

Investigating the BBC Skillswise as a Learning Tool

Maths

Practical, common-sense maths for adults. Choose a topic area.



Numbers

Use number lines, decimals and negative numbers



Calculation

Add, subtract, multiply and divide



Percent and fractions

Work out parts of amounts



Measuring

Use the best tools and units of measurement for the job



Shapes

Work with area, scale drawings and 3-D shapes.



Graphs

Use graphs and tables to communicate information

**A study report submitted for the DTLIS Unit -
Action Research**

By

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September 2013

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Introduction

The constantly emerging technologies have given birth to an era of unprecedented change in the way technology is now being deployed in teaching and learning. However, checking through the previous studies carried out by various researchers regarding the use of technology, it is now evident that technology is playing a key role in the way teaching is done and most importantly, how learning is aided (Woolf, 2009; Attewell, 2004; Coben et al., 2007b). Also, it was reported in the research report conducted by Cognition and Technology Group at Vanderbilt (1996) cited in National Research Council (2000) that technology has great potentials of enhancing learning, student achievement and teaching provided it is deployed appropriately, hence the motivation for conducting this research.

It is also important to note that digital technologies now encompass wide range of innovative learning technologies enabling adaptive virtual environment for teaching & learning, multimedia systems, technology-enhanced tutoring environment, educational games and so on and have become a permeating part of students' classroom experiences (Brusilovsky, 2011; Gertner et al., 2000; Koedinger et. al.,1997). Despite highly evolving over the years, research in this area is no longer new and the euphoria surrounding the empirical studies is sometimes being challenged.

However, there is a common ground regarding one of the motivating factors driving the experimentation of an intelligent tutor which is a research finding postulated by Bloom (1984). In an attempt to emulate the learning gains obtainable from human tutors as reported in the study conducted by Bloom (1984) tagged the 2 sigma effect in which the average students achievement with personal tutor increased by 98% of classroom student, it is evident from the various past researches that utilising an intelligent tutoring system is the preferred option since one-to-one tutoring is not sustainable (Merrill et al, 1992; Ritter et al, 1998; Anderson et al 1995).

This study is about taking an evidence-based approach to the optimisation of the design of BBC Skillswise in a way that it exploits to a great extent the opportunities made available by the digital technology. In achieving this goal, the study explore how well the BBC Skillswise work in terms of the way learner interact with it and most importantly, how it helps develop a deeper understanding of mathematics. This is followed by a theory-informed critique of the current design and development of a prototype to better improve the student learning

experience based on the application of suitable learning theories and feedbacks from the research participants.

Rationale for the study

The rationale for this study focuses on three different issues which summarises the difficulties experience by students acquiring mathematics skills within a formal traditional classroom settings which a pedagogically enriched learning technology may be able to address. This becomes necessary after studying previous empirical studies on the teaching and learning of numeracy in the lifelong learning sector coupled with the frustrations being exhibited by the NEET (Not in Employment, Education or Training) cohort in an East London Training centre (Excel College) currently on an apprenticeship programme. Against the above background, the followings are the reasons for carrying out this research.

First, majority of the students on the apprenticeship programme struggling with acquisition of maths skills have been disturbed by their perceived lack of numerical ability and the associated low self-esteem based on the available information in both the teachers report and their respective Individual Learning Plan (ILP). More than half of the cohort are petrified expressing the difficulties they have been experiencing acquiring the skill which have been holding them back from seeking help especially when they are with other group members. This issue also align with the research conducted by some researchers where they all argued that such are usually being caused by fear, hatred, psychological barriers as part of the varied difficulties being experienced (Sewell, 1981; Bibby, 2002; and Meader, 2000).

Also, the well-known notion that most of adult learners struggling with maths comes to the lifelong sector with the negative perception of school maths, it is no surprise that learning environment which provides opportunity of having individual attention, non-threaten environment where they come under less pressure and not afraid to make mistakes will always play a crucial role both in the way they learn and what they are able to learn. Citing the empirical study carried by Swain and Swan (2007) buttressing the role that the learning technology plays in providing a non-threatening route back into learning for adults.

Lastly, examining the issue at stake from the teaching side, it is important to note that the tutors are not just interested in using learning technology for the sake of using it but they are bent on knowing the opportunities that such learning technology brings. They are more keen in knowing based on the huge data they have gathered about their students over time that they are right for their students hence the reason for studying the pedagogical strengths of using BBC Skillswise to support the teaching and learning of maths.

Motivation of the research

The study conducted by Laurillard (2002, 2007) played a key role in embarking on this research since it is argued that the higher quality of learning may be achieved through the adoption of a mediated technology which creates a learning platform that promotes an repetitious, dialogic, collaborative, and constructive model of interaction. Likewise, the downward trend in the cost of acquiring a computer system coupled with the increased coverage of internet connection created new possibilities for affordances of learning technology. However, taking advantage of the opportunities offered by the computer and smart phone technology affordance is a right step taken in the right direction as it is evident that the need to explore other sustainable and innovative technological means was created in order to augment the current face to face, distance learning and computer based training in use and thereby widening participation. This would therefore corroborate a claim made in the research that a third of adults use smartphone and recognise mobile phones as the foremost vehicle for wider social change and mobile learning, (BBC News, 2011 and Traxler, 2009).

This research contributes to sustainability of the environment through the use of technology to promote sustainable greener environment according to Parham (2011). The resultant of this is also crucial to food security, CO2 emission reduction by encouraging learning eco-system rather than having to be commuting to the training centre. This will have the impact of reducing the effect of global warming; howbeit, in a small way.

Objectives of the study

Considering the purpose of this study, the followings are the aims and objectives have been classified under three different key areas:

- To determine whether the student feel more secure and confident using BBC Skillswise to learn maths.

- To evaluate how the students interact with the BBC Skillswise Maths and whether it helps in fostering a better understanding of mathematics.
- To present a prototype of a pedagogically-enriched modified BBC Skillswise Maths after adopting a participatory approach to design and conducting a theory-informed critique of the current design based on the application of suitable learning theories.

Appropriateness of Action Research

In order to establish the appropriateness of an action research in the achievement of the study objectives, it is worth to first determine what an action research entails.

According to Slavin (2006, cited in Fisher, 2008), “Action research is a user-friendly, practical approach to conduct a research with one purpose: to improve learning and teaching”. This approach has been developed to encourage academics to contribute to the common agenda of improving teaching and learning, but in an informal and relaxed manner.

It is important to note that the term ‘action research’ has often been used in a similar way to other terms used to describe research undertaken by educational practitioners, such as: ‘*zone of accepted practice*’ (Zeni, 1998, p.13); ‘classroom research’ (Hopkins, 1985); ‘self-reflective enquiry’ (Kemmis, 1982); ‘educational action research’ (Carr and Kemmis, 1986); and, ‘exploratory teaching and learning’ (Allwright and Bailey, 1991). It has also been referred to as the ‘practitioner enquiry’, ‘reflective analysis’ or ‘evidence-based practice’. The most important component of action research is that it does include both action and reflection that lead to enhance practice (Open University, 2005).

Also, Kemmis and McTaggart (1992, pp.21-22 cited in Open University, 2005) distinguish action research it from the normal practice of teaching in the following way:

- They opined that it is more methodical and concerted in the collection of evidence on which to base their group reflection as it is not expected to follow a typical thought line of a teacher thinking about their teaching.
- They also suggested that is not just about problem-solving but delve also into problem-posing. Buttressing their point, they reiterated that it is usually motivated by a desire to learning about improving the world by studying the effect of the changes made.

- Another valid point raised focus on the suggestion that action research is not “the scientific method” that is applied to teaching as there are many. They went further to clarify that action research is not research done on other people but by a particular people on their own work, to help them improve what they do, including how they work with and for others.

Against the above background, I can simply describe in a layman terminology as any research into practice undertaken by those involved in that practice, with an aim to change and improve it. It is therefore, a process of enquiry by a practitioner into the effectiveness of their own teaching and the students’ learning. So the basic principle underlying action research is identifying a problematic issue, imagining a possible solution, trying it out, evaluating it (did it work?), and changing practice in the light of the evaluation.

According to (Koshy, 2010), the following are some of the key features of the action research which is worthy of consideration:

- Action research is a method used for improving practice. It involves action, evaluation, and critical reflection and – based on the evidence gathered – changes in practice are then implemented.
- Action research is participative and collaborative; it is undertaken by individuals with a common purpose.
- It is situation-based and context specific.
- It develops reflection based on interpretations made by the participants.
- Knowledge is created through action and at the point of application.
- Action research can involve problem solving, if the solution to the problem leads to the improvement of practice.
- In action research findings will emerge as action develops, but these are not conclusive or absolute.

However, in summary Cohen, Manion and Morrison (2000:231, cited in Open University, 2006), identified three possible approaches to action research:

- **Technical Action Research:** This is assumed to **be** typically undertaken by individual practitioners on a relatively short-term basis and aimed at making ‘an existing situation more efficient and effective’. It should be noted that this approach

is criticised for not relating practice to wider considerations and for being too focused upon an individual practitioner and an individual context.

- **Practical Action Research:** This approach is *designed to promote teachers' professionalism by drawing upon their informed judgement. This is similar to Schon's 'reflection-on-action' and is a hermeneutic activity of understanding and interpreting social situations with a view to their improvement.'*
- **Emancipatory Action Research:** It is suggested that this approach *is political as it is educational ... [and] seeks to develop their understanding of illegitimate structural and interpersonal constraints that are preventing the exercise of their autonomy and freedom.'* Emancipatory action research involves the full involvement of all the important stakeholders in the social or educational system, including researchers, practitioners, policymakers, clients or learners, and community members (Grundy 1990, 358). The purpose is to emancipate participants in the action from the dictates of compulsions of tradition, precedent, habit, coercion, and self-deception. The goal of emancipatory action research is to assist practitioners in identifying and explicating fundamental problems, and to achieve mutual emancipation by raising their collective consciousness, underlying assumptions and values, and involving the practitioners in critical reflection of their practices and unwritten laws (Holter and Schwartz-Barcott 1993, 302).

However, several models have also been put forward by those who have studied different aspects of action research and I will present some of these for clarity sake here. My purpose in so doing is to enable the reader of this report to analyse the principle involved in these models which should, in turn, lead to a deeper understanding of the processes involved in action research. It is also important to note that no one specific model is being recommended and, as you may notice as you read along, they all have many similarities. This means that an action researcher should adopt the models which suit his or her purpose most or adapt them to fit his or her purpose.

However, the developments within the field have resulted in it coming to mean slightly different things to different people. Carr and Kemmis (1986) emphasise the 'critical' action research model, while Elliott (1991) emphasises a 'reflective practice' model – a model often used in educational institutions for curriculum and teacher practice research. (Cohen, Manion & Morrison, (2000, 231).

In light of the above, Open University (2005) proposed a model in which it described the action research process as:

- Cyclical with four inter-related stages: plan, act, observe, reflect
- Collaborative in two senses:
 - that many action research activities are best carried out with colleagues
 - that action research always involves the participants, at least in knowing what is being explored and why
- Qualitative rather than quantitative with the emphasis on language rather than numbers
- Reflective, involving critical reflection on both the process and the outcomes

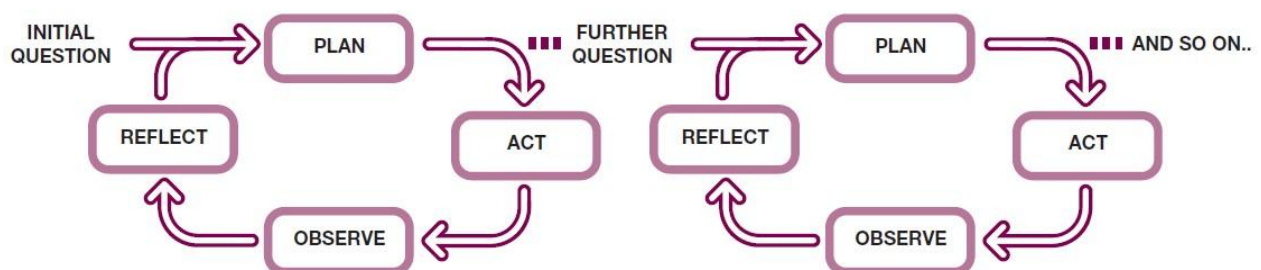


Figure 1: The action research process (Open University, 2005)

However, critical examination of the above diagram depicts an action research process as usually starting with a question or an observation raised either by the researcher or the students, about an issue, problem or difficulty experienced by some or all of them in their learning. Alternatively, it is suggested in the model that a more 'affirmative' approach might encourage an action researcher to look at actions that are successful with some of their students which can be extended as 'good practice' to all other students. The cycle continues as the researcher decides on some action to investigate the question, perhaps by exploring how the students perceive the issue or how an action researcher might adapt a different approach in their teaching. This will also involve the researcher collecting some evidence, either in the form of feedback from the students or by the observation of their work.

Furthermore, as can be seen from the figure 1, the process involved is rarely a simple cycle but more a spiral signifying that reflection on the action and the findings of the action researcher may lead to another question and further action, usually a change in the practice, which in turn loops forward to further exploration and greater understanding of

how action researcher practice his or her teach and how the students learn, as represented in Figure 1 (Open University, 2005).

Similarly, based on Kemmis and McTaggart (2000: 595, cited in Koshy, 2005) model articulation, they suggest that action research is a process involving creating new knowledge based on enquiries conducted within specific and often practical contexts making in participatory in nature. They maintain that action research involves a spiral of self-reflective spirals of:

- planning a change,
- acting and observing the process and consequences of the change,
- reflecting on these processes and consequences and then replanning,
- acting and observing,
- reflecting,
- and so on....

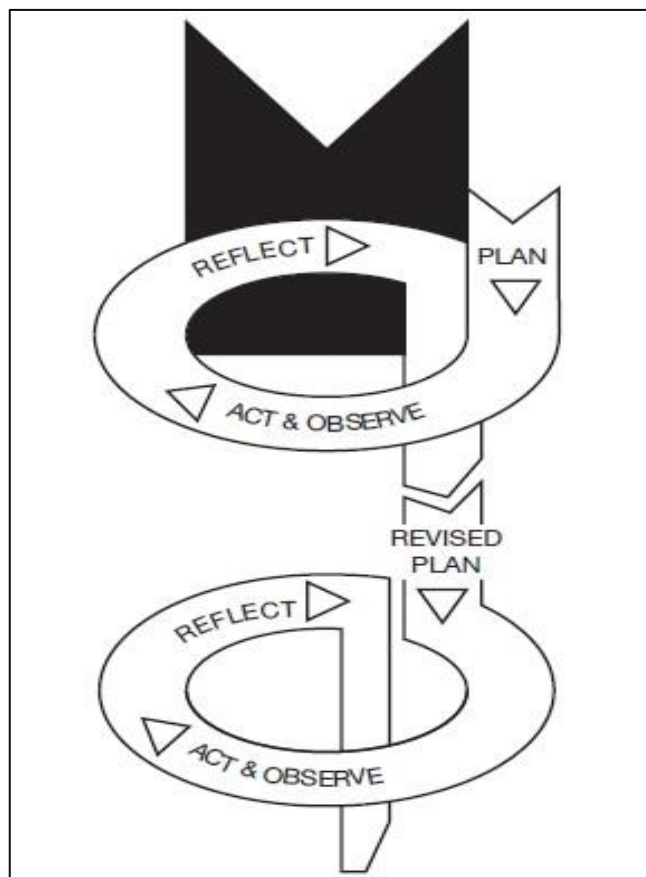
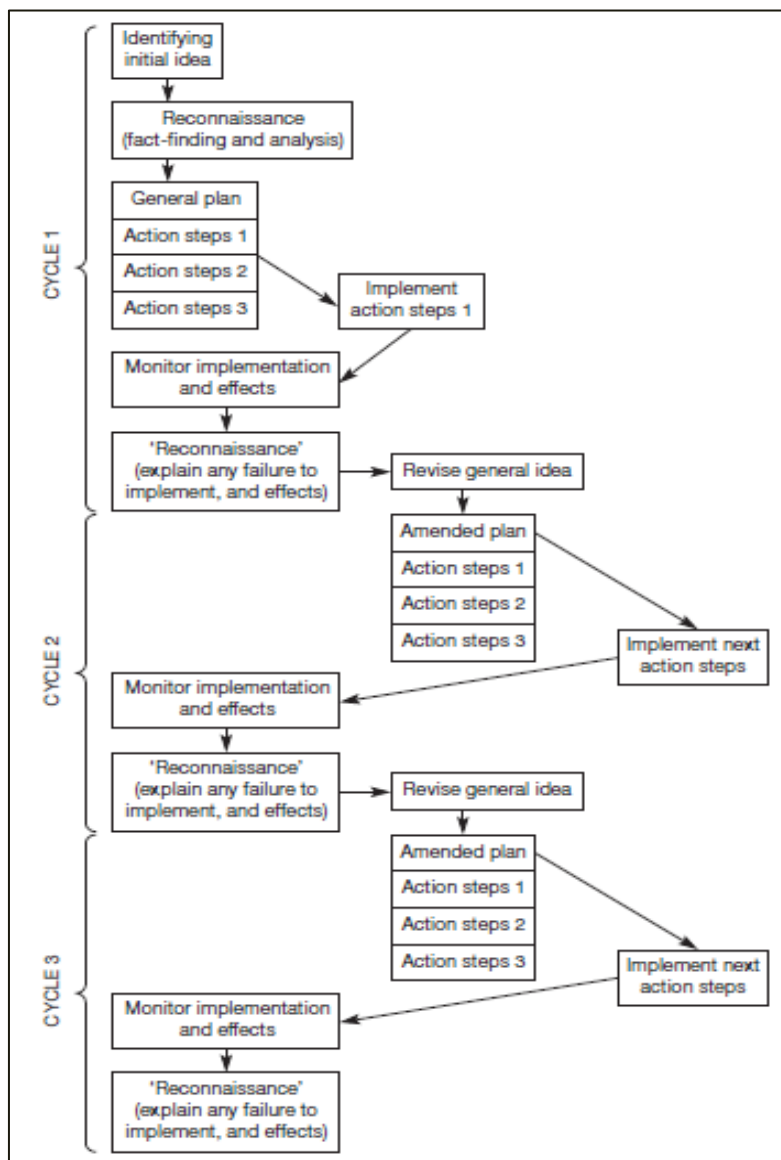


Figure 2: Action Research Spiral (Kemmis and McTaggart, 2000: 595)

Figure 2 illustrates the spiral model of action research proposed by Kemmis and McTaggart, although the authors advise against using this as a rigid structure since in reality the process may not be as neat as the spiral of self-contained cycles of planning, acting and observing, and reflecting suggests. The stages, they maintain, *overlap*, and initial plans quickly become obsolete in the light of learning from experience. *In reality the process is likely to be more fluid, open and responsive.*

Notably, I have found the spiral model appealing because it offers the opportunity to visit a phenomenon at a higher level each time, and so to progress towards greater overall understanding. By carrying out action research using this model, one can understand a particular issue within an educational context and make informed decisions through enhanced understanding. It is about empowerment.



Elliot (1991: 71, cited in Koshy, 2005) also suggested a model which includes reconnaissance – fact-finding and analysis – within each stage of the action research, as can be seen in Figure 3.

Elliott's (1991, cited in Leitch & Day, 2000) revision of Lewin's (1952) 'self-reflective spiral of cycles', which entail the steps of observe-reflect-plan-act-evaluate, provides an approach for undertaking practical action research of this kind. Here the aim is to improve the quality of action within a situation. Theory is generated and validated through the examination of practice by the practitioner rather than being independently applied.

Figure 3: Elliot's action research model (Elliot, 1991: 71)

For Elliott (1991) 'Action initiates reflection' (p. 23). He emphasises the recurrent feature of 'reconnaissance', in the action research cycle, which involves analysis and reflection of the situation, rather than merely fact-finding.

His elaboration of techniques to gather evidence for reconnaissance and monitoring (e.g. diaries, analytic memos, running commentary) seems to demonstrate the value to learning and change of more introspective, self-reflexive kinds of analysis. However, closer examination reveals that these are for largely task orientated purposes. He cautions that although 'the process of analysis is an endless one, in action research (it) must be

interrupted for the sake of action' (p. 74), a warning later echoed in the words of Bridget Somekh (1995, cited in Leitch & Day, 2000):

Too much emphasis on the importance of self in action research can distract the practitioner from the substantive focus of the study. There is a tendency for some action research to become ingrown and 'contentless', so that self-exploration and personal growth seem to become the whole focus and purpose of the research. This may be an effective form of therapy, but it is difficult to call it research. (p. 348)

On the one hand are long-time advocates of action research such as Elliott (e.g. 1978; 1991) who are in the tradition of Schwab and Schön and who emphasize reflective practice; this is a particularly powerful field of curriculum research with notions of the "teacher-as-researcher" (Stenhouse, 1975, and *The Reflective Practitioner*, Schön, 1983, 1987.) On the other hand there are advocates in the "critical" action research model, e.g. Carr and Kemmis (1986).' (op cit. p.231.)

Other models, such as O'Leary's (2004: 141, cited in Koshy, 2005) cycles of action research shown in Figure 4, portray action research as a cyclic process which takes shape as knowledge emerges. In O'Leary's model, it is stressed that 'cycles converge towards

better situation understanding and improved action implementation; and are based in evaluative practice that alters between action and critical reflection.' (p.140).

The author sees action research as an experiential learning approach to change the goal of which is to continually refine the methods, data and interpretation in the light of the understanding developed in the earlier cycles.

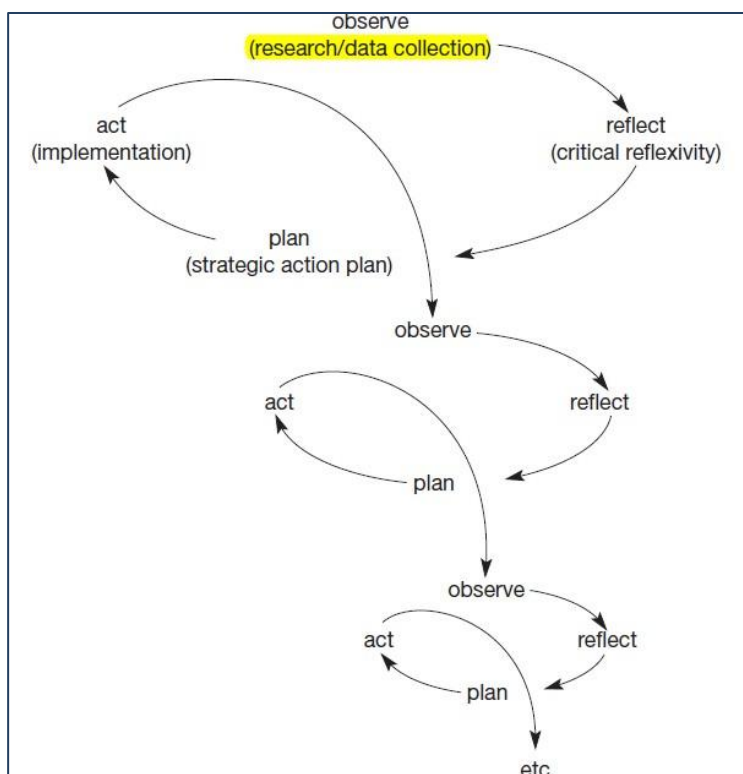
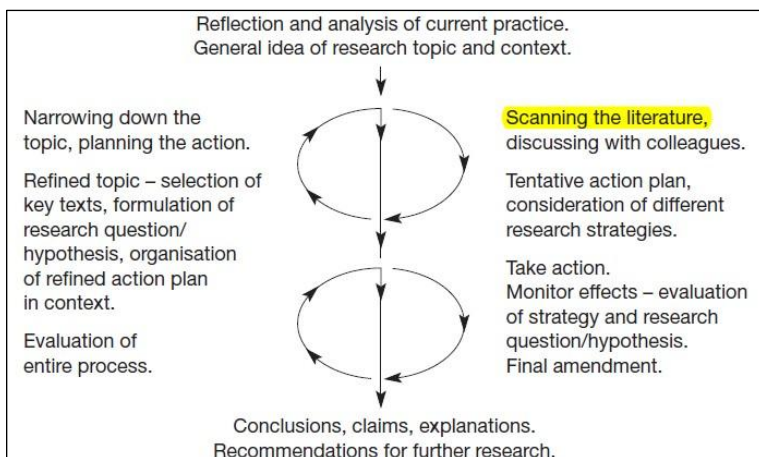


Figure 4: O'Leary's cycles of research (O'Leary's, 2004: 141)

Lastly, O'Leary's model stresses on an experiential learning approach where the goal is to continually refine the methods, data, and interpretation in light of the understanding developed in each earlier cycle. Thus, as an iterative process, it balances problem-solving actions implemented collaboratively to comprehend the underlying cause, enabling future predictions about change (Reason and Bradbury, 2008).



And finally, in Macintyre's (2000: 1, cited in Koshy, 2005) suggest that the representation of the stages in action research, the processes involved are signposted as shown in Figure 5.

Figure 5: Macintyre's Action Research cycle (Koshy, 2005)

On a final note, both Open University (2005) and Koshy (2005) suggest that excessive reliance on a particular model, or following the stages or cycles of a particular model too rigidly as they are not intended to offer straitjackets to fit an enquiry. They further stress that adopting them rigidly could adversely affect the unique opportunity offered by the emerging nature and flexibility which are the hallmarks of action research.

Against the above background, it can be concluded that this study is suitably fit for an action research from the standpoint that the purpose is about determining the pedagogical value of the BBC Skillwise Maths as a learning tool. This is to be followed by using data collected from research participants to determine the student learning experience so as to propose a theory-informed development of a prototype based on the application of suitable learning theories and feedbacks from the research participants. Similarly, the self-initiated approach to research adopted in this study and an improvement through the proposed design is another strong indication of the action research approach adoption. Further, the

systematic, critical and self-critical enquiry approach adopted, which aims not only to contribute in some way, however small, to the advancement of knowledge, but equally importantly leads to the improvement of professional practice. Lastly, the population of participants who are student on the NEET project were engaged in a collaboration designed to benefit all those involved.

Also, as suggested by Mumford, “action research offers a good combination of practical and theoretical enquiry, offering considerable potential for educational research, which can benefit both the students who researched course as well as who researched it” (2001, cited by Heinze & Procter, 2004).

This study will help me in my role as a Centre co-ordinator and Programme leader for the NEET project within the organisation to bring about changes in the thinking of some of the colleagues, as not all lecturers believe that blended learning is the way forward. Also as a practitioner, it will allow me to reflect in an effective way and learn consciously through experience. These roles collectively demand to meet the needs of both the organisation and the students whilst fulfilling portfolio of responsibilities in the most effective manner.

On another note, the students characterise being very diverse in terms of age, gender, culture, nationality, language, education and belief, also demonstrate different learning styles and preferences. Also, considering that this cohort of students have issues with their previous educational experience making them to fit in the NEET classification make it essential to figure out how to provide them with a better learning experience to help achieving the progression outcome of the project. It is therefore important under the various roles that I perform within the organisation to gauge the effectiveness of my practice and how best to approach teaching and learning which involves blended online resources with traditional classroom instructions. This will also help in identifying the gap between the current process – an insight into what is working and what needs improvement; to enhance teaching and learning experience within the organisation.

Furthermore, these findings would provide guidelines to other tutors and share good practice among the NEET team to further advance the blending learning strategies in the organisation.

Research Background

This section provides an overview of the BBC Skillswise, the underpinning learning theories it tends to be based on and synthesises the already published study carried out by others in establishing the pedagogical strength of the BBC Skillswise which would be used in developing the research.

BBC Skillswise – A review

The BBC Skillswise was formally launched in March 2002 after about six month of pilot study. However, the latest design was launched in 2011 to provide English and Mathematics learning resources which have been mapped to the Adult Core Curriculum, mainly at Entry Level 3 and Level 1 of the Qualification Credit Framework (QCF).

It is a high quality learning tool incorporating resources targeting at adult learners and addresses the creation of a learning environment which open the possibility of acquiring the Mathematics and English skills in a non-patronising way. BBC Skillswise is now being used with Skill for Life / Functional Skills learners in all types of contexts (BBC , 2011).

In terms of the design and usage, the resources are best suited to be used with the guidance of a tutor within a classroom setting though it is possible for an individual to still use the materials for independent learning. The site can be considered as a teaching resource repository where tutors can visit and download factsheet or worksheet for student learning as well as for the student to use to reinforce what has been covered in the class. The site incorporates relevant and interactive resources within a structure that is easy to read and print.

Looking at the site at a glance, there are about seven main features that are quite visible, namely English, Maths, Job Skills, Adult Learning, Tutors, Quick resource finder and Help. However, considering the focus of this research which is on Skillswise Maths, it is ideal at this point to describe the main features of the BBC Skillswise Maths.

Notably, this learning tool is built around the Adult Maths Core Curriculum's forty curricular topics that are covered using varied resources ranging from factsheets, worksheet, quizzes, one-minute videos, and games.

The factsheet is meant to be used to reinforce the underpinning knowledge needed to master or foster understanding of each of the Math's curricular topics. It is meant to help in clarifying the methods to be used by the student in acquiring the Maths skills as well as helpful hints.

Worksheet is designed to be used to check whether learning has taken place. It is meant to be viewed on the screen or be printed off and can either be used in class or outside the class. It helps the teacher in making judgment on the strengths and weaknesses of each individual student. This invariably helps in determining the student's attainment as well helping in setting up a much focused curricular targets. It is important to note that the Skillswise Maths do not internalise the student's attainment since the result are captured offline and it is almost impossible to use the site to track students' progress over time as it does not have that facility. Just like the worksheet, the quiz is designed to be used to check learning but the main difference is that it is done online.

It is also evident from the Skillswise Maths that the site adopts innovative ways of engaging the users by including forty one-minute videos based on what a typical adult must have seen or encountered in life thus buttressing the argument of Swain, et. Al (2005) who postulated the adoption of learning materials that offer the learner the skills they need to develop or the activities that built on their interests or experiences. This would go a long way it enhancing learning.

Furthermore, it is worth mentioning that part of the strength of this learning tool is the innovative ways of engaging its users through the availability of various learning resources among which is by including forty one-minute videos based on drawing on a typical adult's prior experience or encountered in life thus buttressing the argument of Swain and Swan (2007) that argues that using activities or resources that builds on learners' interest or experience usually go a long way it enhancing learning. it is important to note that this learning tool provide a fun way of reinforcing what is already covered in the factsheet as well as to check / reinforce learning.

Examining the design, usage and the features therein, it is evident that it is based on some key learning theories among which are the Behaviourism and Cognitive learning theory. An examination of the site shows that it consists of pages of text and graphics which are well planned and arranged without any learner control. This also shows that the learning

strategies being adopted focus mainly on memorising, demonstrating and recall as the teacher and the computer are the source of knowledge or the catalyst.

Furthermore, there is evidence of the pedagogic approach adopted incorporating the cognitive science approach that believes that teaching can be effective only if it respond to students' prior ideas by constructing on a foundation of existing understanding/experiences especially with the use of the one-minute video and the design of the factsheets (National Research Council, 1989).

It is important to note that pedagogically the design of the Skillswise Maths also draws part of its strength from the Piaget's Constructivism theory which promotes the adoption of (or switching) 'street maths' which learners are used to according to Safford (2000) and Baker (2005) within the formal maths teaching thereby ensuring that the general rules of mathematics are explored within the street maths concept. Overall, the presentation of the resources shows evident of scaffolding in that it gives the student a context, motivation or foundation for integrating new information into their mind.

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**A study report submitted for the DTLLS Unit –
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By

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September 2013

Methodology

Research methodology refers to the theory of the research and the reasons for the way the research has been designed. Ideally, it explains the starting point of the research; explain the research question, why the question is important, directions of the research and the possible implications of the research when it is completed. Similarly, it explains the literature the researcher is using, the language and terminology, the other theories and explanations being used, the methods and the type of analysis that will be used to interpret the data and information collected (Reason and Bradbury, 2008).

In a nutshell, the methodology gives a justification for the approach a researcher takes and demonstrates it is not just doing things because it is convenient, cheap, or just do not want to do anything else. For example, in the case of this action research, the methodology will explain the reasons for talking to the multi-disciplinary team and students face to face or in groups or not talking to them at all, the reasons for selecting some people and not all people, the reasons for talking to people rather than gathering the data from anonymous surveys or vice versa. This literarily means that methodologies explicate and define the kinds of problems that are worth investigating; what comprises a researchable problem.

In light of this, Rossman & Rollis identify 4 different paradigms but the two primary paradigms are positivist and intepretivism paradigms. The positivism is typically associated with quantitative research, which involves hypothesis testing to obtain “objective” truth and used to predict what may happen at a future date. Furthermore, critical realism is a subtype of positivism that incorporates some value assumptions on the part of the researcher. It involves looking at power in society. Researchers primarily rely on quantitative data to do this. Notably, a positivist researcher often gathers large amounts of data in the form of large-scale surveys and analyses them in order to make generalisation.

However, Interpretivism is associated with qualitative research. It is used to obtain an understanding of the word from an individual perspective. Interpretative researcher tries to get inside individuals and institutions to understand situations and people. Also, critical Humanism is a subtype of the Interpretive paradigm. The critical humanism approach is one in which the researcher involves people studied in the research process. Data is used for social change.

Research Method – An Overview

Basically, the purpose of any research is to add a new knowledge to the existing body of the knowledge in an area of interest (Ismail, 2005). The way data will be collected depends on the research objectives and, of course, on the way research will be processed. As fitting a research problem to a specific type of research is important and very critical, one has to give a clear thought on the type of research to be adopted which invariably determine the suitable method. The method however can be described as the actual tools the researcher use to deploy the research and methodology. The methods to be used will also be dictated to a large extent by the methodology that is being used and the overall aims of the research. One can choose either the quantitative or the qualitative method.

Quantitative research method

Quantitative research relies on the collection of quantitative data (i.e., numerical data) and follows the other characteristics of the quantitative research paradigm. Quantitative methods are used to gather data for the purpose of analysing quantity and numbers, and deriving meaning and understanding from these. Quantitative methods are also useful at providing an understanding of 'what' phenomenon are occurring which also lend themselves to a deductive research approach which means that they begin by taking existing theories and testing them in a top-down approach to research.

However, part of the issue with quantitative research is the lack of 'voice' given to participants in being able to describe and input into the understanding of why phenomena are occurring.

Qualitative research method

Qualitative methods involve the collection of data for the purpose of analysing content (over quantity), and include the gathering of stories, talk, art, and other forms of expression. These methods are useful in determining 'why' certain phenomenon exists. They are also inductive in their approach as the researcher is expected to draw meaning and understanding from the research and not testing data against pre-existing theories or notions (Denzin, et. al. (eds.), 2005).

This literarily means that it is the research which is not subject to quantification or quantitative analysis with rigorous mathematical analysis as in quantitative research; rather much of the measurement is dependent upon the evaluation by the researcher

(Maykut and Morehouse, 1994). There are five specific types of qualitative research: phenomenology, ethnography, case study, grounded theory, and historical research (Creswell, 2003).

Usually, qualitative research is usually based on the qualitative data gathered from the interviews, focus group, documents and participant's observation data, to understand and explain the social phenomena. By adopting any of these methods tend to make the qualitative research to move more towards being subjective since different people can perceive the truth differently. Another implication of this is that the researcher's experiences, beliefs, and values are usually incorporated into the research design and analysis of data.

Methodological paradigm, design and methods adopted

This action research being a multi-disciplinary work deployed critical design ethnography which is a process resulting from the confluence of critical ethnography, participatory action research, and socially responsive instructional design (Barab et al., 2004; Reason, 2004). As a result of the critical nature and the context-sensitive features of an e-learning ecosystem in which the BBC SkillWise belong to, participatory approach was adopted by utilising iterative system that allows for continuous refinement and analysis of the co-design of the learning activities in situ (Dick, Carey & Carey, 2011)

However, the research design adopted has its basis in the philosophy of Social constructionism. This epistemology adopts the view that knowledge is established based on understanding derived from how participants understand the meanings attached to phenomena based on their experiences. As this research takes a prototype approach, the views as experienced by the teachers, skill specialist, graphics designers, content writers and the students in the use of this prototype as well as the benefits derived from the process of teaching and learning were requested. The relevance of the critical design ethnography and social constructionism as the research philosophy is therefore apposite.

In a nutshell, this is a purely quantitative study of pre-defined qualitative categories of description.

Research questions

This section attempts to expound on the research strategy and instruments being adopted in order to investigate the followings:

1. Does the BBC Skillswise Maths help in developing a better understanding of Mathematics?
2. What are the main challenges faced by students when learning Maths using BBC Skillswise Maths as a learning tool?
3. What kind of re-design can be introduced into the BBC Skillswise Maths so as to enhance the student learning experience of Mathematics?

Participants

In order to achieve the main research outcomes of this study, one teacher and six (6) students from the NEET cohort in an East London Training centre currently on the Early years apprenticeship programme are carefully selected to participate in the study based on their previous experience using the BBC Skillswise. They are between the ages of 18 and 25. two of the students have good IT Skills and the last four are new to using technology as a learning tool. This cohort of student is currently working at Entry Level 3 on the National Qualification Framework and has just basic knowledge of the mathematical concepts.

Research methods

As it is generally recognised that there is no one method that is 'right' for action research. Any method could be used. What makes a piece of research 'action research', as opposed to mere audit or evaluation, is the commitment to change. Also, considering the fact that the action research has been referred to in this study as an approach or a process, not a method. This research can, therefore, draw upon virtually any 'method' and able to use any number of research 'tools' to assist in the gathering of data. Although, some tools, which have proven effective in action research projects in educational contexts, are:

- Audio, photographic and video records
- Case studies
- Diaries, journals or logs
- Documentary evidence
- Field notes
- Interaction analysis
- Interviews (in person or by telephone)

- Participant and non-participant observation
- Questionnaires
- Rating Scales
- Sociograms

Given this, the choice of method in the instance may be more to do with the nature of the problem that one is seeking to understand and explain. This research however, makes use of a triangulated approach to data collection that were from both interviews and observations regarding the way the BBC Skillswise Maths is being used to teach, the context of use and what the student would like to see in this e-learning ecosystem. These focuses on collecting data that reflects on and provides detailed description of the envisaged BBC Skill maths usage in different contexts.

Taking on-board the objectives of the data gathering which are based around the core research questions outlined above and considering the size of the participant, this study draws on mainly two methods which are observation and interview.

Observation

This is used to gather primary data involving 1 teacher and 6 students using the BBC Skillswise Maths as both a teaching and learning tools in order to elicit and elucidate the usage, usefulness and likely changes to be made to the BBC eLearning ecosystem in order to make it more effective.

In light of this, an agreement was reached among the participants to observe two teaching & learning sessions where the Skillswise Math was used as the learning tool and the teacher serves as a facilitator. It is important to note that the Observation serves as the main tool used in this study to gather data required to answer research questions 1, 2, and 3. This entailed the observation of the face-to-face delivery of the Maths lesson at two different times, as well as observing usage scenarios of the navigation and the user perception of the intuitiveness of the present BBC Skill Maths eLearning ecosystem.

Please see the observation notes in appendix 1.

Interview

A brief unstructured interview was also conducted with the aim of eliciting teachers' and the students' view of the usefulness of BBC Skillswise as a learning tool. The emphasis here also includes other system features such as the assessment, feedback, web interface, navigation, intuitiveness and usability. This interview was conducted at the end of the second observation with the teacher to clarify some issues around the areas mentioned above.

Generally, interviewing as a technique of data collection is primarily used in this study to gain an understanding of the underlying reasons and motivations for people's attitudes, preferences or behaviour (Saunders et al., 2009). For this reason, interview was used to get a good understanding of the reason for the study and how the study fits into the bigger picture. Also, the main player's opinions, concerns and experiences concerning the prototype were informally sought during the focus workshop session on a personal basis (one-to-one) and as a group.

The above action corroborates Kvale (1996, p. 14) assertion that regarded interviews as an interchange of views between two or more people on a topic of mutual interest, sees the centrality of human interaction for knowledge production, and emphasizes the social situated-ness of research data

Ethical issues

Ethics is a vital consideration for any research undertaking, and underlies the entire research process. It can be defined as a code of practice that is based on moral principles. The Oxford Dictionary (1964) defines ethics as "The rules of conduct recognised in certain limited departments of human life"

In research, ethics is then important in ensuring that these principles are adhered to when entering into relationships and engaging with other people. This literally means that research project needs to ensure that the approach and the methods being used are 'ethical' and that adequate measures are put in place to ensure the safety of the participants, the researcher, and the stakeholders involved in the research. In a nutshell, it is worth noting that ethics and ethical research is both based on respect and safety.

As with any other kind of research, ethical considerations are of paramount importance as emphasis are usually placed on factors that could affect the validity and reliability of the study. One important factor was to ensure that information being presented had the consent of all sources and that credit was given to all information sources so as to avoid plagiarism. Another important ethical issue was ensuring that the confidentiality and the privacy of the participants were respected at all stages of the research and that no harm would come to those who became participant or were stakeholders.

During all stages of this research from the conceptual stage to the very end, all efforts have been made to ensure that the research does not adversely affect the participants. The researcher has also obtained informed consent from all participants. For example, students that felt reluctant to be in a group that is undergoing what they see as 'experimental lesson' or felt it would add to an already heavy workload were excluded. Also, the purpose of the research and all uses of the research were clearly disclosed to the participants. Personal data is being handled as stipulated under the Data protection Act 1998. The Data Protection legislation applies when personal details of students are recorded in some way, manually as well as electronically.

Also, the gathering of data was also conducted in an environment acceptable to the participants and the researcher ensured that all interpretations were subsequently crosschecked with them to ensure that the researcher was capturing meanings appropriately. The Data Protection legislation applies when personal details of students are recorded in some way, manually as well as electronically. As all tutors are advised, their student group allocation is time limited and usually destroyed after the course is completed and examination results have been notified. This means that no personal details of students involved in action research activities should be recorded and all data must be treated anonymously.

In addition to the above, students were informed of what would happen to the data they provided, for example, copies of their assignments which they agreed to release. These materials were anonymised with care for potentially identifiable aspects of individual students and teachers destroyed.

Above all, it can be argued that it is unethical not to monitor and audit the quality of educational research. This literally means that one could argue that it would be unethical

to produce 'research' that was merely quality assurance, or which applied methods unskilfully without advancement of knowledge. Action research, like any other research, entails systematic, critical and self-critical enquiry. Its principal aim is the improvement of professional practice, but also to contribute in some way, however small, to the advancement of knowledge.

Limitations

There are a few limitations to the research methods adopted. The research could have been conducted over a wider range of participants to ensure more reliability. However this would have generated an enormous amount of data which could be unmanageable due to the qualitative nature of the research. It would also have required a lot more time to analyse.

Time was also a limitation to this research. The research had to be conducted within a short period of four months. As there were several holidays during this period the researcher had some difficulties assembling all participants in the same venue due to their different schedules. Despite all of these limitations; however, the research has been conducted with the relevant uses and was able to obtain adequate information based on the purpose of the research.

Research results & Evaluation of findings

The section summarises the data obtained from the different data gathering methods discussed in the methodology. Results are presented by summarising, structuring and categorising themes based on the key research questions and objectives.

Observation

The observation of the use of the BBC Skillswise Maths was conducted on two occasions and the followings are the summary of the key issues and their evaluation in an attempt to answer research the questions:

Issue 1: Just in time feedback

It is evident from the observation that the Skillswise Maths do not come with any 'just-in-time' advice (Intrinsic feedback) and guidance to students when required. The only feedback area of the system where feedback was provided did not come with a very useful phrase that could have propelled learners understanding and critical thinking. Please see

figure 1 below for evidence of that. It was also noticed that the games that comes with the learning do not give any feedback for any wrong move or mistake on the part of the student. It is also important to note that feedback is used to regulate knowledge acquisition and in motivating the student.

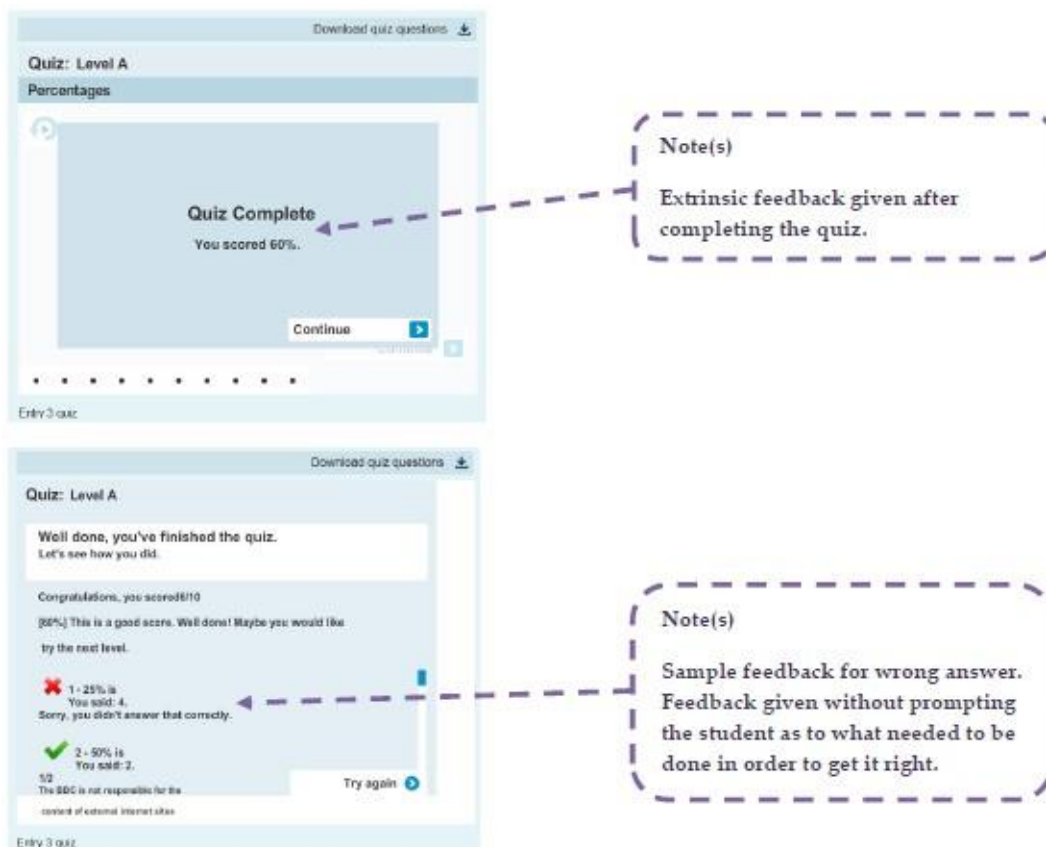


Figure 1: Skillswise Maths Feedback

Issue 2: Smart Learning Outcome

It is also evident that the Skillswise Math did not include any information for each of the lessons observed or any clear learning outcome for the student to be working toward. It rather just briefly described the topic and started showing examples. There was no evidence of the topic being discussed in-line with what the student should learn at the beginning coupled with a review of what has been learnt at the end. This is helpful in reinforce learning.

Issue 3 – Assessment task wordings

Another main issue that caused confusion during the observation was the wording of the quiz question. All the students had difficulties understanding the question. The implication

of this is that the students were not really sure of the interpretation of the question and the teacher had to intervene for them to be forged ahead with the quiz. Also, Please see figure 2 below for evidence.

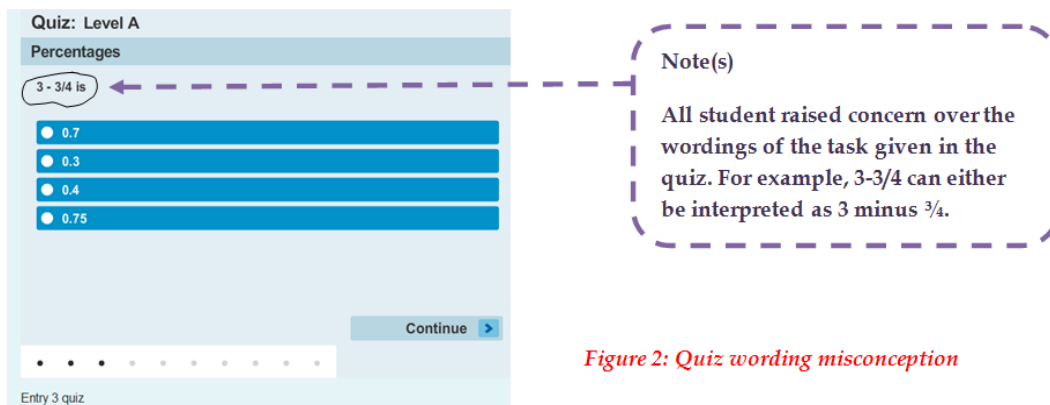


Figure 2: Quiz wording misconception

Issue 4 – Students are hesitant in initial discussion

It was discovered that some students were apprehensive about openly initiating dialogue with the teachers which may be as a result of being afraid of making mistakes and the associated low self-esteem. Two students out of the six being observed were petrified expressing the difficulties they have been experiencing acquiring the skill which have been holding them back from seeking help especially when they are with other group members. Below is statement made by one of them

‘Mathematics class was one of those classes I usually messed about because I just couldn’t get my head round what is being taught and the thought of not sounding stupid prevented me from asking the teacher to explain’.

Issue 5 – Site Navigation & Usability

A thorough examination of the layout shows that it may be a daunting task for an individual new to the use of learning technology to easily find a starting point when navigating as the materials targeting at people with different roles and different intentions for visiting the site, for example, teacher, students and job seekers. It is important to note also that insufficient allowance was made for learners very new to using technology as a learning tool as they tend to struggle navigating way around the tool. This is evident in the time the teacher spent supporting the usage of the system and the frustration expressed by some learners with the navigation hence suffering a steeper learning curve. Figure 3 below for evidence of this.



Issue 6: Learning gains – ending on a positive note

There was evidence of independent learning as 50% of the students worked collaboratively during the group discussion using the information contained in the factsheets as the basis for the discussion. Students expressed satisfaction with the incorporation of the one-minute video directly linked to the topic of the day thereby giving them the opportunity of drawing on their previous ideas on the topic. The entire student group participated in the video discussion. Feedback at the end of the lesson confirmed that 4 out of 6 mentioned that discussion of the content of the factsheets helps in self-evaluating and in problem-solving. Another main point to be raised here is that factsheets were used to promote group discussions thereby pushing the students beyond their comfort zone and making Mathematics learning a social activity.

Interview result

Unstructured interviews were carried out with a teacher and 2 students after the observation to support the view that if the teachers did not make themselves approachable to the students then they were rarely approached. The students expressed the view that the Skillswise learning tool was not always helpful in providing tips and signposting in order for them to fully understand maths. They also said that when they could not understand, they were reluctant to ask the teacher out of fear or embarrassment. They were encouraged when the teacher was approachable, but unfortunately not all teachers are not so approachable. There was also the embarrassment they felt from their friends and peers as well.

The teacher in the interview also made mention of the fact that collaborative learning style was adopted so as to encourage peer support in order to compensate for student hesitation to seek for help openly from the teacher. The teacher further speculated that the students tend to sit in a friendship groups and that they are afraid of putting their hands up and revealing that they are having difficulty understanding and not willing to seek for help when required because of embarrassment from fellow student. This corroborated the student view and what was noticed during the observation.

It was also mentioned by the teacher that students' request for help from the teacher commonly happen when teacher passed close to such student as the teachers monitored classroom activity. The importance of this observation is that the proactive teachers were more likely to be asked for help. This is due to the fact that the more reactive teachers, who wait and look for hands to go up, are not so accessible to the students who seem to prefer a more 'covert' method of attracting attention.

Theory-based rationale for the redesign

New design research methodology

The proposed design for the Skillswise Maths takes into account the issues raised in the study on how the Skillswise enhance the understanding of Maths and how students interact with it with the aim of incorporating the findings in the design of the prototype.

In order to achieve the above and obtain sufficient input from the stakeholders, three teachers that have sufficient knowledge of the use of the Skillswise Maths for teaching & learning and about four learners from the cohort are carefully selected.

The motive behind the prototype is about putting the requirements of end users at the centre of the design process. A power point presentation was put together with the main aim of demonstrating a series of user journeys and also to explain the proof of concept to the teachers and the students. This is based on the assumption that the *participants should be involved in the design process*, engage them in all stages from objectives setting objectives, exploration of needs / requirements analysis, Iterative design to address the needs and finally evaluation of the prototype. (Luckin, et al 2006). In achieving this, three 30 minutes focus meetings were arranged with the 3 teachers so that the proposed design is discussed as a group and their inputs feedback eventually into prototype shown in appendix 2.

Key changes being proposed & theoretical justification

The design concept is based on enabling a learning platform that develop the student learning disposition thereby empowering them to become agents in their own learning and the technology being catalyst.

In achieving this, the proposed design intends to make use of the conversational framework which integrates the instructionism, social constructivism, constructionism and situated learning which are going to be interchangeably adopted based on the pedagogically approach that suite the learning intentions. (Laurillard, 2009). See figure 4 below. This is based on the premise that students require more interaction to achieve the deeper forms of learning. These interactive elements have the main purpose stimulating and maintaining student attention, promoting students into reflecting and maintaining a link between the student, other students and the teacher where any cognitive conflicts or misconceptions can be identified and resolved.

Taking into account the findings of the study and the inputs of the teacher and students that participated in the prototype evaluation, the newly proposed system is going to tap into the novelty features bring about by the Artificial Intelligent. The new design is going to incorporate both the basic features of Computer Assisted Instruction (CAI) and Intelligent Tutoring System (ITS), (Woolf, 2009). This will involve modelling the subject domain in a way that it must have been pre-defined in terms of topics to be covered, exercise as well as the answers, and the feedback actions with tips at the point of learning. In terms of communication and feedback, the proposed design will provide unsolicited hints both after

correct and incorrect answers. Above all, it will monitor the learner profile thereby being able to information about their progress and also give hints on areas they needed to work on in order to get to the desired level.

Another new feature being introduced which also has its root in conversational framework is called 'MathsBoard'. The ideal behind this to tap into some of the learning opportunities made available by the communication technology. This entails posting mathematical problems or task which can be used to instigate discussion within the Skillswise Maths platform thereby helping in articulating/construction ideas and making mathematics a social activity.

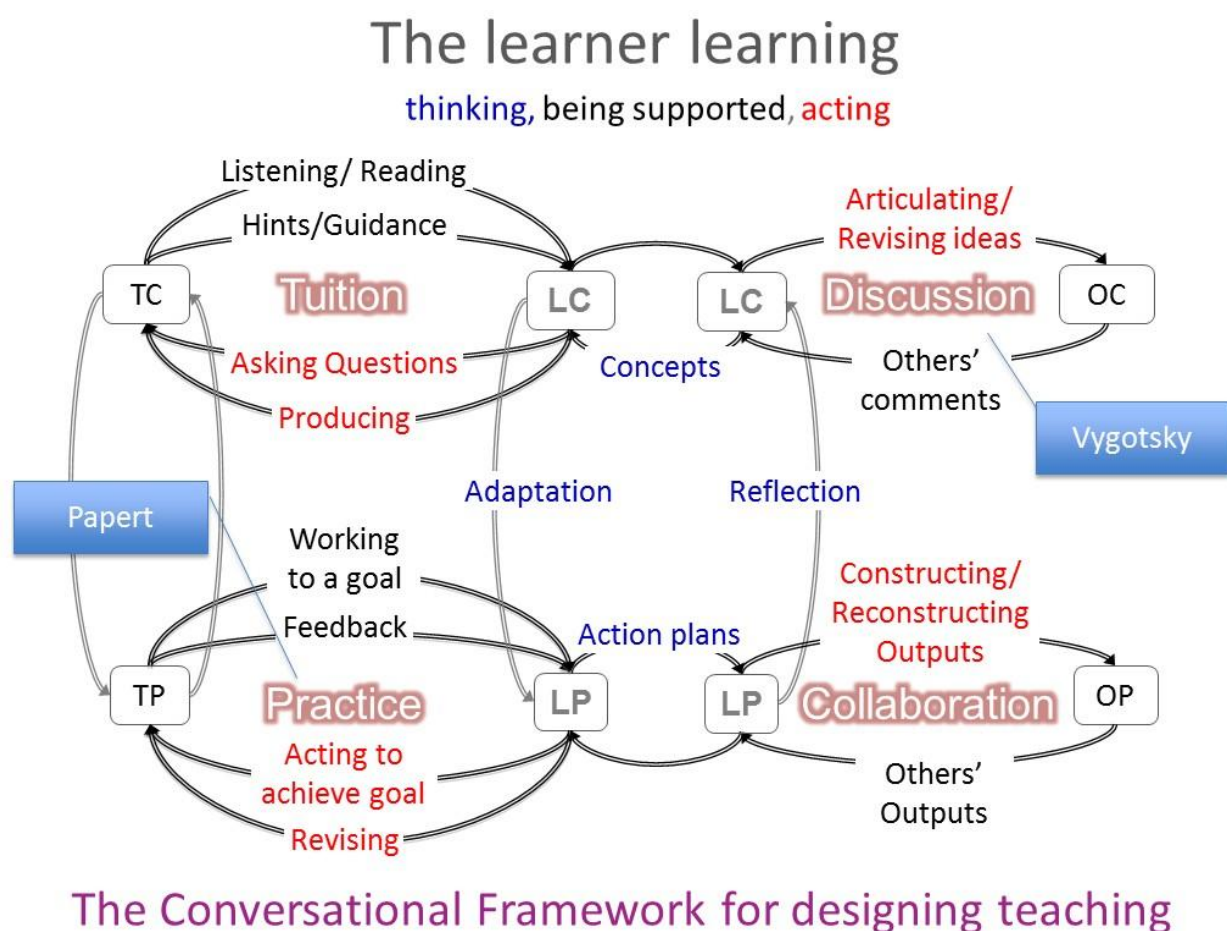


Figure 4: Conversational Framework (culled from Laurillard, 2009)

Conclusion

It can be concluded in answer to the first research question that Skillswise as an learning tool does not go far enough in developing a better understanding of Mathematics because

it does not provide Just-in-time feedback and guidance to students when required. It also provides no clear and specified learning outcomes which could lead to confusion when attempting to review student learning.

Several challenges were observed in the usage of the resource. The assessment task wordings posed challenges to students learning and understanding as interpretation was sometimes a problem. Students had to rely on the teacher to provide interpretation and where the student was apprehensive or shy, understanding of the questions were not always possible. There was also the added challenge posed to those students who were new to technology as they found the layout difficult to navigate. This therefore meant the usability of the site as a resource could be very challenging for some students.

Skillswise as a learning tool has great potentials of enhancing learning, student achievement and teaching provided it is deployed appropriately. There are some positive aspects to it being used as a resource for enhancing learning as it did promote group discussion which pushed students beyond their comfort zone and made mathematics learning a social activity (as seen in Issue 6). However, there is room for improvement as seen in the justification for a prototype which would address the gaps identified by the research. This view is consistent with views expressed by Laurillard (2009).

Recommendation & Evaluation

In carrying out this research which as mentioned previously, an evidence-based research in which case the action research fit perfectly well into. In order words, the best way to improve classroom practice is by teachers evaluating the methods they use, thinking about how they could improve them, putting this into practice and where successful, sharing this with others. This is vital because it is the teachers themselves rather than an learning provider or regulatory body who know what works best as they are the ones directly involved with the students.

In light of this, actions research places teachers in a position of authority and acknowledges them as professionals. It also gives them control over their own professional development. This concept has been proposed by Jack Whitehead (1998) who opined that the work of teachers should be supported (but not directed) by higher education personnel, who would in turn provide intellectual and emotional support to the teachers, as well as advise about further resources and pathways to accreditation.

However, the inclusion of action research in the DTLLS coursework has given me the opportunity to focus on an aspect of my teaching with the aim of improving it. It means that I can try a new approach, evaluate its effectiveness and then decide if it is a worthwhile method to adopt or whether it needs further adjustment or improvement. Rose and Grosvenor state: The model normally adopted for action research is one of self reflection which follows a set pattern of pattern of planning, actions, observations and modifications (2001:13).

Lastly, choosing a topic for my action research project caused me some consternation because of the very diverse and idiosyncratic learning need of this particular cohort of learner that I am using for this research work. As a result of what usually make students to come within the NEET category.

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Appendix 1 – Observation

First Observation

The first session observation lasted for one hour and it focuses on 'Percentages'. The teacher introduced the student to the topic and briefly discussed the learning outcome for the session. He played the one-minute video on the Skillswise Maths tagged 'Why learn about percentages'. The teacher requested the student to discuss the main issues raised in the video as well as the relevance of the topic to their everyday life. The teacher spent about twenty minutes using the 'factsheet' to teach the meaning of percentage and the conversion of percentage problems to fractional problem focusing showing various examples. The teacher later gave the student about 15 minutes to discuss the content of the 'factsheet' and attempt some activities there as a group walking about checking what they were doing. The teacher at the end gave out each student the Skillswise worksheet exercise 3 'Matching up fractions and percentages' which the student spent an average of ten minutes to complete.

First Observation result

Activity	Remarks																					
<div>Teaching resources usage</div> <ul style="list-style-type: none">One minute VideoFactsheetWorksheetQuizzesGames	<ul style="list-style-type: none">All students (6 in number) participated in the ‘Why learn about percentages’ video discussion. The discussion was very captivating as they are all able to bring in their prior knowledge of the use of percentage in both personal and work life.Only 3 students were able to identify well with the content of the factsheet though 1 of then raised concern about it not being challenging enough. The remaining 3 students struggled with the content as they complained about the non-clarity of the steps to be taken in order to tackle percentage related problems. 1 of the 3 students struggling with percentage concepts actually raised concern but the remaining 2 kept quiet during the factsheet discussion though it was evident that attempted to say something but shelved the idea in about 4 different times.Worksheet: 6 students attempted the activities though the teacher had to give 2 of the student a lot of push before they attempted it. The followings are the marks obtained<table><tr><th>Student</th><th>Mark Obtainable</th><th>Mark Obtained</th></tr><tr><td>1</td><td>6</td><td>6</td></tr><tr><td>2</td><td>6</td><td>6</td></tr><tr><td>3</td><td>6</td><td>4</td></tr><tr><td>4</td><td>6</td><td>6</td></tr><tr><td>5</td><td>6</td><td>2</td></tr><tr><td>6</td><td>6</td><td>1</td></tr></table>	Student	Mark Obtainable	Mark Obtained	1	6	6	2	6	6	3	6	4	4	6	6	5	6	2	6	6	1
Student	Mark Obtainable	Mark Obtained																				
1	6	6																				
2	6	6																				
3	6	4																				
4	6	6																				
5	6	2																				
6	6	1																				
<div>Feedback (Intrinsic & Extrinsic)</div>	<ul style="list-style-type: none">The quiz and the game were not used.The only evidence of feedback given by the BBC Skillswise Maths only comes at the end of the quiz. See figure 1 for sample.The teacher had to be looking out for student requiring help or studying their body language in order to know when to intervene.Other activities that could have generated feedback are done outside the																					

	Skillswise system.
Challenges faced by students	<p>The following issues that challenged the student are summarised below</p> <ul style="list-style-type: none"> • The entire student raised concern about the navigation of the system as they had to be clicking on the back button on the menu bar to go a step backward. The 3 students without the good IT skills had to be literally calling the attention of the teacher despite the fact that they have worked on the Skillswise Maths on 6 different occasions. This had negative impact on the support that the teacher could have given to entire cohort as the teacher's effort was also reduced to providing IT support. • Apart from the navigation, one of the student actually mentioned the user interface as one main issue mentioning that the screen is too busy with several icons making it difficult to figure the layout of the screen
Nature of Interaction it provides	<ul style="list-style-type: none"> • Though the BBC Skillswise Maths is rich in content in terms of availability of different resources that appeals to different learning style be it Visual, Auditory, Reading and the Kinaesthetic but some of resources needs to be twinkle a bit in order to give the student a good learning experience. • It provides opportunities for the learner to reflect on the rationale for the acquisition of the Maths skills as the videos, factsheets and worksheet are directly linked to the 'Street Maths'. By so doing it helps them in bringing in their previous ideas
Assessment	<ul style="list-style-type: none"> • 4 students raised concern about the wording of the assessment task • There is evidence of the assessment aligning with the learning outcome for each topic. • Not able to get immediate feedback from the system is of great concern to 4 of the cohort as they expressed dissatisfaction on the off-line nature of the assessment process
Additional note(s) <p>During the observation it was discovered that some students were apprehensive (exactly 2 students) about openly initiating dialogue with the teacher. With a combination of some students having low IT skills and the hesitation of some of the students to openly request for assistance, teachers tend to have difficulties identifying the student that require assistance. There was a general consensus among the students that the BBC Skillswise fails to harness full opportunities provided by learning technology as they kept uttering statement like 'the system should be able to doon several occasions.</p>	

Second Observation

The observation session also lasted for about one hour and it focuses on 'Comparing Fractions & Percentages'. The teacher instructed the student to attempt the quiz level A in the current session which somehow overlap with the conversion of percentage problems to fractional problems (Previous session). The teacher checked the result on the individual screen of the student video and outlined the learning outcome for the session which focuses on comparing fractions and percentages. The quiz lasted for about 5 minutes. The teacher then played the one-minute video on the Skillswise Maths tagged 'Why compare fractions and percentages'. The teacher asked the student discussed why the knowledge of comparison of fractions and percentages are important in early years. The discussion lasted for about 6 minutes. The teacher rounded up the discussion and spent about 35 minutes using the 'factsheet' to teach the changing percentages to fractions and fractions as decimals and percentages showing various examples. The teacher asked the students to discuss the 2 factsheets for about 5 minutes each during the teaching session. The

teacher gave the students worksheets in-between the two topics covered using the factsheets for average of about 5 minutes each giving feedback to them as they were working on the worksheet individually.

Appendix 2 - *Prototype of the proposed BC Skillswise Maths - 1*



A login and registration screen for Skillswise Maths. The background is light blue with a pattern of small water droplets. In the top left corner, the text "BBC" is displayed in a large, bold, black font. Below it, the word "Skillswise" is written in a large, bold, red font, and "Maths" is written below it in a large, bold, dark blue font. Below the title, there is a red box containing the following text: "Registration is mandatory condition for using this learning tool. We require it in order support you appropriate as it will help in knowing the level you are working at and reporting how well you are progressing." Below this text, there are two sections: "Existing User" and "Or are you a new user?". The "Existing User" section has two input fields: "Email Address:" and "Password:". To the right of these fields, there is a link that says "Forgotten your password, click HERE". Below the input fields, there is a black button with the text "Submit" in white. The "Or are you a new user?" section has a black button with the text "Register" in white.

Appendix 2 - *Prototype of the proposed BC Skillswise Maths - 2*

Skillswise
Maths

Student Registration Page

New User

Email address *

College / Centre

Full Name *

Class / Group

Password *

Submit

* Are mandatory field and must be filled

Skillswise
Maths

Teacher Registration Page

New User

Email address *

College / Centre

Full Name *

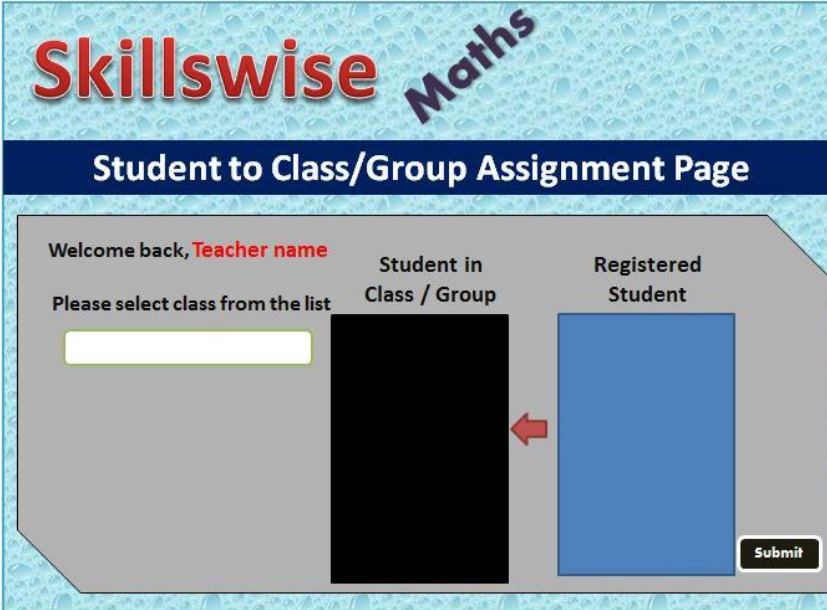
Class / Group

Password *

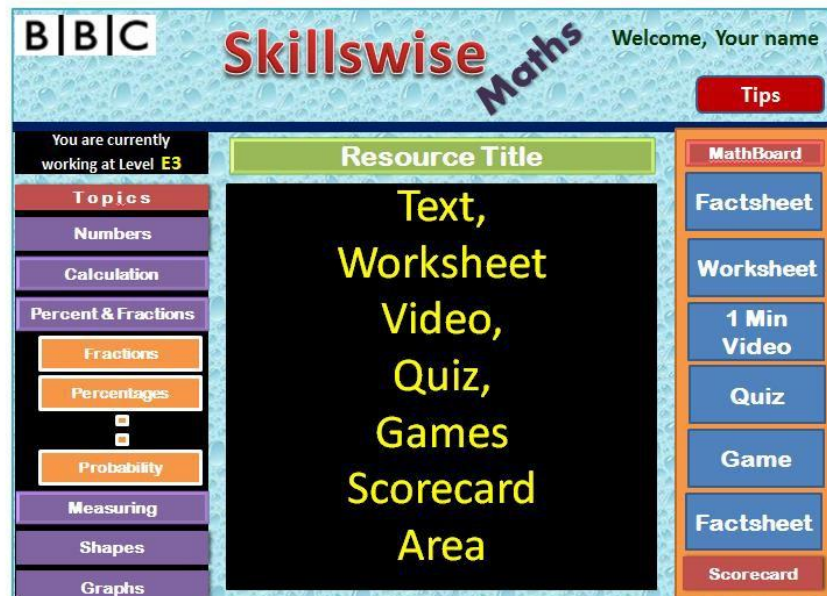
Submit

* Are mandatory field and must be filled

Appendix 2 - Prototype of the proposed BC Skillswise Maths – 3



The image shows a web interface for Skillswise Maths. At the top, the logo "Skillswise Maths" is displayed in red and blue. Below it, a dark blue banner reads "Student to Class/Group Assignment Page". The main content area is a light gray box with a blue border. It contains a welcome message "Welcome back, Teacher name" in red. Below this, it says "Please select class from the list" next to a white input field. To the right of the input field are two columns: "Student in Class / Group" (a black box) and "Registered Student" (a blue box). A red arrow points from the "Registered Student" box to the "Student in Class / Group" box. A "Submit" button is located at the bottom right of the gray box.



The image shows the BBC Skillswise Maths home page. At the top, the BBC logo is on the left, the "Skillswise Maths" logo is in the center, and "Welcome, Your name" is on the right. Below the BBC logo, it says "You are currently working at Level E3". The main content area is a large black box with yellow text that reads "Text, Worksheet, Video, Quiz, Games, Scorecard, Area". To the left of this box is a sidebar with a "Topics" section containing buttons for "Numbers", "Calculation", "Percent & Fractions", "Fractions", "Percentages", "Probability", "Measuring", "Shapes", and "Graphs". To the right of the main box is a sidebar with a "Tips" button at the top, followed by buttons for "MathBoard", "Factsheet", "Worksheet", "1 Min Video", "Quiz", "Game", "Factsheet", and "Scorecard".



