media theories, media impact research, theoretical aspects of media-based learning**

Generally, a multimedia object is perceived as a time-lapsed individual expression, or a time-lapsed speech. Regarding its function, it seems to be experienced as a valid equivalent to authentic or spontaneous personal communication, if only limited by technical effects. In fact, the prevailing opinion persists that authentic communication can be technically emulated and be used in diverse applications. In this view, media is an illustration or representation of experiences and personal contacts with people.

Teaching is obviously a communication system, too. Furthermore, teaching has traditionally been defined within a correlation between the teacher and the

learning content, where the relevance and connotations of contents are transmitted to learners. In this context, the teacher provides not only the presentation of contents, but its interpretation as well. The interpretation's aim is to provide the intellectual accessibility of contents. With regard to this understanding of teaching, the teacher is the expert and guardian over values and significance of learning contents, and has an interpretation sovereignty that the learner has to accept.

When a teacher uses didactical aids like books, images, or films, in order to promote a better comprehension of learning contents, it is thus always intended to provide the teacher's specialized knowledge to the learner, which in consequence reinforces a clear teacher-learner (encoder-decoder) relation. The interpretations transmitted in the teacher-learner interaction are basically forced acts imposed by means of a system of sanctions. Refusal of interpretations result in poor evaluations for the learner, which provokes a low self-esteem and poses an obstacle in professional prospects. Most importantly, the use of a system of sanctions (for both, the teacher and the learner) often ignores the integration of a different perspective of learning as a voluntary and agreeable act of identification with the learning contents. Thus, in analogy to a much quoted line in communication science, it seems to be necessary to shift from 'what teaching does for the learner, to what the learner can do with teaching' (in analogy to Sturm, 1971). In this alternative view, the learner is not solely a consensive, passive element reduced to a receptor role, but an active participant.

The changes brought by the new digital media have in the main enforced the insight that the specific character of *point to multipoint* is only technically conditioned in various types of media (and in



consequence, in its contents), and does not possess general validity. Certainly, the current prevalent forms of media are not limited to it. The use of digital media applications has lately been intensified in teaching situations (partly actively, as an improving complement to illustrate teaching contents, and to some extent passively, as a result of social or political decisions). Their major properties (multimediality, interactivity, openness, participation), offer new perspectives for other forms of communication. The modality and effectiveness of information transfer in media invariably depends on the medium to be used and its specific characteristics (Thissen, 2003; Giessen, 2004).

Thus, the use of digital media brings inevitably more open (that is, increasingly networked) as well as more intense interactive communication, and also more active reception. Furthermore, when compared to the situation in the 80's, current media users are now much more accustomed to a wider diversity of media, networks, and a stronger consideration of their personal needs and interests. The attributes and features of computers have a steadily growing influence on other media, sometimes of a mere aesthetic quality (for instance, from the use of *roll down menus* to graphic user interfaces in program announcements from television networks: so, computer aesthetics are being taken up and used by the television media, the until now dominant medium). Frequently, however, dominant media also influences contents. For example, literary scholars have pointed in this context at new tendencies in literature (for instance, since the second half of the last century, apparently caused by the dominance of other media, in this case the cinema, a form of writing to some extent visual and then again emphasized modular took place; see, for example, Poppe, 2007). Often, such tendencies can be a temporary trend, because the

respective new media with its characteristics and aesthetic qualities are presumed to be more 'fashionable'. However, due to its multimedia properties, the digital media is not only more 'up to date' but certainly makes specific forms of information transfer more significant, while other specifics, rather typical for more traditional media, is losing some of its importance.

This development becomes apparent in situations that some might perhaps regard as minor aspects. So, the openness of the digital media (choice between different sorts of media, as well as the use of feedback channel options) brings in an increase of *feedback* communication with the user (readers or learners) by means of questionnaires, or simply an e-mail address. This is now not only possible, but almost expected, and today can be considered a standard.

Likewise, the phenomenon of interactivity, made possible or at least intensified by the digital media, conducts inevitably to a stronger consideration of the users' needs and interests. This is apparent for example in the process of navigation, where a user can play a more active role, such as following or ignoring hyperlinks, according to his personal interests. Such an active form of reception has an effect not only on the receptive behavior but also on the users' production of meanings.

The characteristic users' situation, as well as the properties of multimediality, have further contributed to increase the importance of visual conditions. A computer monitor hinders the complete overview of longer texts, allowing only a view of the current screen page. When a text is longer, *scrolling* has to be done: that is, bringing the non-visible part of the text over the scroll bar that usually is located on the right edge of the screen. This might be considered a similar

proceeding as the turning of pages in books or magazines. However, turning back pages or reading back and forth between a table of contents and the text is much more complicated when using a monitor. Experiments and surveys have shown that almost all computer users concentrate their attention on the current page when reading longer texts, trying to keep in mind preceding pages and an overview of the text that has been read (Giessen, 2004, 29). The exact localization of parts of a text on a screen is a too strenuous task for many. All-too often, it is nearly impossible to find the exact position of a desired text passage; and this problem grows when the size of a text increases. Furthermore, page numbers do not exist in *HTML* documents, as the representation of pages depends on the user's settings (the numbering of paragraphs, often used in legal texts, has not been accepted as a standard). When the overview of a text is not feasible – a probability that increases with longer texts – few users restart the reading of a text from the beginning, because it is usually perceived as a frustrating experience.

Another decisive fact is that, compared to printed matters, digital media creates physiological difficulties and constraints. Unlike printed matters, an image flickers on a monitor. Although this problem does not occur on *LCD* displays any more, the character resolution on both *LCD* and *CRT* displays is relatively low. Moreover, physiological studies have shown that when watching a computer screen, a lower eye-blink frequency occurs, which causes the eyes to be moisturized less frequently and, as a consequence, the eyes tend to fatigue more rapidly (Thissen, 2003. 70). This aggravates the previously mentioned disadvantages of image flickering, low character resolution and also, the effects of screen reflection. Finally, the body posture is almost unchangeable because the computer monitor can not be easily

relocated when the sitting position becomes uncomfortable. Especially when reading, the body posture tenses up strongly, which clearly intensifies fatigue effects (Giessen, 2004. 67). Of course, users have to sit relatively close to the monitor because they normally work with a keyboard and a mouse, and icons or hyperlinks need to be clicked exactly.

For the authors, the consequences that result from these specific receptive situations are a cause of concern. The reading rate is between one-fourth and one-third slower than with printed matters, and the memory retain performance is clearly lower than with the same text in a printed version (Thissen, 2003. 70). There is even the impression that many computer users tend to avoid texts, and often it has been argued that the traditional concept of 'reading' should not be used when referring to computer-aided media. This is emphasized, for example, by Jakob Nielsen, who wrote already at an early stage that longer texts on a computer monitor usually are avoided, at best 'overflowed' or, as he called it, '*scanned*' (Nielsen, 2000; Nielsen/Pernice 2009).

Thus, it is clearly asserted that texts in the context of computer-aided media are read differently than print media from a book or magazine. Hence, they should be written and displayed in a different manner. Of course, this refers as well to texts with learning contents. By the way, all these observations lead to the assumption that computer-based learning might not necessarily be more effective than other ways of learning, or other learning media (like books; see Wolf, 2007).

At least, the authors are to avoid longer texts. A text should only need a single screen *scroll* or even better, it should be read without scrolling. According to this, the length of a text should not exceed the size of a

single screen page. This creates the necessity of *fragmenting a text in single sense-steps or modules*. Some, like Nielsen, consider this proceeding of *modularisation* of multimedia texts an indispensable step. Here in turn, the representation of strands of argument are much harder to achieve than in a written text. Argumentative progressions are not easy to represent; here are books or *time-based media*, like films or cartoons, the better alternative.

However, when previous knowledge about visualized objects exists (this would be a premise, since the images can not be at first described or explained, but have to be recognized and integrated at once; Arwood/Kaulitz, 2007; Oliva/Torralba, 2007), visual representations allow a much faster transfer of information (because different forms of information are simultaneously present and can be handled without a decoding phase; see Sowa, 1983). Additionally, new specific overvalues arise. Especially, connections between the objects shown, as well as temporal progressions, are easier to understand. For this reason, an instruction manual for a machine in graphical representation is usually more effective than a written manual (see Grob & Breger, 2002).

The digital media continues a development that has already been observed as films or television were used to transfer information. Studies then took place on how a more emotional transfer of information influences an observer.

## **2. Issues, Controversies, Problems**

Already in the 1970's it was found out that emotional impressions are dependent on the type of media, for example when comparing emotional responses of television viewers and radio listeners (Sturm, 1978). Other early results (for example, Sturm, Habler &

Helmreich, 1972) suggest that emotional responses last clearly longer, and are more detailed than knowledge acquired with cognitive means, which usually gets lost in temporal progression, but can be more easily remembered or reactivated when associated to emotional connotations.

Recent research studies in neuroscience have confirmed these findings (overview: Johnson, 1997; Bar-On, 2007; Goleman, 2009; Gardner, 2009). Even more, current neuroscience research has shown that information and knowledge are assimilated with different degrees of effectiveness, depending on mood and tendency of emotions (for example, Erk et al., 2003; Cohen/Margen, 2004; Cozolino, 2006). With regard to this, information associated with positive emotions is assimilated through the hippocampus and further processed in the cerebral cortex, while the information associated with negative emotions is incorporated through the amygdala, a region situated on the top of the temporal lobe, directly ahead of the hippocampus. The amygdala conditions the organism when quick reactions are needed, for instance in situations that involve conflicts, or fleeing. When activated, it produces an increase of blood pressure and acceleration of the pulse rate. Likewise, an entire muscular tension can be determined. This condition enables quick reactions, since the activation of the amygdala occurs simultaneously with a number of other physiological processes. In the history of evolution, being able to flee rapidly or defend oneself in hazardous situations always has been an advantage. In these cases, too long periods of reflection would not be useful (and even contra-productive). Here, the amygdala is not of avail when recalling experiences and factual knowledge, or when knowledge is processed (Aggleton, 1992, 2000; Aggleton/Young, 2002; Stone/Baron-Cohen/Knight; 1998; Phelps, 2006).

The amygdala should not be considered in this context an evolutionary relict of no present-life importance – in fact, it still protects us in ‘modern’ hazardous situations, for example, in road traffic. In diverse types of decisions, it is even indispensable as it contributes to assess potential dangers and promotes critical faculties. In this field, a number of impressive case histories have been compiled by the Portuguese-American neurologist Antonio Damasio. They refer to patients whose amygdala was calcified and (apparently because of that) had problems managing a ‘reasonable’ behavior (Damasio, 1999; 2002). Scientists researching simulation of intelligence also confirm the theory that critical faculties, including fear, are elementary aspects of intelligent conduct (for example Ogata/Sugano, 2001; Minsky, 2006).

During a learning process, the mode of functioning and the tasks fulfilled by the amygdala are very often problematic. Thus, in a complex society, where interrelations and other mechanisms are to be presupposed and understood, fear and aggression, or authoritarian models of communication, are the wrong advisors. Activation of the amygdala can even be contra-productive, because the amygdala is not able to handle information in a creative manner. It is a known fact that stress can not promote good analytical achievements. Neuroscience has now determined the causes for it (for example Cahill et al., 1994). Considering this, learning is a less effective process when boredom, lack of motivation and hostility prevail. In this context, explicit positive emotions should be evoked.

Therefore, it makes sense to adapt every form of information transfer to the neurological needs of information receivers. This happens ideally when connecting information to positive emotions. These positive emotions can be achieved passively, for

example with music (for example Koelsch et. al., 2006), or, what is important in our context, actively, through participation and integration of the information receiver (user, reader or learner), giving persons the feeling that they are taken seriously, in order to promote their personal engagement (Barab/Evans/Baek, 2004; Cross, 2007). Thus, the individual reactions that the digital media allows are an ideal frame to achieve this.

In a pleasant emotional context, not the amygdala, but the hippocampus will be activated (Seifert, 1983; Storm-Mathisen, 1990; Traub/Miles, 1991; Andersen et. al., 2006); however this cerebral region is apparently not involved in quick responses (neither physical nor mental). Though, in the context of successful transfer of information and knowledge, this is an advantage. The hippocampus passes on the recorded information to the cerebral cortex, where it is stored on a long-term basis (this is the case, for example, with dreams that people experience while they are sleeping). Consequently, 'learning' functions effectively only with the hippocampus, in spite of, or because of its 'slowness' (Thiel/Eurich/Schwegler, 2002). Creativity as well can only be generated in this form. Therefore, there are neurological reasons why learning contents should not be presented neutrally but in an emotional, interesting and exciting manner.

Creativity relates less to facts that are supposed to be learned by heart (like historical facts) or must be followed (like mechanical sequences). It rather connects to relations and associations. Meanwhile, there is a prevalent opinion that our networked and complex modern times demand aptitudes that are not basically related to fixed processes, or factual knowledge that becomes increasingly faster obsolete. It rather demands flexible answers to permanently changing situations.



Apparently, the media presence is a decisive reason for this broad transformation process, from a static, to a more dynamic society (Innis, already in 1950), because they are able to transfer information rapidly, and so alter social, economical and even technical realities in constant feedback processes. Specifically the digital media and its relevant forms of knowledge integration, transfer, and representation, facilitate such a creative approach in a changing environment.

Consequently this concept can be summarized as follows: digital media is less suited for the presentation of facts and rational analysis than for the representation of connections and relations. But, the more the digital media influences our environment, the whole society, economic life, and so on, the less influential some traditional (perhaps only socially) relevant facts will be (the classical 'education'), allowing a more flexible and task-appropriate acquisition and application of relevant information.

Thus, the growing use of media in our society, and as a consequence in our daily life, has almost inevitably focused attention to forms of information and knowledge acquisition connected to emotions in the human psyche (and has even helped some psychologists to develop their models, such as McLaren, 2007). With it, there is a growing public awareness about new and more effective forms of learning and teaching.

One media-adequate form of presentation is the integration of information in stories, games and communicative situations. The media users participate in the narration of a story that they consider subjectively interesting, or a game in a context where information is transferred and knowledge acquired. For this reason, the emotional forms of gaming and storytelling are supposed to be adequate alternatives.

### **3. Solutions and recommendations: A brief look at the constructivist learning theory**

Constructivist learning theory suits to this demand. This theory already gained strong influence during the second half of the last century. It endorses the idea that the human perception of the environment is not to be seen as a reproductive process of knowledge. Thus, it does not represent a projection but an active constructive process (see, for example Harms/Voermanek, 1994, 248).

Ultimately, the constructivist learning theories go back to neurological findings, too. Already in the 50s, biologist and psychologist Humberto Maturana formulated theoretical statements that attempted to explain how living organisms gather and process external sensations. Apparently, this process is not always identical, or at least, we do not know yet how other organisms gather, process, interpret or understand reality. So, there is a possibility that every living organism experiences its existence differently. The assumption that living systems must be understood as autonomous and dynamic entities goes back to Maturana and Varela ( this, and the following, see: Maturana & Varela, 1972; LeDoux, 2002; Fine, 2006).

These entities are not static, but rather develop themselves continuously. That means that on one hand they are open, so they can gather and process information about the world. On the other hand, the gathering and processing of information occurs against the background of individual capabilities and specific experiences. This means, in the first place, that an objective image of the real world does not exist, but only subjective constructions that relate information to present experiences and processing capabilities. Since an objective and comprehensive image of the world is not feasible – if all present sensations were processed

simultaneously our brain would be overstrained –, this also contributes to achieving a certain efficiency, or rather allows the creation of a manageable image of the surrounding reality, in order to enable a reasonable processing of the incidental sense data. Furthermore, this concept implies that information is not processed passively. In fact, the brain processes and modifies it actively (comparing, and sometimes 'adapting' it to previous information).

In the 'radical' interpretations of the constructivist theory, expressed particularly by von Glaserfeld (see von Glaserfeld, 1995), it is even postulated that the brain does not enable perception, but (simply) organizes the own realm of experience. This would imply that the brain (also) 'constructs' meaning in a 'real world' where meaning actually does not exist (or maybe only other meanings, beyond its subjective abilities and possibilities of perception), an old 'topos' of Gestalttheorie (Wertheimer, 1925).

So, the subjective and contextual character of information is underlined, and the binding objective reality replaced with the learner's cognitive reality. This theory corresponds with the previously exposed neurological findings, whereby information is always processed in a different way, depending on the emotional connotations they are related to. In some cases they might be easily kept in mind and actively used. In other cases, probably not.

Another concept related to this theory refers to the fact that the brain constantly strives to keep its 'sensory construction' consistent. In this context, Niklas Luhmann has introduced in Germany the term *Selbstreferenz*, that he incidentally also uses in an analogical mode in other systems (the media system, and the educational sector, see Luhmann, 2006). 'Self-referential' means that a system seeks to

preserve its sensory construction. This is given up only when it absolutely does not apply to reality, and even in that case, with a certain resistance. (Incidentally, this also would explain why educational establishments adhere so strongly to their prerogative of interpretation. On the other hand, it would also explain why learners are nearly not reachable when teaching does not fulfil their needs and expectations).

Unlike a widespread misunderstanding within constructivism, the individual construction of reality is of course not arbitrary, but (also) determined by social consensus that develops through interactive communication (Harms/Voermanek, 1994. 249). Applied to the educational sector, it means that the relevance of learning contents is determined jointly between the teacher and the learner. Here, it is important to integrate the learners' interests, knowledge, and previous experience, because they affect the learning behaviour and the willingness to assimilate new information. It must also be considered that previous experience and knowledge can be drastically heterogeneous. Nevertheless, they pose the decisive points of connection for the transfer of learning contents, since learners basically tend to look for familiar items of information. The implication for the constructivist learning theory is the concentration to the frame of reference in which the learning contents are shown and interpreted. A learning experience occurs when a learner can relate the new information to previous experience and knowledge, and order the learning contents in a personal structure of knowledge.

#### **4. Future trends: emotion-based, action-oriented and narrative information and knowledge transfer**

Up to now, empirical evidence from research on computer-based learning methods gives diverse results on whether and in how far they are superior to traditional learning methods (Giessen, 2003). There are major advantages in certain contexts, such as providing independence from time and place, which is important for language learners (Bufe/Giessen, 2005). All in all, however, it is still not yet clear what teaching methods are adequate to media-based learning (Giessen, 2004). Hints from communication science, neuroscience and cognitive science suggest methods connected with emotions, like games and story telling.

These are widespread and old established forms of knowledge transfer (Huizinga, 1939). This has been confirmed by the recent findings in neurological research. They are deeply human-rooted forms of knowledge transfer, and their particular character is that they are present at all times, in every culture and in every medium (Gredler, 2004).

In every culture, narrated stories have had the function of transferring knowledge between individuals, groups and generations (Hillocks, 2006). They appear in all sorts of media that have been developed in our society. The knowledge transmitted is not only limited to facts but implicitly includes cultural values, opinions, emotions and problem solutions. A story provides a structure for a narrative representation of a content in sequences, as well as a timeline represented with a linear language. Furthermore, successful stories are in essence transmitted structures of dramaturgical contents rooted in ancient myths, and related to emotional needs based on depth psychology. Thus, a coexistence of traditional forms of oral story-telling, multimedia

narration in mass media and digital storytelling in internet might occur – but this does not diminish the attraction of traditional storytelling for the narrator and the listener.

The attraction of a story is based on its subjective perspective that enables the construction of an interesting thematic frame, and that can interact on a vivid and captivating level, so that audiences feel attracted and are able to feel with the story. The same categories can also be applied to games and other forms of action-oriented group learning.

Narrative and emotional forms of information and knowledge transfer have always been confronted with the objection of relativism. This criticism can be addressed, for example, to the constructivist concept of history, which stresses the constructive character of history, as well as its resulting controversies. Probably, narrative structures might be able to offer a closer access to the 'truth', since they contribute to achieving a stronger empathy and participation, and so, to an 'inner insight'.

Narrative, and consequently emotional, media-based forms of representation also allow interaction, and thus not only lead to emotional participation, but also (via specific action-oriented and networked forms of information and knowledge transfer) to an exchange with other learners.

The participation of the recipient (learner) as the co-author is at the same time an essential element of the hypertext-theory (Dillon, 1994. 125). Emotional, narrative and action-oriented forms of information and knowledge transfer are thus a media-adequate answer (initiated by the digital media) to current challenges – that, not least supported with digital media, can be

achieved with a particularly effective and convincing standard of production and representation.

## **Conclusion**

The current state of knowledge in the areas of pedagogy, neuroscience and research on the effects of media proposes the use of action-oriented, narrative and emotional approaches for the information and knowledge transfer. Cognitive learning achievements appear stronger and are more enduring when combined with emotional connotations and personal involvement. Furthermore, it intends to include the learner in the process of development of knowledge, consciously and as much as possible. This, in turn, has implications in the modalities of conveyance. When excitement and interest are aroused, learners will rather be willing to include their own experiences, and to construct their own interpretations. Emotional, narrative and action-oriented forms of involvement for learners as co-authors – for instance, using gaming or storytelling, are essential elements in the hypertext-theory that can be transferred to media-based learning scenarios.

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## **C**HAPTER 30

### **SHARING A VISION: IMPROVE READABILITY OF EDUCATIONAL WEBSITES**

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#### **Abstract**

The sudden emergence and explosive growth of the Internet as a more pictorial medium marks the expansion of the visual and the decline of the verbal in the twenty-first century. This paper explores how readability of educational websites for children on the Internet can be analyzed as rhetorical phenomenon through visual rhetoric. Both visual and verbal images are investigated. Visual images are examined through their nature, function, evaluation, actions, major features, subject matter, medium, forms, colors, organization, craftsmanship, and context. Typography used on the educational website is evaluated through familiarity, serif versus sans serif, contrast,

alignment, line-length, letter spacing, leading, point size, color, value, and texture of type. Readability of text is calculated using both the Fry (1977), Flesch Reading Ease (1975) and Flesch-Kinkaid (1975) grade level readability formulas. Analyzing highly respected websites for children, the researchers discover how some of the best educational websites for children might either be improved for children to read or used by teachers for instruction. The researchers begin to establish conventions for the design of electronic media for improved use by both teachers and students.

## **Keywords**

Computer technology – readability – visual rhetoric – typography

## **1. Introduction and Theoretical Framework**

The most important instructional decision teachers make is matching reading materials to reading abilities. Materials are too easy to read, do not strengthen skills. Materials too difficult to read, lead to frustration (Fry, 1977a). Either way, students don't make progress (Gambrell, Wilson, & Gantt, 1981), are not on task (Enz, 1989), could give up (Kletzien, 1991), often detest, (Juell, 1994) and may stop (Fry, 1977a) reading. As educators, ensuring student success is the ultimate goal. Incorporating visual literacy strategies when teaching students to read will strengthen their ability to read and excel in school.

Stroue (2004) claims the advent of the Internet adds new lexica demanding new rules and experience in how students interpret what they read. Kress and van Leeuwen (2006) make the case for schools to equip students adequately for this new semiotic order. Educators and students must understand how electronic technologies function in the newly defined semiotic landscape to function. Students must produce and read both images and text. To do this,

students must be given the skills necessary to integrate text and image into a form that keeps them engaged so they can learn and transfer knowledge.

Visual rhetoric describes the study of visual imagery within the discipline of rhetoric. Historically, rhetoric is a term associated with the study of the use of symbols to communicate. Rhetoric is now synonymous with the term communication (Foss, 2004; 2005). It is a mode of pedagogy used as a tool for, and subject of, classroom pedagogy. This is important because visuals are displacing the linguistic in social importance (Ott & Dickinson, 2009), especially on the Internet. As Foss (2005) suggests, restricting study of symbol use only to verbal discourse means we are studying only a minute portion of the symbols that affect daily lives; improper processing of visual information results in inadequate, incomplete, and distorted understandings of how humans use symbols to communicate.

Both literally and figuratively, rhetoric of the written word is visual, and can be distinguished from other forms of symbolic representation through sight. On websites, images and words appear together in one discursive space. In this space, they operate synergistically (Frascara, 2004). As the Internet becomes more important to supplement classroom activities, it is important that teachers give students skills to maneuver this platform for education. For this reason, educational websites must be carefully designed. Choosing and placing the text properly on a page while selecting appropriate images to complement is an important task for instructional designers.

Today's educational domain is different from what it was even 10 years ago. Reading is generally considered to be the process of decoding letters into recognizable patterns to form words, sentences, and



paragraphs. Being literate primarily means possessing the ability to read and write. It is this definition of literacy that educational systems currently use. When studying readability, the literature concentrates primarily on textual materials (Flesch, 1943; Fry, 1968; Klare, 1952; Chall, 1958; Dale & Tyler, 1934).

## **2. Research Question**

There is scant research available regarding readability of educational websites. Much of the research is primarily related to design, rarely acknowledging readability. Chen, Wong and Hsu (2003) recommend criterion to consider when making decisions regarding when instructional activities should be conducted on the Internet. Information readability is one criterion, but little evidence exists to suggest it is ranked highly in website evaluation.

Numerous groups and organizations offer website recommendations for classroom use. However, recommendations are based on widely varying criteria. The question posed by the researchers is — How readable are educational multimedia materials recommended for children? This chapter will detail considerations to be addressed by teachers, instructional designers, parents, and any person or group creating or evaluating educational multimedia, educational websites, and interactive software.

## **3. Discussion of Literature**

### **3.1 Overview**

As Universal Design for Learning proponents will attest, consistency in the creation of multimedia products improves the learning potential for users. This means designers of educational websites and multimedia need to be aware of the user of the

product including basic knowledge of information processing and cognitive learning theories. Cognitive processes mature as children age. Designers of materials for younger children must consider different design elements than materials designed for older children. Understanding cognitive processes will improve overall design (Kirk & Kiekel, 2010).

Putting something onto a website and calling it educational doesn't make it so. Most websites use flashing buttons, random noises, and images having little to do with the content presented. Often, designers of educational multimedia have no experience with the content or sites are created by content experts who have no experience designing multimedia (Kay & Knaack, 2008). Visual elements should aide the user in understanding the materials, however, they are often added as an afterthought in the creation process.

Assessing the suitability of educational multimedia is difficult. Currently, there are few published assessment tools. Evaluation methods primarily look at learning, accessibility, interactivity, and reusability. Readability is rarely included (Kay & Knaack, 2008). When included, it is primarily related to text with little consideration of other elements on the page. Because visual elements can assist or detract from text, we need a new way to evaluate readability by considering how visual features (images and text), navigational elements, and statistical readability combine to help children process the information they are receiving to improve learning.

### ***3.2 Visual Elements***

The Internet is rapidly becoming more image- than text-oriented. With increased use of multimedia, users are confronted with a wide array of textual and

nontextual features. Textual features include: Font choice, size of text, line length, placement of text, and contrast of text on background. Images are visual symbols representing concepts and ideas. Today's students are more comfortable with images, often gaining knowledge from them. Adding pictures and graphics to webpages may aid in comprehension if used appropriately (Acha, 2009; Burns, 2006). Images not carefully chosen to aid in understanding the information tend to distract.

Analysis of visual symbols allows a perspective in which to focus on the symbolic processes by which images perform as communication. Description of visual images contains two components. The first is naming major features: Space, media, and shape. The second is suggested elements: Concepts, ideas, themes, and allusions inferred from visuals (Foss, 2005). Recognition of the integration between images and text is imperative for designers of these materials. Using familiar metaphor will help designers choose relevant graphics that assist in comprehension (Williams & Stimatz, 2005). Instructional goals must be communicated to designers so images can be chosen based on reading levels and cognitive abilities (Kirk & Kiekel, 2010).

Typeface choices designers can make to represent text on electronic resources are abundant. Typefaces should avoid confusion between letters (Frascara, 2004). Choosing typefaces more conventional and familiar to students, will be easier to read. Because it is more difficult to read from a computer screen, size and placement of text and images is just as important as information on the site (Goldsborough, 2001; Sutherland-Smith, 2002; Walker, et al., 2005). Inappropriately sized text makes reading more difficult (Carter, Day & Meggs, 2002). Standard upper and lower case text should be used because it aids in

making fonts readable. Text-heavy screens should be avoided for the same reason. Appropriate line length should also be considered. Lines overly short will tire a reader because the eye must change lines too often (Carter, Day & Meggs, 2002). Lines too long make it difficult for the reader to cascade to the next line, reducing comprehension (Gordon, 2001).

Contrast between text and background also affects readability. Because color combinations vary on computer screens depending on resolution, designers must be aware of color choices (Rabinowitz, 2006). For easiest readability, dark text on a lighter background is considered the easiest to read. Using lighter colors for background also reduces glare (Williams & Stimatz, 2005). Thinking and planning for visual elements is just as important as the actual content.

### ***3.3 Navigational Elements***

If there is no good reason to include something on a page, it should be eliminated due to the possibility of increasing the extraneous cognitive load of students (Hogg & Eckloff, 2008). This includes not just text and images, but also navigation. While newspaper publishers report people rarely follow news below the fold, one study suggests people will scroll down on a webpage if visual elements suggest pages do not end (Abilock, 2005). Therefore, navigation should entice users to fully explore sites.

Pages of a site should be consistent in layout and design. The homepage should detail organization (Abilock, 2005; Hsu, 2006). If readers have difficulty navigating, they will not pay attention to content being presented (Abilock, 2005). Navigational controls should be placed in the same location on all pages with all pages linking to the homepage. Reducing the

number of links also aids in navigation. This is especially important for younger users who tend to click on all links available to them, increasing cognitive load and leading to frustration. Effective navigational control allows learners to be more efficient in locating information and in control of their learning (Hsu, 2006).

### ***3.4 Statistical Readability***

Statistical readability has long been acknowledged in reading research. Over a span of almost one hundred years, many readability formulas have been composed; more than 200, nearly all concentrating on text (Kirk & Kiekel, 2010). These formulas are created using factors such as sentence length, number of long words, extent of difficult words, and vocabulary difficulty.

Gunning (2003), Fry (1977a), and Chall and Dale (1995) note that important factors to be considered regarding reading materials include legibility; density of concepts; familiarity with subject matter; physical features of text, including size of print; quality of illustrations; number of words on a page; appeal; background experience; story structure and style; language structure; and interaction of illustrations with text. Gunning (2003) emphasizes that objective and subjective factors must be considered.

## **4. Methodology**

Foss (2004, 2005), Kenney (2005), Ott and Dickinson (2009), have presented researchers with a means to explain how visuals on the Internet can be analyzed as rhetorical phenomenon. Images should no longer be reduced to a discussion of verbal grammar (Dondis, 1973) or idealizing and praising images as holistic truths (Mitchell, 1986). Scholarship has begun to correct this tendency by intertwining how we construct

and analyze text and image. Visual rhetorical analysis as methodology was chosen because it allows a perspective in which to focus on symbolic processes by which images perform communication.

The researchers looked at websites recommended by The American Library Association (ALA). Random sites were chosen, but the fact that they are recommended by such a respected organization means they have increased potential to be used by educators for instructional purposes. The evaluated elements were images, legibility, navigation, and statistical readability.

The authors calculated statistical readability of text on the selected websites using the Fry Readability Formula (1977b), the Flesch Reading Ease Scale (Flesch, 1974), and the Flesch-Kincaid Grade Level formula (Kincaid, Fishburne, Rogers, & Chissom, 1975). While these scales have been in use for nearly 40 years, they were chosen for their prominence in current practice and relative ease of calculation. Quantitative calculations were taken from numerous pages on each website. This material was then integrated to provide average readability calculations for each of the formulas.

## **5. Research Results**

### ***5.1 Chris Van Allsburg Website***

The official website of author Chris Van Allsburg (2010) was evaluated. Fantasy is the overall theme of the site. The ALA recommended this site for pre-K through middle school aged students.

Navigation is consistent throughout the website which is important to good webpage design (Abilock, 2005; Hsu, 2006). All pages include a link to the homepage

and navigational controls are in the same place and displayed in the same manner throughout the site. There are links to multiple pages located across the top of a dialog box that show up when scrolling across the links. Navigation submenus are located on either side of the image on the page. Clicking on links takes readers to subpages. However, links do not remain on the screen and when finished reading the page, readers must scroll across links to get submenus to reappear. Effective navigational control allows learners to be more efficient in locating information and more in control of their own learning (Hsu, 2006). Two links take readers off the main site to auxiliary sites Van Allsburg supports. These links open in a new page so readers will not lose their connection to the main page. There are some minor redundancies with the navigation. For example, whether the reader clicks on the book in the Timeline or book title on the Books page, readers are taken to the same information.

Most images on the website are the author's work or photographs of his work. If students are familiar with the books, they will be familiar with the images. Recognizing these images may increase interest in exploring the website. A notable concept of Van Allsburg's images that they seem to be drawn from the perspective of a child emphasizing power of imagination. His images create a sense of wonder, or hint at alternate reality. Images may aid in comprehension, if they are appropriate and carefully chosen to enhance content (Acha, 2009; Burns, 2006). There are two photographs readers must assume are Van Allsburg. One photograph is a picture of a person (assumed to be Van Allsburg) sitting next to a child. Readers do not know who or why this child is in the photograph which violates the rule of using images to enhance content.

The website contains standard writing, but there are spelling, punctuation, and capitalization errors throughout. Typefaces are conventional, either Calibri or Verdana which may be more familiar, so the student may be able to read text more fluently (Rabinowitz, 2006). Most pages on the site use line lengths of approximately thirty characters with six to seven words per line. This is slightly less than recommendations for optimal line length in a digital environment, however this website is recommended for younger viewers who have less experience with digital media, so shorter line lengths may be preferred.

Some pages require readers to scroll within a dialog box. On these pages, two arrows are located to the right of the box. This feature is not readily obvious as a navigational control. When the mouse is placed over the arrow, text scrolls very quickly, but cannot be read while scrolling. In some cases, there is more than one additional dialog box of text, so readers have coordinate the mouse off the arrows at the right time to make sure information can be fluently read.

When incorporating color, it is important to achieve an appropriate contrast between type and background (Carter, Day & Meggs, 2002). Text in all capital letters appears as display text which is the same color as the background, but in a lighter value. This site also uses light-colored text on a dark-colored background. The primary reason this combination should not be used is light text on dark backgrounds cause halation and decreases comprehension (Rabinowitz, 2006; Baines & Haslam, 2005). On some pages, the light text appears to bleed into the darker-colored background.

The Flesch Reading Ease (Flesch, 1974) formula rates text on a 100-point scale. The higher the score, the easier it is to understand text. The Flesch Reading



Ease score for individual pages range from 9.1 to 87.8. The average statistical readability for the entire website is 64.89. The Flesch Kincaid Grade Level (Kincaid, et al., 1975) score rates text on a United States grade level. For example, a grade equivalent score of four means material can be understood by a fourth-grade student. The Flesch Kincaid Grade Level score for individual pages of the site range from 3 to 15.8. The average statistical readability for the entire website is 8.44. The readability graph developed by Fry (1977b) was designed to identify grade-level scores for reading material from first grade to fifth year in college. Fry recommends using three representative samples, but stresses that if more samples are taken, the more accurate the readability results. Fry's readability graph predicts difficulty of material within one grade level. Representative samples range from 3 to 13. The average grade level of the entire website is 7.95.

### *5.2 J.K. Rowling Website*

Author J.K. Rowling's (2010) website was also evaluated and also has a fantasy theme. It is recommended for elementary and middle school students. The site opens up to a view of a cluttered desk. An animated spider moves across the desk and a butterfly flutters across the screen. Random noises also sound.

Initially viewing the page, there appears to be no obvious means of navigation. As the mouse is scrolled across the page, however, images on the desk highlight to indicate the user is able to select the item to navigate to a new page. Alt-text is revealed as the mouse is scrolled across items. Keeping with a theme in the author's books, items on the desk are considered portkeys which take the user to different pages within the site. Through trial and error, the

user is able to figure out navigation of the site. However, the site breaks basic guidelines that navigation be clearly defined and consistent throughout the site (Hsu, 2006; Abilock 2005).

Images found on this website do not readily extend user knowledge of what is stated in text. One example is on the News page, accessed by clicking on the newspaper. Small images appear to be icons. However, no explanation of what these images are or how they fit the content is given.

This site breaks a primary rule by using several typefaces throughout the site. Not all these typefaces are considered to be standard. Text does not fit a single screen requiring users to scroll through several screens. This makes reading more difficult. Most pages use small font sizes and some pages ignore the contrast rule, such as placing red text on a black background.

Again, the Flesch Reading Ease score, Flesch-Kincaid Grade Level score, and Fry scores were calculated for the site. The Flesch Reading Ease score ranged from 28.5 to 100 for individual pages with an average Reading Ease score being 62.89. The Flesch-Kincaid Grade Level score for individual pages range from .5 to 17.1 and the site received an average rating of 9.09. The Fry grade-level score ranged from 6 to 17 for the site, with an average of 10.56 (Kirk & Kiekel, 2010).

## **Conclusion**

Instructional design for educational use needs to consider the entire website and audience. All sites had rather high statistical readability for their intended audience. This is concerning for educators and parents given their recommendation by the ALA.

Educators cannot ignore the impact of the Internet and technology on classrooms. A goal of this research is to make instructional designers aware that creating usable websites is more than just putting up information. Creating websites that are readable is essential in keeping readers engaged. This goes beyond simple cosmetics. Planning and structuring, production, and evaluation of communication must be assessed. Designers and developers must focus on organization and visual interpretation of messages. Stakeholders must learn to evaluate websites to make the best choices for use in instruction.

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## **C**HAPTER 31

### **VALUES OR TECHNOLOGICAL EFFICIENCY: WHAT IS ESSENTIAL IN A PEDAGOGICAL PROJECT?**

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#### **Abstract**

This paper is built based on pieces of research conducted in Brazil, specifically in Rio de Janeiro, three investigations connected by the same thematic thread: high school youth and their teachers coming from public and private schools in Rio de Janeiro, Brazil, talking about their practices concerning the use of digital media, books, and television, and about what they think about the values and issues of the youth who experience the beginning of the 21st century. The data confirmed that young people have a great familiarity with digital and computer media. In contrast, their teachers manifested a more conservative position. Both youth and teachers cohorts show, each in its own way, a universe of concerns regarding what both groups call a "crisis of values." The research has shown that neither the modalities of moral judgments nor the values themselves



are homogeneous, and that in each individual there is a certain "mixture" of levels: individual, local, social, universal, and so on. Therefore it is the life they live out that really shapes the field of moral questioning. The research also combines the testimony of the young people, the teachers, and the nature of the government measures. This combination points to a very large gap between values, attitudes, and effects on the issue of education on the part of the stakeholders.

## **Keywords**

ICTs & Education – Youth – Internet – Teacher-student relationship – Values and issues

## **Introduction**

Unlike many authors, I enjoy writing not only about what I have learned from authors I consider references, but also my forays into the empirical world. It is not that I do not believe in what is theoretically discussed; it is just because I understand that comparative studies between contexts are essential because there must be "different strokes for different folks," and also because "one man's medicine is another man's poison."

Therefore, when talking about people, mainly young people and their teachers, I see that often what gets published is related to how urgent it is for all the generations to take in the media innovations, under a globalized view, and, in a way, without proper contextual differentiations. This situation divides readers' opinions about the technology that nowadays sets the world upside down, mobilizing the pessimists, but charming and dazzling the futurists.

I'm not against it. It just afflicts me that events and emotions get generalized, not being given enough time for a more thorough look into the values that

might be emerging and that are underlying these media practices.

Personally, in many publications I see an erratic, almost frantic rhythm of the urgency for everyone to step into this digital era. This does not hold me back, but I like to look for signs that this world, which is still unknown to many, is being applied to the values and beliefs of all of us

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“Would Christmas have changed or have I myself change?” asks a Brazilian writer<sup>1</sup>

This is also the question that permeates this article, which, coming from my writings, is built on pieces of research conducted in Brazil, specifically in Rio de Janeiro—three investigations connected by the same thematic thread: high school youth and their teachers coming from public and private schools in Rio de Janeiro, Brazil, talking about their practices concerning the use of digital media, books, and television, and about what they think about the values and issues of the youth who experience the beginning of the 21st century.

## **1. Networking young people**

Networking young people is actually the culmination of a series of investigations on youth and mass media that detected a strong relation between the materials broadcast by these media and the construction of

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<sup>1</sup> Ending of a sonnet by Machado de Assis, one of the greatest Brazilian writers and one of the founders of Academia Brasileira de Letras (Brazilian Academy of Literature), *Poesias Completas—Ocidentais*, 1901, p. w/n.

values and the problems pointed out by young urban people. Besides, it was proven that another kind of media process exists that advances beyond the printed newspaper and television: the Internet. It was through this thread that we arrived at the development of the research called Networking Young People, which analyzed the conditions, the use, and the representations they had toward the Internet.

We worked with a survey of senior high school students recently accepted into college obtained through a voluntary questionnaire on their use of the Internet; 965 students from different districts of Rio de Janeiro and with significant class differences responded (N=1500).

The group was composed of females at 51% and males at 49%, aged 17 to 19, divided into two groups: those who entered university through a competitive exam or through ENEM<sup>2</sup> —hereinafter GROUP A—and those from ProUni<sup>3</sup>. These students were born when the commercial Internet appeared and the computer and video games were in widespread use. So, if we cannot consider them thoroughly contemporary to this era, we also cannot consider them fully alien, as some of their teachers do to a certain extent. The fact that the ProUni group is in the same age group as the others contradicts the common sense in Brazil that young students from less favored backgrounds enter university later.

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<sup>2</sup> The Exame Nacional do Ensino Médio (Enem) is an exam created in 1998 by the Brazilian Ministry of Education to be used as an entrance exam into Brazilian universities and as an assessment tool of the general quality of high school education in Brazil.

<sup>3</sup> ProUni (Programa Universidade para Todos—"University for All Program"), a federal government initiative, grants full-time scholarships to undergraduate students at private institutions geared toward poorer students who attended high school at public schools.

Everybody declared that he or she knows how to use the computer: GROUP A for over 6 years and the ProUni group for 4 to 5 years, the difference probably being due to the different financial capabilities of the groups. Thus, digital illiteracy, supposedly of less favoured classes, was not observed.

In GROUP A, among the radio, books, magazines, television, and the computer, 46.3% preferred the computer. Television, a mass medium that is more popular, ranked below the computer (25%). Perhaps technological advances will increasingly expand hypermedia capabilities, making activities once restricted to the television much more attractive on the computer.

In the ProUni group the use of television prevails as entertainment (43%), seconded by the computer (18%). It was interesting to relate these data to the question of having or not having a computer at home. Indeed, in GROUP A, 97% have a computer at home, while in the ProUni group 64% do, and therefore watch more television. However, as we shall see later on, not having a computer does not stop the ProUni student from browsing the Internet, having an email account, taking part in social networks, having blogs and photologs, using social networks and Skype, or even searching for information online as commonly as students in GROUP A.

Seen in its entirety, 98% browse the Internet daily or at least 2 or 3 times a week. How do the ProUni students access the Internet? From their friends' houses, school, work, and in places such as cyber

cafes (Lan houses)<sup>4</sup>, which are a lot more ubiquitous in low-income communities than in more privileged urban spaces, which was confirmed by research carried out in 2008 by the Internet Management Committee in Brazil. This paper indicates that there has been a 100% increase in the use of public spaces with Internet access, as well as of Lan houses. The Lan houses, at the time of the research, were responsible for almost 50% of Brazilians' access to the world wide web, as compared to 43.39% who access it from home, 25.3% from work, 16.69% from someone else's house, and only 18.48% from school.

We can say that there is not only diversity in how young students consume media, but also a new developing culture.

Just as a majority of the students questioned prefer the computer in their free time, it is also true that they use it to search for information. This reinforces the idea that an Internet connection has become a given with computers, since it is essential to obtaining information; however, without exaggeration, as a young fellow said, "I can easily live without the Internet."<sup>5</sup> The data show that they prefer to go out and meet with their friends—"It is better to go out, to play real soccer than Playstation"; they are interested in the media for personal use because they are allowed to prolong real relationships beyond the limitations of space and time.

The computer, television, and newspapers have very close percentages. Although data show that the

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<sup>4</sup> Lan houses are considered a powerful tool in the process of digital inclusion in Brazil, chiefly, in Rio de Janeiro and São Paulo, because there are many of them in poor communities ("favelas").

<sup>5</sup> The speeches of members of the groups under study are written in italics.

students do not read the newspaper continually, they credit the printed newspaper with a degree of legitimacy as a grounded and trustworthy source.

Thus, young students obtain information from the TV news, complement it by resorting to the online newspaper, and discuss it with their friends, colleagues, and family members.

The data collected have shown that the concept of context cannot only be expressed through geographical boundaries or restricted to the school environment, thus ignoring the continuity of the educational process, which unfolds, intentionally or not, through countless relationships in other spaces, including the virtual one.

In GROUP A, we predominantly found a preference for the "traditional textbook" as the best means to study; in the ProUni group, the favourite choice was "Internet sites" (29%), followed by a "textbook accompanied by audio" (23%). The vast majority looks down on the possibility of using photocopies to study, although it is a widespread pedagogical practice.

We did not expect to find traditional textbooks to have a high acceptance. Our hypothesis is that books have a somewhat sacred appeal to students, who equate them with the "possibility of increasing their knowledge"; "active wisdom"; "boring but necessary"; "the third pillow"; "never forgotten"; "seriousness"; and the "best source of knowledge." No one suggested that the book is negative, of little educational value, or harmful!

Television, however, was massively reported as being alienating, not constructive, which also demonstrates the same bias (in this case, negative) toward books.

Both positions can be important points to consider when discussing how this dichotomy persists in our context.

More than half of the group learned to use the computer on their own, which reinforces the idea that the age of computers and the Internet is based on the fearless exploration of the new. Only in ProUni, 17% learned at school, possibly because they did not have a computer at home or friends with computers at home.

More than half of all young students indicated they were curious about computers, as well as a previous positive assessment in relation to the efficiency of this technology for purposes of entertainment, research, studying, and obtaining information. We did not detect any pessimism in relation to their ability to handle computers. The students are very clear about the ideal conditions for the understanding of the contents of a website.

Orkut and Facebook are used as socializing spaces, and Google is predominantly used for searches.

Doing several things at the same time seems to be the *modus operandi* of today's young people. This corroborates the idea that young people are increasingly in search of hypermedia that incorporate other media, and we observed that they relate to the Internet in an integrated manner and that, many times, it represents an amplification or a continuation of other experiences lived outside cyberspace.

Data also indicated that these students use the computer as an information technology which greatly helps them do their schoolwork, research, and work. However, the ProUni group (25%) rarely uses the computer, and 4% of these never use it. In our

experience, this fact can be easily understood by the differences in earning power and the lack of opportunities that the less favored classes always face.

The most important finding of the research was, therefore, the fact that there is no difference in the attribution of meaning, the valuation, or the forms of representation and use of the Internet between young students from higher social classes and those from lower income classes. The differences found rested mostly on the socio-economic conditions of the groups, but never on a possible digital illiteracy of the less favoured.

## **2. Networking teachers**

When studying the context of the lives of young people and adolescents, we always associate to it the figure of the teacher, because in this area of their life their teacher, rather than their parents, constitutes the universe of their communication.

That is why we also turn our eyes to the teachers who taught the young students from the research called Networking Young People. It was important to know their representations on the Internet, their goals and frequency of use, the influence of the Internet on their everyday lives and its appropriation as well as frequency of use in their classes.

The group under study was made up of an intentional sample of over 100 teachers, evenly distributed between the sexes (56% males / 44% females), working at several different public and private high schools and teaching several subjects: Portuguese, literature, mathematics, physics, chemistry, biology, sociology, philosophy, history, geography, physical education, computer science, English, Spanish, and religion.



A great many these teachers (50.7%) had been teaching for over 15 years; 83.3% of them had been using the computer for over 8 years, and 59.4% of them for over 11 years. The period during which teachers mostly embraced the Internet ranged from 1998 to 2004 (89.8%), which means they were not born in the digital age but they understand that the Internet today is a reality; in every region of the world, according to findings from Internet World Stats<sup>6</sup>, Internet use has grown, altogether, more than 300% in recent years.

Also a great many of these teachers learned to use the computer by themselves (57.2%) or out of a work-related need (30.4%). Those who already mastered using a computer amounted to 43.5%. Reading and taking courses were not significant doors to computer science (17.3%).

All surveyed teachers had, at least, one computer at home with broadband access to the Internet; 81.9% of them bought their computers in order to study or work, using them mostly to prepare class material.

Among the latter, the idea that prevails is that the introduction of technology, in and of itself, does not guarantee the adoption of these gadgets by teachers and does not promote the expansion of the field of educational media among Brazilian schools, and therefore is not considered an element that engenders pedagogical transformations.

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<sup>6</sup> The Internet World Stats statistical data are calculated based on information gathered by Nielsen//NetRatings, the International Telecommunications Union, local NICs, and other trustworthy sources. The data can be found at <http://www.Internetworldstats.com/sa/br.htm>, and were obtained on 16, October, 2011.

As regards their current use of the Internet, 71.7% always write emails; 93.5% always or almost always use search engines; 72.5% read content pages; 54.3% type texts, exams, and documents; and 27% download programs and other software. However, these teachers admitted rarely using the Internet for entertainment or cultural “wanderings” without having a professionally-oriented goal in mind.

Although teachers indicated that they have free time and liberty to use the computer at school, they complain that taking it to the classroom is difficult. Thus, in the schools where they teach, they still make very little use of the computer and of the Internet, no longer because they cannot use the device, but because they lack the right conditions to access it in their everyday school practice.

The teachers also pointed out that the lack of time in class, the large number of classes in a row, and the need to work at several schools to make a living, among other reasons, stop them from using material available on the Internet in the classroom or in computer labs. The result of this state of things is that explanatory classes and printed material still prevail.

We also researched the changes that took place in the lives of the teachers as regards work, study, and access to information, communication, and time optimization. A great number of them (70%) affirm that the Internet changed their lives for the better. In relation to issues of money and relationships, most answers indicated no change; a change for the worse ranked very low, and time optimization reached 8%.

When asked what they usually did to occupy their free time, the teachers responded that they primarily used the computer and the Internet, followed by reading

books. They are quite sure that books are not used as much as before. Printed media are regarded as equal to digital media. The computer is seen as possessing versatility when used in their free time, but also as a source of information; it is a device that allows access to the Internet and to television itself. In fact, television is no longer the primary source of entertainment, since it is now much less frequently used in comparison with other activities, perhaps because teachers, as do young students, have a negative representation of television. The radio ranked very low.

Finally, with as regards the routine of these teachers, 33.3% admitted that the time dedicated to work increased after they started using digital media. The rest of their routine remained the same.

The responses about which aids teachers use in their classes were assessed at different levels. Films are the absolute winners, perceived by 64.5% of teachers as attractive and useful. Next are Internet websites at 58% and CD-ROMs at 50%. As regards films, we know that teachers have already internalized using them, especially in subjects that feature an array of DVDs, and also because most schools have a DVD player.

It is curious that teachers affirmed using ICTs, since it contradicts their responses to another question in the questionnaire, where they indicated that ICTs are difficult to use in the classroom. Perhaps they were referring to the use of computer labs, whenever the school possessed one, or to the assignment of searches for content on the Internet outside of school, which very often made students resort to Lan houses in order to do their assignments.

Textbooks and handouts received similar evaluations (between 35% and 40%) as regards their usefulness,

although 50% of the people in this same group dislike the use of photocopies, but 20.3% still use photocopies against their will. Considering everything the teachers pointed out, we can ratify what was said before: classes remain mostly explanatory and dependent on printed media.

It is understandable to notice that the teachers interviewed are not fond of chats, blogs, photologs, and so on since they are uses and practices that were not available in their adolescence.

A third point that emerged from the empirical data is that, differently from previous years, nowadays curiosity and expectations remain high in relation to ICTs, except now they are based on evidence of gained knowledge.

However, there are still some teachers who barely give in to the use of computers, arguing that, nowadays, they reckon everything can only be solved by digital means.

- I had to learn "whether I liked it or not." You can't do without a computer.

- I hate computers...I had to learn...I'm having a hard time!

On the other hand, the idea remains, at least implicitly, that older people should be regarded as having greater knowledge than their younger peers; thus, not knowing how to deal with computers and the Internet causes fear in teachers:

- I cannot see myself as an educator as long as I cannot answer questions people have.

Comparing, therefore, the behavior of the young people and their teachers, we get the idea that ICTs are related to "youth," that is, the tendency to hail youth and its values. The cult of the Internet seems to be from the predominantly young, "from the young to the young." "It is conceived of as a kind of process of permanent revolution in which young people determine the direction of movement" (Breton, 2000 p. 87). The wealthy, today, are young people; the poor are older.

- I notice that teachers who are not digital natives are having a hard time (I am digitally illiterate compared with my son) in relation to younger people.

To many teachers, in established projective behavior, information technologies often resemble witches, while books have more in common with fairies.

On the other hand, the surveyed teachers keep to the deeply rooted idea that students are unable to discern the good from the bad in the network, so they don't know how to have the best use of Internet.

- Actually, even though many of them use the Internet, the students do not know how to use the potential that it represents. Thus, they download the material and they do not know what to do with it, how to edit and provide the data.

At this point the presence of a teacher is considered very important.

- We really try to put a filter, it is difficult, it is hard work, but we try to work as a filter, and then I think the mediation work of the teacher is so important. We always have this mission, this concern to filter...we even discussed this: the responsible use

of the net...discussing with them about these two possibilities of the Internet.

It is interesting to mention here the other end of this set of assessments of the Internet, given by some surveyed teachers: the Internet is regarded as instigating and fantastic, therefore something forward-looking that excites people, an icon of the liquid modernity that Bauman (2001) talks about. In this case, the idea of a new world has several points in common with the current trend revolving around the Internet, which mobilizes thousands of young people and adults alike in the search for a more fraternal, peaceful, communicative society.

From this perspective, the world of the Internet could be seen as "underground in its own way, the current underground, a place where the ordinary world can be escaped" (Breton, 2000 p. 81).

Finally, we also found some reasonable opinions from many teachers about the value of the Internet:

- [The Internet] is the place where one searches for something; the student can insert and remove things, he or she searches for and provides information. Instead of goods, information is traded. The Internet makes trading possible.
- I see the Internet as polemical for those outside of it. They [young people] use the tool as a means of socializing. We tend to get a little neurotic about finding several things. Perhaps we find it polemical because we do not use it or know it enough.
- The socialization mediated by the computer is sometimes seen with prejudice, but it is a great thing.

If we bring what the youth say and what the teachers say in the research side by side, we see that, in their collocations, there comes a range of beliefs concerning what is new and has no way back. This leads us to ask, as a result, whether the values present in the current times are in the process of change or if they are just presented to us in different “clothing.”

From all that has been discussed this far, we observe that, for seemingly different reasons, the youth and the teachers in the surveys are talking about the same scenario where values are forged: the cultural context in which the school is inserted.

In Brazil, which is considered an emerging country, in which the Internet has increased more than 1,250%, whatever happens daily in a school reflects, largely, what the government policies and state administration in different management consider as essential programs to be implanted.

The inclusion of schools in the media world is, therefore, one of these programs. In fact, I’m not against these projects themselves, but under what conditions they are taking place.

Due to its geographic size, population, and huge socio-economic differences among its regions—in all social levels, but especially in the areas of education—large government projects are being deployed as a guarantee of entry to public school in cyber culture.

In this regard, there are two well-defined positions: on the one hand, the Brazilian government is concerned to raise the quantitative indices for the presence of ICTs in schools through government action nationwide. On the other hand, pedagogic analysts are denouncing the dangerous gap between the expansion of the field of media education in Brazilian schools and

the true quality of education that shall apply only if they observe the profound differences that mark the regions of Brazil.

Among the latter, the idea prevails that incorporating ICTs into everyday school life and getting teachers onboard to use these devices are not the guarantee of quality improvement in education. Clearly, to those analysts, the ICTs alone cannot be considered evidence that will trigger pedagogical transformations. We fully agree with them.

It seems, in first approaching the analysis, that we are facing two different situations: on the one hand the need for technological advancement that, evidently, puts the country in the ranking of the developed nations, and, on the other hand, the professional quality of the teacher, which does not happen only in the field of digital media. In other words, being inserted into the media world does not mean having a good teacher.

What would then be missing for this professional? Increased technical training, knowledge of what he teaches, knowing how to teach? Surely, these are essential points and they should be taken into consideration in the field of education. But, it seems, there is a confusion of values that creates mismatches among purposes, actions, consequences, and, above all, imbalances in searching for the desired results. What do we want with these current practices in school? Which values do we intend to achieve?

About what values, therefore, are we talking?



### **3. Values or efficiency: sketching some conclusions**

In listening to 1,202 young students from Rio de Janeiro talk about values and issues that, according to them, the youth of the beginning of the 21st century face, and also a group of teachers who discussed the same theme in focus groups, we conclude that youth and teachers show, each in their own way, a universe of concerns regarding what both groups call a "crisis of values" (Mamede-Neves, 2008; Mamede-Neves, Pedrosa, & Fonseca, 2010).

The responses of the young people and the teachers make up a space for ideas, concerns, and socio-moral experiences that are close to the problems of identity and moral socialization of the youth.

For this group of young people, at their core, it seems to be the general perception of an atmosphere characterized by the disagreement or snarled coexistence of what is desired and desirable, as well as social conditions.

Taking as our basis the theoretical premises of J. Bleger (1989) from the field of social psychology, we sought to gather this vast range of responses from the young people, according to what was most relevant to the individual field, to the field of interpersonal relations, to the field of social context, to the field of planetary values, and, finally, the field of universal values.

Regarding the total responses we had in our research on the values that the youth of today have, we have found that, as a primary value, 55% of the young people interviewed connect their values to the social field; 18.2%, universal values; 11.9% have values connected to the individual field; 10.5% to the field of

interpersonal relationships; and 4.3% have values connected to the planet Earth.

Regarding the issues, we found that, relative to the social field, the percentage goes up to 82.3%; only 7.3% point to problems connected to the relational field; 5.5% connected to the individual field; and only 4.9% to the planet or transcendent values.

Thinking of the total responses, both related to values as well as to problems, we find there are similar results between these two orders, in the sense of the preponderance of the social dimension, and, regarding the problems, this category gets further accentuated.

Values inside the category "universal" are mentioned by 18.2%, but they are pointed out by only 4.6% when referring to issues. This is understandable, when one considers that there is a concrete nature to the problems, which require an actual resolution, while values can be thought of in a more idealized way.

Seeking to learn what issues these young people talk about, by order of highest incidence, we found: jobs, economic stability, relationships, success and prestige, having a good personality, followed by (with lower incidences) citizenship, family, freedom, individualism, and also happiness and life improvement.

When they refer to youth issues, they mention, with highest incidence, violence, unemployment and the labor market (scarce), drugs, competitiveness, corruption, financial difficulty and an uncertain future, low quality of life, the country's situation, family issues, and prejudice toward young people.

Interestingly, education and schooling are not mentioned either as values or issues, which makes us suppose that maybe they are built into the social field.

In carrying out a qualitative analysis of the data collected (Mamede-Neves & Vidal, 2008), taking the values and the issues pointed out by the young people together, the answers show concern for and socio-moral experiences with a person's values and immediate circumstances, which, however, do not exclude an approach to the issue of identity and moral socialization of the young person.

In other words, even though they mention mostly the socio-contextual field, they allow a generalized perception of the crisis of values, a climate characterized by disagreement or coexistence of what is desired and desirable.

The research has shown that neither the modalities of moral judgments nor the values themselves are homogeneous, and that in each individual there is a certain "mixture" of levels: individual, local, social, universal, and so on. Therefore it is the life they live out that really shapes the field of moral questioning.

In regards to the teachers, it was not possible to carry out deep research about the values and issues of the youth of the beginning of the 21st century. However, observing the results of the focus groups of teachers discussing the significance of the Internet, most of them show their concern about having to play the role of "advisor," always emphasizing their mission to bring good things to the student.

Thus, the teachers, almost always, must be mediators of that which is good, never of that which is bad. As a matter of fact, in Brazilian society, very often, what

prevails is the idea that teachers are always the mediators of that which is good, never of what is bad.

Their speech points out that, despite the remarkable presence of the Internet and its undeniable value in knowledge building, teachers are still not able to apprehend it as an element of teaching. Quite the opposite, they look at its great dangers and fret about the youth's lack of preparation in facing these dangers.

They talk more about the issues than about the values of today's youth: their recklessness, their lack of commitment to what is serious, their immediacy to get what they want, their huge lack of interest as to what the school teaches them.

Among the most important causes, they mention the easiness of the Internet; the great attraction that it exerts on young people for entertainment, instead of serious study; the fact that teachers are still not ready for this new social order, which results in pessimism and wavering in any effort to change, renew, or reinvent the school that they themselves consider a complete failure.

Less than grieving over these opinions showed by this group of teachers, we feel the need to combine the testimony of the young people, the teachers, and the nature of the government measures presented in this paper. This combination points to a very large gap between values, attitudes, and effects on the issue of education on the part of the stakeholders.

When stakeholders share common values, attitudes, and purposes, things go well, but problems can arise when this is not the case, as in Brazil. In the interaction of stakeholders from different socio-cultural

groups it is not so much alignment or misalignment of “behaviors” that is important but the alignment or misalignment of the values, attitudes, and purposes implied by those behaviors.

Even if government strategies get changed for implementing technology in schools, for teachers training, and technical training, there still remains, from my view, the lack of a political pedagogical project that embraces more than just the demands for technological modernization of the school buildings and the specific training for teachers and school managers. I think of the need for a pilot study on what is actually happening in regards to the involvement of teachers with the innovations imposed by the central administration, in regards to the relationship between teacher and student, what has been broken in this duo, and what needs to be reinvented.

From all I have researched, which also deserved theory studies, I do not draw standard formulas; I draw from it the sure knowledge that, in the field of education, any proposal that is intended to be successfully implemented in any culture or group will have to be necessarily oriented by the comprehension of the specific conditions of the values of such group and its traditions, the interpersonal relations that connect the elements of such culture, and, most importantly, the tune of the stakeholders in what regards the human essence.

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## **C**HAPTER 32

### **COMMON VALUES OF YOUNG PEOPLE IN A VIRTUAL COMMUNITY: SPECIFICS OF SOCIAL COMMUNICATION AND FAN ACTIVITIES**

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#### **Abstract**

The performed surveys suggest that one of the most active user groups of electronic media - fans of television series, who are often highly qualified electronic media users, create and cooperate on a vast amount of activities (video-clip editing, fan fiction creating etc.) that further enhance their spectator's pleasure as well as the impact of original product. The activities should be supported by current educators. This article will present the case study of a Czech virtual fan community of Buffy the Vampire Slayer on both subjects mentioned: fan activities and social communication in a virtual community. As regards the age, the interviewed group is not homogenous. It includes both teenagers and



young people from 20 to 35. The socio-economic status of the group is also diverse. Some of them are pupils, others high school or university students, and many of them already have a regular income and families. Despite their differences, we can identify their common values, attitudes and purposes in relation to their interest. Before the study, I knew the respondents of this study for more than two years thanks to the discussion forum at [www.buffy-angel.org](http://www.buffy-angel.org), which enabled long observation of the group development in the sense of our similar values, attitudes and purposes.

## **Keywords**

Online communities – Communication – Fan activities

## **Introduction**

Today's highly developed electronic media have an enormous impact on how young people spend their leisure time. They can be either interested in the individual consumption of media contents such as playing games, watching television or browsing the web or they can be considered more sophisticated users and active participants of media flows that surround them. A contemporary world of various online offerings creates a space where popular culture audiences can come along and discuss their favourite TV shows without having fear of being ridiculed with reactions of misunderstanding or depreciation.

Media fans can be described as consumers/creative content producers: readers who also write, and viewers who also participate (Jenkins, 1992). Fan activities are being recognized as an important base for media activities as such, and quite natural roots of cultural production and distribution. Frequently, it is the fans that pioneer the possibilities of participatory processes and culture through new media (Jenkins in Lancaster, 2001).

According to Jenkins the model of fandom can be built on following four pillars: (1992: 210):

- 1) Fans accept the distinctive mode of reception. Their media consumption is not occasional, and it certainly does not serve as a vehicle for traditional leisure-time activities; on the contrary, it is rather selective and as such it is well-controlled by fans themselves while all media programs are watched on a regular basis; they are recorded, stored and discussed continuously.
- 2) Fandom creates a specific and interpretative community. Fandom is formed in its very nature as a social leisure-time activity whilst it is perceived on an institutional level of participation (clubs, live chats, conferences) that serves as a vehicle and source for cultural and knowledge exchange.
- 3) Fandom creates a specific artistic world. In doing so it follows its own standards, habits, critical evaluations etc. The world of fandom differs from the constituted world of art in its focus on cultural recycling, and thus creates a sort of counter-culture.
- 4) Fandom incepts alternative social community and for that reason it is attractive for minorities and those whose interests could be otherwise hidden in isolation.

However, Jenkins later (2007) doubts his own classification in an effort to differentiate fans and spectators: "Concepts of the social dimensions of fan culture are changing. There is no longer the „weekend-only world“; this kind of fandom is everywhere and all the time, a central part of the everyday lives of consumers operating within a networked society." (Jenkins, 2007: 361). "(...) Certainly, there are still people who only watch the show, but more and more of them are sneaking a peak at what they are saying about the show on Television without Pity, and once you are there, why not post a few comments." (Jenkins, 2007: 361).

This case study will demonstrate the way how we distinguish/define today's fan and "false fan" – someone who is likely to believe in their "fandom"; the way in which we have to move our attention from social subject to fan activities. Let us assume that young people who are fans of the same TV series, and who share the values of the same characters, may vary in the ways of their communication (from simple appearance at a discussion forum to creative expressions on fans' meetings), as also mentioned by Jenkins (2007). At the same time we assume that though these people are members of the same fan community, they do not always have to share the same attitudes towards the story and its characters.

## **1. Methodology**

This study analyses the behaviour and values of members in a virtual community and the modes of spectatorship in one of the most re-evaluated phenomena of recent audio-visual culture – Buffy the Vampire Slayer (1997 – 2003) and its spin-off Angel (1999-2004) – both – in the Czech context to which the issue is rather new. The Buffy series maintains its global cult position in humanities research, and as such it has undergone extensive observation from many traditional fields of research. However, education sciences have been standing a bit aloof from these efforts. The survey is structured into two parts:

- 1) Common behaviour: Shared fan activities and creative efforts (frequency of Buffy viewing experience, creating blogs, webpage designs and subsequent graphics innovations, fan-fiction stories and hypotheses, using foreign languages within the world of Buffy fan-fiction creative efforts);
- 2) Aspects of communication (Buffy-related thoughts and shared experiences, values, attitudes and purpose).

When choosing the method, I started from the experience of authors of comparable studies<sup>1</sup> and from the methodical trend in the sphere of fan studies, although the research design of the existing problem does not fall by far only within this scope. The traditional methods of social research in the form of interviews with the target group are criticized for their inability to capture the experience of mediated lives (Alasuutari, 1999 in Harrington – Bielby, 2007), and within the context of the fan studies, current leading representatives of the subject field often mark them as incapable of giving the true picture of the certain obscurity of the fan's pleasures (Hills, 2002 In Harrington – Bielby, 2007). Today, the research in the sphere of fan studies tends to ethnographic studies that are considered the ideal method for studying the current reception of media. The virtual ethnographic studies also allow more effective combination of the methods.

Usually, fan studies experts, by reason of their efforts to avoid any problems brought about by the role of external observers, objective and impersonal ethnographers, first write from the point of view of the fan, and only then from the point of view of academics (Jenkins, 1998, pg. 263).<sup>2</sup>

I met the respondents of this study two years ago in a discussion forum at the [www.buffy-angel.org](http://www.buffy-angel.org). It

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<sup>1</sup>In elaboration of the research circles I start namely from the more complex findings of Buckingham (1987), and additionally from the partial conclusions of Rogge (1999) and Jones (2003).

<sup>2</sup>For instance, two thirds of the researchers in the study regarding the Global Fan Studies replied that they were fans of what they specialized in: 78% of scientists of the humanities, 67% of scientists of sociological fields, 46% of interdisciplinary fields and 25% of sports management (Harrington – Bielby, 2007).

offered possibilities for lengthy observation of the group development in the sense of our similar values, attitudes and purposes.

This study analyses the results obtained during a series of interviews within the Czech Buffy the Vampire Slayer and/or Angel fan communities in the years of 2007 and 2008. All survey participants quoted in the following pages hold a good reputation and a permanent member status within the Czech web Buffy/Angel discussion group [www.buffy-angel.org](http://www.buffy-angel.org) which is considered the largest web fan site of such a kind in the Czech Republic. All participants quoted here are regular visitors or they even lecture to each other at Czech fan conventions (e. g. Slayercon at The Festival of Fantasy).

The members of the interviewed group are not of the same age, though. There are both teenagers and young people from 20 to 35, with a variety of socio-economic status. There are pupils, high school or university students, and many of them are already employed and have a regular income. Some other participants were not able to attend face-to-face, thus they provided their responses via e-mails. Contrary to our original assumptions on the live-chat being the best option for data collecting, it was not this case, since some of the participants interviewed via e-mail or web discussion groups provided us with more relevant and "honest" answers than those questioned live and face to face. This was especially apparent when analysing speeches related to personal emotions and reception issues.

## **2. Results and discussion**

It is necessary to note that false fans are highly active participants of web-based discussions, and they really cared for taking part in our research. If there is a

lower-secondary pupil with a regularly expressed interest in a 10-year-old TV series he or she can be often mistakenly considered a real fan. Our conclusions, based on live interviews, have revealed that some pupils who considered themselves fans are sometimes nothing more than false fans because of their preference (and expressed interest) for school duties (such as learning and homework). False fans also prefer an easily accessible media product (such as live broadcast) to other forms of (self-)entertainment or the usual extracurricular activities (summer camps, sport events, trips). False fans can be considered to be people who frequently visit web forums, think of themselves as part of the fandom community but who lack a more profound interest or creative participation (cf. Krátká, 2010).

In such case they do not fully meet the four pillars of fandom as defined by Jenkins (1992: 210). There is no fascination – frustration conflict that originates from the development of audio-visual culture, and subsequently the fans have no need to possess the aspects of original culture that immanently incorporate both the acceptance of a part of original work and its partial modification (see Jenkins, 2007: 362).

### ***2.1. Fan activities and creative efforts***

People can communicate the same values using different creative efforts. Fan culture is born out of a mixture of fascination and frustration that equally involves both accepting certain core premises in the original work and reworking others to accommodate our own interests (Jenkins, 2002). Popular narratives frequently fail on the matter of satisfaction, thus providing an opportunity for fans to take care of the prospective development of fictional characters (myriads of fan-fiction efforts that save the story for the future). Repeated viewing experience can be

classified as an intentional activity as well as looking for his or her place in the broader context of a social community of any given media product. An activity separating fans from false fans can be considered an issue while those who actively participate in the creation of the fictional/artistic world are the blessed ones; those that just look for an alternative, interpretative community, while missing active participation in it (passively recycling the current media product) are false fans only.

The Czech Buffy fans are familiar with all the usual approaches and factors of fandom activities such as fan fiction, video clip editing, webpage design and web discussion groups, fan lectures given at conventions, translations of subtitles and game activities (e.g. quizzes and karaoke). These efforts are considered as not worthy of talking about among fans as they are perceived mandatory. However, these activities are done with a serious approach which, of course, does not exclude the aspects of joy and pleasure. The opinion on re-rendering of a media product varies significantly within the Czech fan group.

Some academics even articulated their opinion that it is the Buffy fan fiction that cements the community (Bacon-Smith, 1992). Alongside there exists a number of opinions concerning artistic world modifications even among fans because fandom can be considered as a way of perceiving cultural objects while its characters rely heavily on specific culture merits of every single fan (Williamson, 2005, p. 118). It is rather difficult to find a consensus even among fans themselves who come to different meta-textual conclusions. And most of all, "false fans" have far less understanding of such fan-fiction activities.

## **2.2. Aspects of communication**

We found Czech Buffy fans quite similar in terms of reception, identification and fan fiction creative efforts. However, they differ significantly in the way they communicate about the series. They usually represent different socio-economic and educational levels of society, and they also fill in the communication gaps with the schemes that appeared during live talks. Some of the interviews were highly identifiable because of the heavy use of specific phrases. Frequently, the Buffy case study participants tended to use Anglicisms in order to be most accurate in their spoken expressions. Another specific group was created from those who were able to describe precisely a large number of episodes in its contents but who usually withdrew or failed when asked on the clarification of the series and its representation matters. Although most female informants do not consider themselves feminists, we can identify a combination of both fandom and feminist vocabulary (see Williamson: 61). Communication stereotypes range from resignation from any explanation up to thorough explanations while using more or less relevant arguments. Some expressions may be accompanied by heavy use of formulas.

Interpersonal communication of (not only) Czech Buffy fans flourishes; the fans frequently meet new friends through web discussion groups that make the most of the series for their visitors. Although it is apparent that common interest is not enough for inception of a long-term relationship and its permanent growth, there are examples of such a state. Sometimes, former web discussions can become real-life conversations with prospective friendship-relation development. In the Czech case of [www.buffy-angel.org](http://www.buffy-angel.org) - which is the principal data source of this case study - there is a solid hard core of Buffy/Angel fans: they know each other thanks to their shared



interest, which later transgressed the boundaries of the virtual world. They are united by a number of traumas (concerning family, relationships, sex orientation etc.), which drove them towards identification with the TV series characters. This community is classified by shared loyalty and confidentiality.

## **Conclusion**

False fans and fans are distinctively differentiated through creative activities. Both groups can be very critical of their favourite subject of interest. Identification with a fictional character and fan activities do not exclude a specific critical approach but the permanent joy and pleasure coming from reception are present only for the fans. Although Henry Jenkins (2007) increasingly doubts the possibility of separating the fans from viewers, the presented case study tried to demonstrate a possible way of separating contemporary fans from false fans – the people who usually only think of themselves as fans. The applied method stresses the shift from social aspect to fan activity. Real fans are still out there, being well and alive. However, they must be assessed under more rigorous conditions – with a respect to functional division of both groups.

If an individual is informally led to think about her/himself, about the world and about his/her activities in interesting discussions with distinctive personalities and people sharing common interests, such an individual will not be just a consumer of the contemporary society's products, but s/he can be led to deeper life orientation, change in attitudes or values (Čech, 2009).

Educators should embrace more opportunities resulting from informal grouping of fan communities

as the places of informal learning (Jenkins, 2007). It is also necessary to support the fan activities including sharing the interest with other people within the virtual groups, development of communication skills, creative interests etc. The level of people's understanding of stories told by films, strategies, production and distribution systems is reached by watching films and discussing them with friends. The natural character of this informal learning method is confirmed by the fact that many authors compare it with early language learning (for example Dyson, 1993).

Virtual communities of fans of any TV series offer a space for meeting people with a common interest, and often also with similar problems, who share their ideas and discuss the series without the fear of being mocked by others who do not share their fondness for the respective TV series, and who would not understand their passion

The fictional stories can provoke and "discuss" the emotional and social type of information (Fiore, Metcalf and McDaniel, 2007: 41). Generally, we can say that sharing the experience with a fictional character creates opportunities for reflections of personal experience. Self-identification with a fictional character creates opportunities for self-reflection and following discussion of one's own problems with other fans who share similar values, attitudes and purposes.

Sometimes, web discussions may turn into live meetings with possible development of friendship. In the case of this virtual community ([www.buffy-angel.org](http://www.buffy-angel.org)), there are strong Buffy/Angel fans who have known each other in person for many years thanks to their shared interest, which later transgressed the boundaries of the virtual world. They belong to various socio-cultural groups but they are

unified by a number of real-life traumas that drove them towards the identification with the TV series characters. In their community they share values, attitudes and purposes, as loyalty and confidentiality. A good example of how things go well when two members of the virtual community share common values can be the marriage of two fans (who differ in age) from this virtual community.

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## **C**HAPTER 33

### **A EUROPEAN PROJECT: DEVELOPING COMMUNICATIVE COMPETENCE AND SUBJECT CONTENT THROUGH DIGITAL TOOLS**

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#### **Abstract**

The European project 'An Integral Teacher Training for Developing Digital and Communicative Competences and Subject Content Learning at Schools' deals with training Primary and Secondary School student teachers through a methodology that fosters the development of communicative competence and subject content knowledge through digital tools in pupils. The project provides a teacher training which is based on the integration of communicative and digital competences with content

learning, and it also promotes a conceptual and attitudinal change concerning the teaching/learning process in student teachers. A multidisciplinary team of experts in Linguistics, ICT, Science and Humanities, involved in initial teacher training, from six Universities -Alcalá University (Spain), Comenius University (Slovakia), University of Leicester (United Kingdom), Lisbon University (Portugal), Helsinki University (Finland) and Karadeniz Technical of Trabzon University (Turkey)- participate in the project. This team, though sharing the same common values as educators, can also add different perspectives to the project as they come from different geographical, cultural, personal contexts, they can also incorporate different pedagogical points of view due to their academic profiles and their own professional experience acquired from different situations in education. All this can benefit and enrich the development of the project.

This paper presents the project and its methodology that can be transferable to other academic levels or other educational and vocational environments. The project proposal was accepted by the European Commission in October 2009 and it will end in October 2012.

## **Keywords**

Teacher training - Communicative and digital competences  
– Subject content - Culture

## **Introduction**

### **1. The Project: Aims and Outcomes**

Six Universities, Alcalá (Spain), Comenius of Bratislava (Slovakia), Leicester (United Kingdom), Lisbon (Portugal), Helsinki (Finland) and Karadeniz Technical of Trabzon (Turkey) participate in a European project, financed by the European Commission. The project proposal was presented under Long Life Learning Programme to the Commission in March 2009 after a preparatory visit held in the University of Alcalá, coordinator of the project in November 2008, and it was accepted in October 2009. The teams of the

respective Universities consist of experts in ICT, Teacher Training, Language, Applied Linguistics, Sciences and Humanities and have been working together in different European projects, which means a guarantee of coordination and coherence to achieve the aims of the project.

'An Integral Teacher Training for Developing Digital and Communicative Competences and Subject Content Learning at Schools' is a project which deals with initial teacher training in primary and secondary School. The general objective of the project is to train future school teachers in order to improve the development of communicative competence in pupils of compulsory education, using model materials which meld information technology with scientific and humanistic content across different subjects of the primary and secondary school curriculum (Lavonen, 2010).

The specific aims are to:

- promote a change in attitude and practice among student teachers through initial teacher training so that they are capable of developing communicative and digital competences in pupils across the range of subjects,
- design a methodology which favors the development of communicative and digital competences in the different subjects,
- produce model materials leading to activities, a fusion of subject content and information technology, which assist the development of communicative competence in both mother tongue and foreign language, and at the same time provoke the acquisition of subject content and digital competence,
- apply and evaluate model materials in the different countries in order to test their viability,
- provide student teachers with ideas for the exploitation of information technology (e.g. Internet, video, TV, cinema, mobile, i-pods) and digital tools (wiki, moodle, blog, e-portfolio, videoconference,



etc.) as didactic resources for the development of communicative competence in pupils, and the learning of subject content, (Comber, 2011; Comber and Cameron, 2009; Lavonen et al., 2006; Lawson and Comber, 2010)

- foster pupil-acquisition of communicative competence across scientific and humanistic subjects in the primary and secondary school curriculum,
- improve communicative and digital competences in school pupils so that they can take responsibility for their own personal and professional development,
- foster student teachers mobility so as to familiarize student teachers in the European context and exchange good didactic practice on the basis of the model materials,
- inform various agents involved in compulsory education of the importance of communicative and digital competences and to motivate their support,
- disseminate the outputs of the project in different contexts and at different levels.

The next question is what will this project produce? We expect several outputs:

1. A methodology, which includes the:

- significant use of digital media,
- use of digital media and tools both as objective of learning and as a communication tools,
- ability to use digital media and tools for the implementation of model materials,
- development of critical analysis by pupil's so as to drive significant learning,
- development of strategies which improve communicative competence both in mother tongue and in foreign language, through model materials,
- acquisition of subject content in different areas in Humanities and Science (Galvão et al., 2006;

Newton and Rogers, 2001; Rogers and Finlayson, 2004; Wellington, 2004),

- use of digital media both as objective of learning and as a communication tools.

## 2. Support documents:

- selected media and digital tools appropriate for creating model materials,
- skills and strategies for developing communicative and digital competences
- merging of communicative competence ↔ media ↔ digital tools ↔ subject content,
- criteria for the design of activities related to the various aspects of communicative and digital competences plus subject content,

## 3. Model materials

- Didactic activities to develop the skills of recognized components of communicative competence based on the fusion of communicative competence ↔ media ↔ digital tools ↔ subject content,
- Six CDs, one per partner, which consist of two modules including didactic activities, one module in mother tongue and the other in English to allow for transference across cultures. Moreover, didactic suggestions and recommendations for student teachers will also be included trying to help them in the implementation of the activities.

## 4. Student teachers mobility

- A mobility of student teachers is planned for the third year. Two weeks classroom experience in a primary or secondary school in the Consortium countries observing and participating fully in the life of the centre. This experience will allow for working with the model materials.

## **2. Didactic materials: general framework and criteria**

As we have said, one of the main aims of the project is the acquisition of communicative competence which implies the development of the four skills: listening, speaking, reading and writing; linguistic knowledge and use of rule governed language; sociolinguistic cultural correctness in context and discourse structure. The project favors language learning and linguistic diversity as didactic materials will be produced in mother tongue and in English using the required linguistic strategies to achieve communicative competence. One of the innovations of the project is that these materials are aimed at being implemented in any subject lessons not only in mother tongue or foreign language lessons as it is generally done in schools. Consequently, these materials will deal with the contents of several subjects integrated in the didactic activities whose objectives are to improve communicative and digital competences as well as to learn contents.

As digital tools are essential in the project, and it is not supposed that every University will employ all of them, project partners agreed the selection of some of them to work with. This was decided in the first meeting in the University of Alcalá, held in December 2009. Here is the final selection:

- wiki (Universities of Lisbon, Helsinki, Leicester and Trabzon)
- e-portfolio (Universities of Trabzon, Alcalá, and Lisbon)
- blog (Universities of Trabzon, Alcalá, Leicester, Helsinki and Lisbon)
- moodle (Universities of Helsinki, Comenius of Bratislava and Lisbon)

- videoconference (Universities of Leicester and Comenius of Bratislava)
- movie makers (University of Trabzon)

Concerning subject content, there was a similar agreement in the same meeting. As most subjects appeared in the school curricula of the different countries taking part in the project, every University partner has decided to work with the following subjects:

- Leicester University: Language and Geography
- Comenius University of Bratislava: Chemistry and English as a foreign language
- University of Trabzon: Physics and History
- Lisbon University: Physics, Chemistry, Biology, Language and Literature
- University of Alcala: Spanish as mother language, English as a foreign language, Literature, Art, History, Geography and Culture
- University of Helsinki: Finnish, Literature and Physics

The project team has adopted a general framework to coordinate the design of the model materials. Seven points were included in this framework:

- Selection of subject content should consider relevant topics and learning objectives
- Selection of initial materials/sources to work with, which implies the elaboration of criteria for selecting these materials/sources
- Selection of digital tools implying the elaboration of criteria for this selection
- Development of communicative competence through the selected digital tools implying criteria for using digital tools

- Design of didactic activities addressed to school pupils implying to follow the four points already mentioned
- Elaboration of didactic reflections and suggestions addressed to student teachers and in-service teachers trying to help them in the implementation of the activities
- Implementation of activities using the selected digital tools

Now, we will present the criteria for selecting the initial material/sources which are the base to elaborate the didactic activities. The resources are selected from Internet, web pages, television, films, newspaper, books, etc. These criteria consider content, pedagogical properties and usability.

As far as content is concerned we study the aspects appearing in this list:

- Curricula Relevance
- Subject content related to other subject content
- Suitable language for primary and secondary school pupils
- Suitability of conceptual level
- Motivational aspects
- Prompts for discussions, writings, further studies, research etc.
- Links with other related sites or to other materials which can be used

Concerning the pedagogical properties of these initial material or resources, we are careful with the:

- Use of multimedia
- Reliability of the provided information
- Subject content accuracy

- Relation to daily life, experiences, other contexts
- Amount of reading content, including downloadables and links to other materials

However, it is necessary to be aware of what we define as usability of these resources:

- Easy access and navigation
- Easy to be related to other materials
- Easy to be learnt
- Pleasant to be used

Once the materials or resources have been selected, we start preparing the criteria for designing the didactic activities, and then it should be taken into account that some parts of these activities are addressed to student teachers, for instance, the didactic suggestions, and some others are addressed to school pupils, consequently we establish different aims (table 1) depending on the kind of activity.

### **3. Methodology: a fusion of communicative competence, subject content and digital competence**

#### ***3.1 Communicative competence***

Why have we decided to use a methodology which includes language strategies to develop communicative competence? There are several reasons and all of them are relevant for the process of learning. Generally speaking, the level of language of most school pupils (even in their mother tongue) is poor, according to Pisa report 2010, because they scarcely read and rely more on visual communication, text messages or e-mails. However, language teachers, especially teachers of foreign languages, try

Addressees	Aims
Student Teachers and Pupils	<ul style="list-style-type: none"> <li>- Provoke a significant use of digital competence in student teachers and pupils</li> <li>- Foster a change of attitude in student teachers and pupils:                         <ul style="list-style-type: none"> <li>o make them aware that digital competence is an essential resource for learning,</li> <li>o avoid the weak use of digital competence as copy and paste</li> <li>o develop communicative competence of the pupils</li> <li>o develop the following communicative components:                                 <ul style="list-style-type: none"> <li>▪ the four skills of listening, speaking, reading and writing</li> <li>▪ linguistic knowledge and use of rule governed language (lexis, syntax and pronunciation)</li> <li>▪ sociolinguistic cultural correctness in context</li> <li>▪ discourse structure: cohesion and coherence</li> </ul> </li> </ul> </li> <li>- Achieve subject content through digital competence tools and at the same time improving communicative competence</li> </ul>
Student Teachers and Teachers	<ul style="list-style-type: none"> <li>- Know the strategies that will help pupils to understand spoken and written discourse and express themselves in oral or written language</li> <li>- Know the strategies that will help student teachers to develop digital competence in pupils</li> <li>- Develop strategies in order to:                         <ul style="list-style-type: none"> <li>o Create awareness of digital and language needs in the learner</li> <li>o Create activities and tasks suitable for stimulus and allowing for pupil autonomy</li> <li>o Implement activities through digital competence</li> <li>o Promote critical thinking</li> <li>o Make available resources for problem resolution</li> </ul> </li> </ul>

Pupils	<ul style="list-style-type: none"> <li>- Identify and reflect on the relation of the subject content with other subject.</li> <li>- Raise pupils' awareness of the uses of subject content.</li> <li>- Acquire the basic terminology needed in the subject content.</li> <li>- Develop/acquire the following attitudes               <ul style="list-style-type: none"> <li>o Develop their autonomy as learners</li> <li>o Take on responsibility for their own learning</li> <li>o Collaborate with other pupils</li> <li>o Communicate with other pupils different from those of their school</li> <li>o Use of digital tools as a communicative tool</li> </ul> </li> <li>- Develop/acquire the following transferable skills               <ul style="list-style-type: none"> <li>o Ability to locate information in digital tools</li> <li>o Analysis and argumentation</li> <li>o Inference</li> <li>o Making decisions</li> <li>o Solving problems</li> <li>o Critical thinking</li> </ul> </li> </ul>
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Table 1. Aims of Didactic Activities

to develop communicative competence in both oral and written skills using typical strategies which help to improve communication, but these strategies are not normally used in other subjects of the school curriculum, on the contrary teachers are usually very pressed with finishing their syllabus whatever the subject is and they have no time to investigate whether their pupils understand the concepts they try to explain to them or not. Nevertheless, we believe that the first step in any lesson is that pupils can understand what the teacher explains or when reading a text they can understand the ideas and concepts concerning the subject or in a problem statement they can clearly catch what it is expressed there. Consequently, language is the window that can open pupils' minds to understand subject content, so communicative competence should be as important in the lesson of History, Physics or Mathematics as



language is in a lesson of Language that is why we defend this change of attitude in teachers and we try to create linguistic activities to improve communicative competence.

Furthermore, we need to be aware that the language of subjects can present variations, if we compare subjects of Humanities with those of Science we can realize that language in Science subjects is very precise and has specific linguistic characteristics, for instance, we can find some differences in the rhetorical organization, syntax and lexis. As an example of the differences between scientific and general discourse, a wider use of passive voice is found in scientific language than in general language as processes and procedures are dealt with in Science (Bronckart, 1994). As far as lexis is concerned we should distinguish specific terminology of every subject area.

These cases are studied in Applied Linguistics in English for Specific Purposes (Hernández and Sierra, 2002 and 2005). The notion of a language with specific characteristics originated in the sixties and in the early seventies of the last century, being associated above all, with the pioneering research of Henry Widdowson (1978) and the so called Washington School with Larry Selinker (1979), and Trimble (1978, 1985). Hutchinson and Waters (1987) make principal distinctions among English as a Mother Language Teaching (EMT), English as a Second Language (ESL) and English as a Foreign Language (EFL). The division continues with a differentiation within the EFL branch, which they split into General English (GE) and English for Specific Purposes (ESP). Reaching that point in classification, the authors once more divide ESP into three subcategories: English for Science and Technology (EST), English for Business and Economics (EBE) and English for Social Sciences

(ESS). There is no need to expect that we are giving school pupils linguistic explanations about this point, however it is required that they are able to use, at least, the correct specific lexis of the subject they try to learn.

So, when preparing linguistic activities, communicative methodology is being used, with the aim of helping pupils to have a better understanding of subject contents and concepts (Tandlichova, 2010). First of all, we have selected the most important language abilities that should be developed to improve comprehension and expression, mainly in reading and writing.

Then, we present the linguistic abilities to be developed in reading, listening, oral expression, writing and lexis and the activities/exercises that can be useful to acquire these abilities (table 2).

Reading comprehension	<ul style="list-style-type: none"><li>- Extracting the main idea,</li><li>- Extracting secondary ideas,</li><li>- Distinguishing secondary ideas from main ideas</li><li>- Skimming</li><li>- Scanning</li><li>- Identifying content</li><li>- Locating information</li><li>- Inferring information</li><li>- Predicting information</li></ul>
Listening	<ul style="list-style-type: none"><li>- Listening for the main idea</li><li>- Listening for gist</li><li>- Listening in order to distinguish secondary ideas from main ideas</li><li>- Listening for identifying content</li><li>- Inferring information</li><li>- Predicting information</li></ul>

Table 2. Abilities to be developed in reading comprehension and listening

Then, we have prepared linguistic activities in order to acquire these abilities that can be useful either for reading comprehension, but also for oral

comprehension (listening).To achieve this, we have used different kinds of didactic activities/exercises. Table 3 shows some of the activities/exercises to improve oral and reading comprehension.

Reading comprehension	<ul style="list-style-type: none"><li>- Direct questions</li><li>- True/false questions</li><li>- Multiple choice</li><li>- Text structure</li><li>- Re-building a text (giving them paragraphs from a text that should be given a logical order in order to build a text)</li><li>- Find the word referred to (relative pronouns, personal pronouns, demonstrative pronouns, etc.)</li><li>- Discussing and debating</li><li>- Drawing conclusions</li></ul>
Listening	<ul style="list-style-type: none"><li>- Direct questions</li><li>- True/false questions</li><li>- Multiple choice</li><li>- Discussing and debating</li><li>- Drawing conclusions</li></ul>

Table 3. Useful activities/exercises to develop reading comprehension and listening

In the same way, here we have a selection of writing and oral expression abilities to be improved (table 4).

Writing	<ul style="list-style-type: none"><li>- Writing summaries synthesizing information, ideas, concepts, etc.</li><li>- Writing short reports developing an argument and giving reasons in support of or against a particular point of view</li><li>- Creative writing: telling stories</li></ul>
Oral expression	<ul style="list-style-type: none"><li>- Oral summaries</li><li>- Oral conversation</li><li>- Arguing</li><li>- Debating</li><li>- Drawing conclusions</li><li>- Telling a story</li><li>- Telling an event</li></ul>

Table 4. Writing and oral expression abilities

Consequently, we have elaborated some activities to improve writing and oral expression of pupils (table 5).

Writing	<ul style="list-style-type: none"> <li>- Summarizing</li> <li>- Paraphrasing</li> <li>- Re-writing a text</li> <li>- Writing conclusions</li> <li>- Transferring non-verbal language (graphic, tables, etc) to verbal language or vice versa</li> <li>- Writing stories</li> </ul>
Oral expression	<ul style="list-style-type: none"> <li>- Talking in pairs</li> <li>- Talking in little groups</li> <li>- Oral summaries</li> <li>- Transferring non-verbal language (graphic, tables, etc) to verbal oral language</li> <li>- Giving arguments</li> <li>- Participating in debates</li> <li>- Presenting conclusions</li> <li>- Role-play</li> <li>- Simulations</li> <li>- Playing theater</li> </ul>

Table 5. Useful activities/exercises to improve writing and oral expression

Lexis is another important chapter in communicative competence. Nowadays, pupils' language is extremely poor concerning vocabulary. Pupils are usually not able to use adequate vocabulary in the given contexts. Reinforcing and enlarging pupils' vocabulary will help pupils not only to enrich their language, but also to improve their comprehension and expression. These tables (6 & 7) show vocabulary abilities to be developed by means of the following activities. We have prepared exercises with these aims.

Vocabulary	<ul style="list-style-type: none"> <li>- Recognizing vocabulary</li> <li>- Inferring meaning of new words from the context</li> <li>- Using suitable vocabulary within a context</li> <li>- Defining words</li> <li>- Building up vocabulary</li> </ul>
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Table 6. Vocabulary abilities

Vocabulary	<ul style="list-style-type: none"><li>- Matching words with definitions</li><li>- Defining words</li><li>- Synonyms/antonyms</li><li>- Finding-the-odd-man-out</li><li>- Guessing unknown words</li><li>- Word formation</li><li>- Collocation</li></ul>
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Table 7. Didactic activities/exercises to acquire and reinforce vocabulary

**3.2 Subject content and digital tools**

The first step before elaborating activities was to take into account the characteristics of school pupils, their daily reality and context and their cognitive difficulties. We have also considered that activity contents focus in contexts that can be useful for pupils as citizens, and that allow them to develop comprehension and application of subject concepts. In this line, we have selected some competences that we think are basic in the process of learning:

- Acquiring cognitive schemes in order to explain reality and implementing more rigorous and systematic strategies and solving problem techniques than those used in solving everyday situations
- Developing logical and critical thinking

Following the point of view stated above, the project team has selected a series of abilities/skills to be worked with school pupils so that they can acquire them, as we all know, these abilities are interrelated. The list of abilities to be developed is as follows:

- Being aware of subject concepts
- Establishing relationships between different concepts
- Comparing different concepts
- Connecting subject content with the real world
- Relating subject content to other subject content

- Interpreting data
- Interpreting graphical information
- Predicting
- Summarizing ideas
- Leading to conclusions
- Solving problems
- Using scientific language precisely

However, competences and abilities cannot be acquired in abstract, they must be worked within the frame of school curriculum contents. We have designed activities dealing with common curricula contents appearing in every country that participates in the project. In the module in English, addressed to Secondary school pupils, we have taken as a main resource a film *The Prime of Miss Jean Brodie*, directed by Ronald Neame and based on the novel of the same title written by Muriel Spark (1961), practical activities have been developed in order to acquire subject content of various subjects: Literature, Geography, Art, History and Cultural, Political and Social concerns. These subject contents are related to the film and the novel, they appear integrated within the novel, so the didactic activities will be a fusion of linguistic strategies, digital tools and strategies for learning subject content as we cannot forget that these activities aimed at developing communicative and digital competences as well. The technological support of these activities are Internet, video, blog and e-portfolio as tools to search and share information, to discuss and argue, to summarize ideas, conclusions, to evaluate the process of learning, etc. (Martín et al., 2011). In the module in Spanish we have chosen the cultural traditional popular local feast of Saint Isidro in Madrid, held the 15th of May every year since the sixteenth century, and from this topic we have touched Geography, History, Art, Culture, Mathematics

and, of course, Spanish as mother tongue trying to improve the communicative competence of primary school pupils as well as their digital competence using the same tools we have employed in module two.

As the project will last for another year, the implementation of activities is planned for the Academic year 2011-2012. The activities will not be only used in initial teacher training courses where they will be presented and discussed, but obviously we will not have the real context, so they will be implemented in real lessons at schools with groups of primary and secondary school pupils. Meetings and seminars with school teachers will be held previously to the implementation and after. The mobility programme in April 2012 will give the chance to student teachers from every University to travel to the other partner countries to attend and give lessons at a school, supervised by mentors, during two weeks in order to work with these activities at the host school, so this programme will be a good test to implement the activities and to compare, check and evaluate their suitability and viability (Martín et al, 2011). We expect this implementation can be successful, and in this case the activities will serve as a model for the student teachers during their training under the supervision of mentors but also in a near future when they become in-service teachers.

## **Conclusion**

We can conclude by saying that we have shown how the didactic activities can be used for developing two key competences, the communicative and digital ones, and at the same time they can be employed in the learning process of different subject contents. We have an example where taking a cultural topic as the main initial resource, Mathematics, a subject apparently so apart from Culture, can also be taught

as it can be related to other points of this cultural topic, which means that reality is very rich and contains a lot of aspects. In our view, this is one of the relevant reflections student teachers and teachers should take into account when they are teaching. Moreover, these adaptable activities can be used to support the development of similar activities on a range of subject or topics to be used in different educational contexts and levels, so this integrated methodology can be transferable to other academic levels or other educational and vocational environments.

We also would like to state that project members and other educators collaborating in the project share a common framework of values though it seems convenient to emphasize that the different cultures of partners, student teachers and mentors add enrichment to the project. Every participant incorporates their own personal, cultural and professional background so that pupils, in some cases immigrants in Europe, can gain benefits for being in touch with different perspectives and points of view. This cultural diversity has influenced the didactic activities, even though the same methodology has been followed by all partners, for example, some didactic materials point out autonomy of pupils as learners, whereas others guide pupils' learning, this highly depends on the systems of education, the curriculum of schools and the culture of the country. However, all this, in our opinion, improves many aspects of the project, a great variety of activities has been produced adapted for the several levels teachers can find in the same group of pupils and with the different learning styles of each pupil.

Furthermore, the project promotes linguistic diversity as six languages are involved and used in the project in the CD in mother tongue and also Culture as one of



its aims is to give student teachers the opportunity to exchange their own culture with that of host countries, so the tutors, mentors, teachers and pupils at schools will benefit from this exchange. Student teachers' mobility can also increase understanding among educational staff and young people in Europe, it reinforces tolerance and respect for other social realities provoking collaborative and democratic work in student teachers in order that they can transmit to their pupils the ideas of collaboration, tolerance and respect for every human being and for different cultures.

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Amelia A. Allen is currently an Assistant Professor in the Teacher Education Department at Felician College in New Jersey, United States. Dr. Allen has been an educator for 40 years. Her experience ranges from elementary school teaching through college in the field of Mathematics and Mathematics Education. She has not only been a teacher but also a Supervisor of Curriculum, an Elementary Principal and Superintendent of Schools. Her primary authorships and presentations to date have focused on the area of mathematics anxiety. The presentations occurred at both the regional and national conferences for the National Council of Teachers of Mathematics and the ANALYTRICS 2010: 2nd International Conference on Education, Economy and Society. Amelia Ann Allen currently is reviewing and analyzing the data for Felician College's Teacher Education Program for the Teacher Education Accreditation Council's review while also teaching undergraduate mathematics education and graduate level research courses.

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Harvey R. Allen is currently an Assistant Professor in the Department of Educational Leadership at Monmouth University in New Jersey, United States. He has been an educator for 43 years. He began his teaching career as a Math teacher and has taught mathematics in grades 7 – college. In addition to teaching mathematics Dr. Allen has been a Supervisor of Curriculum, High School Principal and an Assistant Superintendent. Dr. Allen primary areas of authorship are in mathematics anxiety, school leaders' implementation of technology, school/university partnerships, and educating the whole child. He has also presented at the Regional and National Conferences of the National Council of Teachers of Mathematics, the ANALYTRICS 2010: 2nd International Conference on Education, Economy and Society, Association of Supervision and Curriculum Development National Conference, National



Association of Professional Development Schools National Conferences and the National Social Science Association National Conference. Harvey R. Allen has served on numerous committees at Monmouth University. These include but are not limited to the Academic Standards Review Committee, University Technology Committee, Faculty Council and the Superintendents' and Principals' Academies.

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Moreover, Carmen Sierra has had experience in ICT, planning, programming, assessment and teacher training being a mentor of Primary school teachers in initial training. She has also coordinated teachers of the different cycles in Primary Education. Concerning European projects, she was involved in a Socrates Comenius 1.1 in 2003, and she is working as a consultant in a European project now.

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Jean Brown is a professor in the Faculty of Education, Memorial University of Newfoundland, Canada. She has been involved with policy and leadership studies within the faculty for over 25 years. A firm believer in collaborative research with practitioners, most of her work has been conducted in partnership with colleagues both in the Education Faculty and in the field of education. Jean's most recent research project was as principal investigator of a large 5-year project, Creating Community in the New

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University Chicago. Dr. Kirk brings 12 years of teaching experience in K-5 schools, literacy coaching, supervision of student teachers, and higher education instruction to the College of Education at Concordia. Literacy 1, Literacy in Middle and Secondary Schools, Curriculum and Methods for Literacy Instruction, and Proseminar in Classroom Assessment are among the courses Dr. Kirk teaches. Her research interests include visual literacy, technology and literacy, and the readability of educational websites. Dr. Kirk has been a member of Concordia's faculty since 2011.

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Sanja Kišiček is a research assistant at the Department of Information Sciences, Faculty of Humanities and Social Sciences, University of Zagreb, Croatia. She is enrolled in the postgraduate study of Information Sciences and she conducts research for her PhD thesis in the field of learning styles and virtual multimedia learning. She is engaged in teaching in the area of computer assisted teaching and multimedia. She has worked on several service learning projects throughout her career. She published 6 book chapters, 7 papers, held workshops and attended many international conferences in the field of e-learning, multimedia and service learning. Her most important publications include: Service learning in Zagreb University: how far have we gone? (Matić, Mikelić Preradović, Boras, 2008), Project of developing the multimedia software supporting teaching (Matić, Lauc, Mikelić Preradović, 2007), Framework of the Language Learning Environment for Assisting Foreigners in Learning Croatian (Posavec, Mikelić Preradović, Kišiček, 2011). She received the Sience Award in 2008 from Croatian National Science Foundation for the paper Educational multimedia software for English language.

### ***Janice Koch, Hofstra University, USA***

Janice Koch Ph.D. is Professor Emerita of Science Education at Hofstra University on Long Island, New York where she directed IDEAS- the Institute for the Development of Education in the Advanced Sciences. This outreach institute engages the public in cutting edge issues in science and

technology. She is the Past President (2007-2009) of the International Association for Science Teacher Education (ASTE) and a partner in furthering precollege science education and lifelong science learning. She earned her Ph.D. in Education at New York University where her cognate area was environmental science. Dr. Koch taught courses addressing the introduction to education, science methods for grades pre-K – 12, educational research and gender issues in the classroom. Her research explores preparing teachers to help foster student learning through project and problem based experiences.

She currently consults to science education programs around the world and reviews proposals and evaluates grants for the National Science Foundation. She is the author of *TEACH* (2012), an introduction to education textbook and *Science Stories: Science Methods for Elementary and Middle School Teachers* (2010), now in 5<sup>th</sup> edition.

### ***Jana Krátká, Masaryk University, Czech Republic***

Jana Krátká, Ph.D. is an assistant professor at Department of Education, Faculty of Education, Masaryk University in Brno, Czech Republic. Her research interests lie in the area of lifelong learning, informal learning and media. She has presented papers at a number of conferences in Europe, in the United States and Asia, and has authored a range of articles and papers on education and media. Her most influential book is "Experiential learning through identification with fictional characters of films and TV series" (2010). She received a grant from the Czech Science Foundation. She currently teaches at the Masaryk University, Faculty of Education.

### ***Lesley Ljungdahl, University of Technology, Sydney, Australia***

DipEd (STC), DipLib (London), BA (Hons) (UNSW), GradDipEdStudESL (UOW), GradDipIntSt (UTS), MA (Hons) (Syd), MLS (McGill), MA (Concordia), MA Appl Linguistics (UTS), PhD (UNSW)

Lesley Ljungdahl is the Coordinator of the Bachelor of Education in the Faculty of Arts & Social Sciences, University of Technology, Sydney(UTS). She has taught English at UTS since 1982 and has taught English in secondary schools in London, Canberra and Sydney as well as working as a teacher-librarian in Montreal (1974-1979). She has been a President of ATESOL (NSW), the Association of Teaching English to Speakers of Other Languages and a Director of the Student Learning Centre at UTS. Dr Ljungdahl gained her PhD from the University of New South Wales (UNSW) with research on Catherine Helen Spence. She has qualifications in Australian literature, librarianship and ESL from UNSW, Sydney University, McGill, Concordia, Wollongong and University College London. She teaches English language and literature to trainee primary and secondary school teachers and is an author (Winch, Johnston, Ljungdahl, March & Holliday) of a popular textbook titled *Literacy: Reading, Writing and Children's Literature*, (4th ed.) published by Oxford University Press. She has presented papers at international conferences and published articles on literacy-related topics in the *International Journal of Learning*. Her research interests are the teaching of English and teaching English as a second language.

***Tanya Fernández Maceiras, Colegio de Fomento Montespiño, Spain***

Tanya Fernandez Maceiras is an English Teacher (English as a Foreign Language) at *Colegio de Fomento Montespiño*, in A Coruña, Spain. She was previously a Primary School Teacher at *Tawa Primary School*, in Wellington, New Zealand. There she was the ICT Team Leader as well as the Second Languages Team Leader, where she also taught Spanish as a foreign language to students aged 6 to 12. As a linguist and a school teacher, Tanya is interested in the teaching and learning of foreign languages, and particularly in relation to Drama and the Arts in general, at all levels (from Early Childhood to tertiary education). She is currently studying a Masters Degree in Education at the University of A Coruña, Spain.



***Maria Aparecida Campos Mamede-Neves,  
Institutional Pontifical Catholic University of Rio  
de Janeiro***

Maria Aparecida Mamede-Neves is Emeritus Professor of the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil, Professor of Psychodynamic and Education Psychology in the Department of Education. She is Dr. in Psychology, Master of Education and Master of Psychology. She is also research member of the National Council of Scientific and Technological Development of Brazil (Conselho Nacional de Desenvolvimento Científico e Tecnológico- CNPq), the federal board under the Ministry of Science and Technology, dedicated to the promotion of scientific and technological research in the country. As researcher, she was awarded several grants from the Brazilian Governor. She is author or co-author of more than 204 articles, abstracts, book chapters, invited papers and books. Her field of research has been on youth, teaching-learning in digital society and knowledge construction. Dr. Mamede-Neves has been Visiting Professor in the last ten years at Universidade Autônoma de Lisboa – Portugal (The Autonomous University of Lisbon); Università Cattolica de Sacro Cuore de Milano - Italy (The Catholic University of Sacred Heart). In Brazil, she has been Visiting Professor at Universidade Católica de Salvador (The Catholic University of Salvador) and Escola Bahiana de Medicina (Bahia Medical College).

***Ekramy Mohamed Mersal, Alexandria University,  
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Ekramy Mohamed Mersal teaches Mathematics education in the Department of curriculum, University of Alexandria. He previously taught curriculum & teaching methods at the college of education, Alex., University of Alexandria. Prior to joining college of education, He has also taught mathematics at ministry of education in Egypt. He received his DSc in mathematics, Alex, Egypt, in 1997 and received his PhD in mathematics education. He works on mathematics and mathematics education, particularly English. His research specializes in metacognition, constructivism, and geometrical thinking. He is author of 5

peer-reviewed journal articles, abstracts, book chapters. His recent publications on Developing Computational Fluency. His most influential publication is teaching mathematics for adults. He has been active in the Accreditation Association in faculty of education, in 2009/2010. He is currently the supervisor of bridging program, albaha unv. He has taught at many universities in the Egypt and abroad: The University of king suad, the University of sultan qaboos; the University Albaha. He has also conducted research training workshops for a variety of professions and community groups in the Egypt, Saudi Arabia, sultanate of oman.

***Jase Moussa-Inaty, Zayed University, United Arab Emirates***

Dr. Jase Moussa-Inaty, Australian with a Lebanese background, is Assistant Professor of Educational Psychology at Zayed University (College of Education) based in Abu Dhabi. She received her PhD in Educational Psychology from the University of New South Wales, Australia. In addition to her teaching duties at ZU which involve undergraduate and graduate students, today she is actively engaged in conducting research and offers a wide range of workshops and presentations for professional development on topics related to cognitive processes, instructional design, effective teaching and learning, and foreign language acquisition. Dr. Moussa-Inaty has researched widely cognitive load theory. A recent book publication titled "The impact of spoken English on learning English as a foreign language" (Lambert Academic Publishing, 2011) is where you can learn more about these studies. Even though her empirical studies continue to develop in cognitive load theory in the domain of foreign language acquisition, she has also shown research interest in e-learning and the impact of multimedia on student learning especially in the UAE. A recent publication titled "Multimedia use in higher education in the UAE: A cognitive load perspective" can be found in the Journal of Educational Hypermedia and Multimedia (2012).

***Ahmad R. Nasr, University of Isfahan, Iran***

Ahmad R. Nasr is an Associate Professor in curriculum at University of Isfahan, Iran. His research field is Higher Education and Research Methods. He is also author or co-author of numerous of peer-reviewed journal articles and abstracts.

***Natércia A. Pacheco, University of Porto, Portugal***

Natércia A. Pacheco is an emeritus professor at University of Porto and received her Ph.D. in Educational Sciences at the same university. She is a researcher at de Centre of African Studies of Porto University (CEAUP) and Centre for Research and Intervention in Education (CIIE). Her published work includes several articles, chapters of books and five books concerning her interests: social intervention, art education and creativity. She is involved in several projects concerning education and eco-development, with government support and international partnerships.

***Piedad Martín Pérez, Universidad de Alcalá, Spain***

Dr. Piedad Martín is working in the Unit 'Vocational, Training & Employment Centre', of the University of Alcalá, Unit she created twelve years ago. Her interests lie with Science, Education, ICT; Training and Employment.

She graduated and wrote her doctoral thesis in Chemistry in the University of Alcalá (Spain) obtaining cum laude qualifications, and since then she has been working at the University in the areas just mentioned.

Piedad Martín is an expert in the management of several projects of the Comunidad Autónoma of Madrid, led by the University of Alcalá, in the above mentioned Unit, and she also has a large experience in the coordination and management of European projects focusing in particular on the fields of Education and Teacher Training.

She has collaborated in different national programmes of entrepreneurship, professional assessment for students and

university degrees, research programmes about student's professional profiles which are developed by official departments as ANECA, ACAP, Ministerio de Educación y Ciencia.

Dr. Martín has 35 publications as author or co-author among books, chapter books, journal or proceedings articles dealing with Science, Employment, Education and Training, and also with her experience as coordinator of European Projects in International Conferences.

***Nives Mikelic Preradovic, University of Zagreb, Croatia***

Nives Mikelic Preradovic is assistant professor at the Department of Information and Communication Sciences, Faculty of Humanities and Social Sciences, University of Zagreb. She received her PhD in Information Science at the same university in 2008 and her MPhil in Computer Speech, Text and Internet Technology at University of Cambridge, UK, in 2004. Her research specializes in Natural Language Processing and Service Learning (Community-based Learning). She mentored and administrated over 50 service learning projects over the last 4 years. She received *JFDP* scholarship grant (Junior Faculty Development Program, funded by the U.S. Department of State's Bureau of Educational and Cultural Affairs) in 2005/2006, and *Cambridge Overseas Trust* scholarship grant from the University of Cambridge in 2003/2004. She also received Rector's Award for student paper in 2001.

She is author or co-author of more than 30 peer-reviewed journal articles, book chapters and invited papers.

Her most influential publication is *Approaches to the Development of the Machine Lexicon for Croatian Language*, PhD Thesis, 2008.

In addition to a number of articles on service learning, she has authored the coursebook (in Croatian): *Learning for the Knowledge Society: service learning theory and practice* (Office of Information Studies, Faculty of Humanities and Social Sciences 2009).

***Robin Rackley, Texas A&M University, USA***

Dr. Robin A. Rackley is a Clinical Associate Professor in the Department of Teaching Learning and Culture at Texas A&M University. Dr. Rackley received her Ph.D. in 2004 from Texas A&M University. She joined Texas A&M University in 2004 as a Visiting Assistant professor in the department of Educational Psychology, and then joined the Department of Teaching Learning and Culture as a Clinical Assistant Professor in 2007. She currently serves as the Coordinator for the Early Childhood Undergraduate Programs at Texas A&M. While working on her doctorate, she was affiliated with the Center for the Study and Implementation of Collaborative Learning Communities. In 2010 she received the Student Led Award for Teaching Excellence.

Dr. Rackley focuses her research on early childhood educators. In particular, she is interested in the development of teacher leadership among early childhood educators, teacher efficacy and the development of pre-service teachers. Dr. Rackley has published on topics in educational psychology, human development and the development of pre-service teachers. She has also held workshops for numerous school districts on topics such as integrating technology into the classroom, teacher leadership and classroom management. She has presented conference papers in the field of teacher efficacy and leadership as well as in the area of classroom observation.

***Jens Rasmussen, Aarhus University, Denmark***

Jens Rasmussen is professor at the Centre for Compulsory School Research, Department of Education, Aarhus University, Denmark. He is also currently national curriculum advisor in Vietnam. He has been a visiting Professor, Institut für Bildungswissenschaft, Universität Wien (2008) Professor-2, Institute of Pedagogics, Norwegian University of Science and Technology (NTNU) (2002) and Fulbright Visiting Professor, College of Education, University of Georgia, USA (1999)

Having received his PhD in Educational Studies from the Royal School of Education in 1987, his main research areas are international comparative education policy, especially teacher education, learning and learning theory and curriculum development. He is author of more than 100 research articles and several books, his recent main publications being the books *Undervisning i det Refleksive Moderne* [Education in Reflexive Modernity] and *Viden om Uddannelse* [Knowledge about Education] co written with Claus Holm and Søren Kruse.

***Polina Sabinin, Bridgewater State University, Massachusetts, USA***

Dr. Polina Sabinin is an assistant professor of Mathematics at Bridgewater State University, associate consultant at Teachers, and former Associate Director of Center for Mathematics Achievement at Lesley University. Dr. Sabinin is the conference chair, past president, and founding board member of the Massachusetts Mathematics Association of Teacher Educators (MassMATE). She received her Ed.D. in mathematics education at Boston University. Dr. Sabinin is also a 2012 Service, Teaching and Research (STaR) fellow, supported by the National Science Foundation and Association of Mathematics Teacher Educators (AMTE). Her research and curriculum development interests include students' early logical and algebraic reasoning. She is currently co-authoring a logic curriculum supplement for grades 2 - 6. In the last decade, she presented at over 30 conferences including national and regional meetings of the National Council of Teachers of Mathematics (NCTM), National Council of Supervisors of Mathematics (NCSM), American Educational Research Association (AERA), Association of Teachers of Mathematics in New England (ATMNE), and the Discrete Mathematics Conference at Boston College. She has also served as a developmental editor for a Pre-Algebra textbook and as a proposal reviewer for the NCTM Research Presession. Dr. Sabinin provides animal assisted therapy with her dog at a federal prison.

***Thomas Schalow, University of Marketing and Distribution Sciences Kobe, Japan***

Thomas Schalow is a professor in the Department of Information and Economics at the University of Marketing and Distribution Sciences in Kobe, Japan. He received his Ph.D. from Princeton University in 1989. After graduation he was appointed Director of the CIEE Japan Business and Society Program in Tokyo. From there he moved to the National University of Singapore, where he taught in the Department of Japanese Studies. A few years later he was back in Japan teaching at the Nagoya University of Business and Commerce. In 1999 he became part of a diverse international community in Kobe.

He is a frequent speaker at international conferences and has published on a wide variety of subjects dealing with educational issues, culture and language, technology and its use in an educational environment, and the Japanese economy. He was a pioneer in creating Learning Content Management (LCM) systems for use in higher education, and has worked with Moodle for almost a decade. He is also actively involved in the creation and nurturing of social networks for use by students from around the world. He is presently working on the issues and problems associated with ubiquitous computing and the coming Singularity

***Bruce Sheppard, Memorial University of Newfoundland, Canada***

Bruce Sheppard is a professor in the Faculty of Education, Memorial University of Newfoundland, Canada. Prior to his current position, he had a lengthy career in the public school system and has been Director of Education in two school boards. As well, he has been Associate Dean of Graduate Programmes and Research in Education at Memorial University. His research interests include educational leadership, educational change and computer technology integration into classroom learning. Bruce has been a recipient of a number of distinguished awards throughout his career (e.g. CEA-Whitworth Award for contribution to research and scholarship in Canada; the Newfoundland and Labrador School Boards Association

Educator's Award of Excellence, and the European Distance Education Network Best Research Paper Award). He is author or co-author of more than 100 peer-reviewed publications, including a 2009 book entitled *School District Leadership Matters*.

***Andrzej Sokolowski, Texas A&M University, USA***

Andrzej Sokolowski is a doctoral student in the Department of Teaching, Learning & Culture, Mathematics Education at Texas A&M University, College Station, Texas, USA, expecting to graduate in 2012. He holds a master's degree in physics from the University of Gdansk, Poland, and currently teaches full-time undergraduate math and physics courses at Magnolia West High School in Magnolia, Texas. He is a member of the Texas State Math Committee, which sets teaching standards for high school mathematics courses. His professional interests include searching for means of contextualization of mathematical theorems through scientific embodiments. He ultimately strives to ignite students' passion for finding commonalities between mathematics and science.

Andrzej is author or co-author of more than 20 peer-reviewed publications, including "Science Modeling in Pre-Calculus" (Sokolowski, Yalvac, Loving, 2011), "Visualizing the Concept of Limits" (Sokolowski, 2011), and "Enhancing Interpretation of Natural Phenomena through Mathematical Apparatus" (Sokolowski, 2012). *He has also contributed to four book chapters, including "Teachers' Perspective on Utilizing Graphical Representations to Enhance the Process of Mathematical Modeling" (Sokolowski & Gonzales, 2011) and "Who Should Be a Mentor?" (Sokolowski, 2009).*

After graduation, Andrzej plans to continue his research on implementing inductive learning in mathematics as a faculty member.

***Asghar Soltani, University of Kerman, Iran***

Asghar Soltani received her Ph.D. in curriculum on science education at University of Isfahan, and is now assistant professor of curriculum in the Department of Education,



Shahid Bahonar University of Kerman, Iran. He previously taught biology for a number of years. He is also a member of European Science Education Research Association (ESERA). His research field is in Science Education with a specialization in Nature of Science (NOS), STS (Science, Technology and Society), History and Philosophy of Science (HPS), Attitude towards Science and Science Learning. He is author or co-author of more than 13 peer-reviewed journal articles and abstracts. Currently He is Member of Editorial Board of European Journal of Business and Social Sciences (EJBSS) and Reviewer of Journal of Education and Learning (JEL).

***Yulia Stukalina, Transport and Telecommunication Institute, Riga, Latvia***

Yulia Stukalina teaches ESP (English for Specific Purposes) in Transport and Telecommunication Institute, Riga, Latvia. She received her first degree in languages at the University of Latvia. She received her Master's Degree in Pedagogy at Riga Aviation University. Yulia Stukalina previously taught ESP at Riga Aviation University. Currently, she is a PhD student at the University of Latvia (field of study - educational management). Her research areas include language teaching methodology, sociolinguistics and educational management. Yulia Stukalina is the author and co-author of twenty scientific publications including conference papers, peer-reviewed journal articles and book chapters. She is also the author and co-author of six study aids for students of Transport and Telecommunication Institute. Her current research interests include studying the factors that influence student satisfaction and student motivation in the integrated educational environment of a higher education institution.

***Emily J. Summers, Texas State University, San Marcos, USA***

Dr. Emily J. Summers is an Associate Professor in the Department of Curriculum and Instruction in the College of Education at Texas State University—San Marcos. She teaches graduate classes including social studies methods, qualitative research, and the philosophical foundations of

education. Dr. Summers served as a Peace Corps Volunteer in Guatemala, Central American and worked with public schools there as well as schools in El Paso and Houston, Texas, USA. She has authored numerous peer-reviewed research articles and book chapters and has served as a Principal Investigator (PI) or author on several state-level (Texas) and national (USA) grants. Dr. Summers' scholarship emphasizes issues of equity in education including studying children and youth cultures as well as the intersections of formal and informal cultures in constructing educative experiences.

***Ayman Tobail, Dublin Institute of Technology, Ireland***

AYMAN TOBAIL is a researcher in 3S Group. He received his B.Sc. degree in Computer Engineering from Arab Academy for Science and Technology in 2002 with first class honours. He is currently working towards completing his PhD in Dublin Institute of Technology. Prior to this work, he had seven years of teaching experience in colleges of Engineering and Information Systems. He published several conference papers in the area of Innovation in Education and Simulation Applications in Supply Chain Management Education. His research interest is mainly in Simulation, Optimization, Artificial Intelligence and Web-Technologies. His email address is [ayman.tobail@dit.ie](mailto:ayman.tobail@dit.ie)

***Nuna Tormenta, University of Porto, Portugal***

Nuna Tormenta has a degree in psychology from the University of Porto. She is a school psychologist at a public school. Her research interests are school psychology, psychology of development, arts education and creativity. She received a research scholarship to integrate the research project concerned in this book chapter.

***Yael Wyner, City University of New York, USA***

Yael Wyner, Ph.D. is Assistant Professor of Secondary Education at the City College of New York, part of the City University of New York, where she also holds an affiliate appointment in the Department of Biology. Dr. Wyner

earned her Ph.D. in biology through a joint program between New York University and the American Museum of Natural History, where she studied the conservation genetics of lemurs. After completing her Ph.D. in 2000, Dr. Wyner served as Content Coordinator for *The Genomic Revolution*, an American Museum of Natural History exhibit about the scientific and societal implications of new advances in genetics and technology. After her time at the Museum, Dr. Wyner taught science for seven years at Hunter College High School before beginning her work at the City College of New York in 2008. Dr. Wyner teaches secondary school science teaching candidates genetics, the nature of science, human ecology, and evolution. Her research focuses on connecting daily life to ecology in the formal classroom setting.

***Maria Xesternou, University of Peloponnese, Kalamata***

Maria Xesternou received her Ph.D. in Études Grecques at Paris IV-Sorbonne University, worked for a number of years at literary education, and is now lecturer of Software applications in literary teaching at University of Peloponnese, Philology Department. Her research field is in teaching scenarios using digital classics' projects or language and history educational software. She is author or co-author of several articles on this field and co-creator of the educational software "*The Train Verb*". She has been awarded with scholarships of Onassis, Levendis and Hardt Foundations. Her current research interests include ICT in higher education and digital forms of communication between educators and learners. She is currently a regular member of the *Greek Scientific Union of technologies of Information and Communication in Education* and has also collaborated as instructor in teachers' training workshops in Greece.

## **Introductions to our Associate Editors**

### ***Newsha Ahmadi, Islamic Azad University, Teheran, Iran***

Newsha Ahmadi, PhD, studied linguistics at VUB, Belgium, has 20 years experience teaching EFL, teacher training and linguistic courses in Iranian universities. She is presently a lecturer at the Faculty of Foreign Languages, Islamic Azad University, North Tehran Branch and serves as the consultant for the bilingual schools in Tehran.

### ***Fida Atallah, Zayed University, Abu Dhabi, United Arab Emirates***

Dr. Fida Atallah is currently Assistant Professor at the College of Education – Zayed University, Abu Dhabi, United Arab Emirates. He has a Doctorate Degree in Educational Technology from Concordia University, Montreal, Quebec, Canada, a Master's Degree in Mathematics Education from The American University of Beirut, Lebanon and a Bachelor's Degree in Mathematics Teaching from The American University of Beirut, Lebanon. Dr. Atallah's current research interests include topics in technology integration as well as mathematics and science education such as cognitive load and multimedia learning, readiness towards e-learning, concepts and dispositions of mathematics and science, images of mathematics and science.

### ***Parviz Birjandi, Allameh-Tabataba'i University, Tehran-Iran***

Dr. Parviz Birjandi is Chair of the English Department, Allameh-Tabataba'i University, Tehran-Iran. His previous appointments include: Dean of the College of Persian Literature and Foreign Languages, Allameh-Tabataba'i University, Committee Director of Persian Literature and Foreign Languages, Ministry of Higher Education, Senior EFL/ESL Counsellor, Ministry of Education, Materials Developer and Language Programmer and Professional Test developer.

***Ana Bocanegra-Valle, Universidad de Cádiz, Spain***

Ana Bocanegra-Valle, Ph.D., is a Senior Lecturer at the Universidad de Cádiz. She has wide experience of teaching EFL/ESP to undergraduate and postgraduate students and has published several papers on various aspects of EFL/ESP learning and teaching. Her main research interests include English language acquisition/learning, methodology and teaching techniques, communicative and language learning strategies, terminology and discourse analysis as they relate to EFL development, and Maritime English as a particular branch of ESP. She is co-author of *English for Specific Purposes: Studies for Classroom Development and Implementation* (2007) and is at present editor of *Ibérica* (ISSN 1139-7241) the journal of the European Association of Languages for Specific Purposes (AELFE).

***Antonio Mauricio Castanheira das Neves: Federal Center of Technological Education Celso Suckow da Fonseca, Portugal***

Antonio Mauricio Castanheira das Neves is the Doctor of Philosophy at the Federal University of Rio de Janeiro in 2001, with post-doctoral internship in Education from PUC-Rio in 2008. He earned the title of Professor of Social Psychology by Institutional UGF in 1992. Master in Social Psychology at UFRJ. Specialist in Social Psychiatry by ENSP / FIOCRUZ (1984). Specialist in Social Psychology by evidence of professional experience by the Federal Council of Psychology. Psychologist, and Bachelor Degree in Psychology and graduated in Social Sciences. He is currently Associate Professor - Level 03 of the Federal Center of Technological Education Celso Suckow da Fonseca. He was Professor of the Masters in Education from Catholic University of Petrópolis (2002-2011). It has 40 book chapters, five books published as author and as an organizer 20. 28 communications published in proceedings of conferences and journals. 29 participated in the development of technological products. Supervised 52 dissertations and co-directed five, directed a doctoral thesis, and has directed six works of scientific initiation and completion of 27 course work in administration, production

engineering and education. Participates in three research projects, these being a coordinator. He was chief engineer from 2004 to 2008, by CEFET / RJ, the international exchange program CAPES / FIPSE that gathered by Brazil, the CEFET / RJ and CEFET / BA and the U.S. side, the Voorhees College (SC) and Paul Quinn College (TX). Works in Philosophy, with emphasis on Ethics and Technology in Education, with emphasis on Policies for Higher Education and Administration, with emphasis on Knowledge and Innovation. In his professional activities interacted with 38 employees in co-authorship of scientific papers. Published the book Ethics for the Technological Civilization, among others.

***Georgina Cuadrado-Esclapez, Universidad  
Politécnica de Madrid, Spain***

Dr. Georgina Cuadrado-Esclapez is a lecturer of Academic and Professional English in the Department of Applied Linguistics at the Universidad Politécnica de Madrid. Her research areas include pedagogical applications of specialized discourse in ESP and cognitive linguistics. She is a member of the research group Discyt and is co-author of the Academic and Professional European Language Portfolio. She has participated in many international workshops and conferences, and has published in national and international journals.

***Saadiyah Darus, University of Kebangsaan,  
Malaysia***

Associate Professor Dr. Saadiyah Darus, School of Language Studies & Linguistics, Faculty of Social Sciences & Humanities, Universiti Kebangsaan Malaysia. Her research interests are computer-aided writing at the workplace and computer-assisted language learning. She is also the Chief Editor of GEMA Online Journal of Language Studies (2006 – present). Her academic homepage is at: <http://ukm.academia.edu/SaadiyahDarus>

***Jelena Davidova, Daugavpils University, Latvia***

Jelena Davidova is Professor of music education at Daugavpils University, Latvia. She is the Editor-in-chief of the scientific journal Problems in Music Pedagogy and is on the Editorial Board of The Changing Face of Music and Art Education, the interdisciplinary journal for music and art pedagogy.

Her research focuses on the development of music pedagogy, music teachers' activities as well as the development of giftedness. She has previously lectured in Sweden, Estonia, Finland, Lithuania and she has been aEU consultant since 2009.

***Ian Davies: University of York, England***

Professor Ian Davies is the author of numerous books (published by Routledge, Continuum, Sage and others) and many articles in academic journals most of which explore issues related to teaching and learning about contemporary society (with a particular focus on citizenship education). He lecture and researches extensively in international contexts and has been successful in attracting funding from a wide range of government and non-government agencies in the UK and elsewhere. He also teaches and supervises undergraduate, MA and PhD students and initial teacher education trainees.

***Rob DeSalle: American Museum of Natural History, USA***

Rob DeSalle is a Curator of Entomology at the American Museum of Natural History. He is affiliated with the AMNH Division of Invertebrate Zoology and works at the [Sackler Institute for Comparative Genomics](#), where he leads a group of researchers working on molecular systematics, molecular evolution, population and conservation genetics, and evolutionary genomics of a wide array of life forms ranging from viruses, bacteria, corals, and plants, to all kinds of insects, reptiles, and mammals. Rob is also Adjunct Professor at Columbia University, Distinguished Professor in Residence at New York, Adjunct Professor at City University of New York, Resource Faculty at the [New York Consortium](#)

[in Evolutionary Primatology](#), and Professor at the AMNH [Richard Gilder Graduate School](#).

***Irina Direktorenko, Riga Teacher Training and Educational Management Academy, Latvia***

Dr. paed. Irina Direktorenko is Associate Professor at the Riga Teacher Training and Educational Management Academy, Latvia. Her lecturing responsibilities include: Technique and music education for preschoolers, technique and music education at elementary school and creative self-expression for pre-service music teachers. She conducts projects on integrated and bilingual training and investigates how to promote creativity through the teaching of arts and music.

***Christos Douligeris: University of Piraeus, Greece***

Christos Douligeris is a Professor in the Department of Informatics of the University of Piraeus, Greece. He is the editor of several scientific journals in the areas of computer networks and communications. He has led several projects and has published extensively in the scientific literature.

***Eero Ropo: University of Tampere, Finland***

Eero Ropo is a professor of education at the School of Education, University of Tampere, Finland. Ropo pursues international research interests, specializing in research on teachers' professional identity, use of technology in education, and curriculum studies. He is published in those areas both in Finnish and English.

***Pamela Fraser-Abder: New York University USA***

Dr. Pamela Fraser-Abder is an Associate Professor and the Director of Science Education of the Department of Teaching and Learning at New York University. She is recognized both nationally and internationally for her expertise on the impact of gender and cultural issues on the teaching and learning of science and the evaluation of global science and mathematics curricula. She is currently engaged in leading professional development activities evolving from her recent



publications: Teaching Emerging Scientists and Teaching Budding Scientists.

***Iria Sobrino Freire: University of La Coruña, Spain***

Iria Sobrino Freire is a Teaching Fellow of Language and Literature Education at the University of A Coruña. She obtained a Bachelor's Degree in Spanish Philology and a DEA in Literary Theory and Comparative Literature from the University of Santiago de Compostela. Her research is focused on literature education, the role of social discourses in the cultural field and contemporary Galician poetry. She is the author of the Galician translation of Virginia Woolf's *A Room of One's Own*.

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Improve Indigenous Education in Alberta. Journal of Educational Change, 12 (3), 323-345.

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Dr. Judith Johnson Recently retired from her full-time position at Yamaguchi University, Japan. She is currently teaching part-time at Kyushu Institute of Technology. She is an Adjunct Professor at Southwest China University, P.R.C. and has been on the faculties of universities in Japan, South Korea, China, Ecuador and the United States.

***Jeanne Keay: Leeds Metropolitan University, England***

Dr. Jeanne Keay began her professional life as a teacher of physical education in three secondary schools in England, she then moved to Leeds Metropolitan University in 1992 to work in sport and physical education, eventually leading the physical education group as a principal lecturer and Deputy Head of School. In 2002 she moved to Roehampton University as Head of Initial Teacher Education and subsequently became Dean of Education. In 2012 she was appointed as Head of International Teacher Excellence at

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- Rodriguez, A. J. (2010). Science Education as a Pathway to Teaching Language Literacy. Rotterdam, Netherlands: SENSE Publishing.
- Rodriguez, A. J. (2008). The Multiple Faces of Agency: Innovative Strategies for Effecting Change in Urban School Contexts. Rotterdam, Netherlands: SENSE Publishing. Book selected for Choice's Outstanding Academic Titles List for 2005:
- Rodriguez, A. J. and Kitchen, R. (2005). Preparing Prospective Mathematics and Science Teachers to Teach for Diversity: Promising Strategies for Transformative Pedagogy. Mahwah, New Jersey: Lawrence Erlbaum Associates.

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