

Developing Information Communication Technology (ICT) Curriculum Standards for K-12 Schools in the Philippines

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Abstract

Integrating Information and Communication Technology or ICT into teaching and learning has become a great concern for many educators in developing countries like the Philippines. ICT must be used and taught in powerful and meaningful ways. With its rapid development, educators should find ways to integrate technology in the learning process. ICT should not drive education, rather, educational goals and needs must drive its use in schools. Targeting holistic growth for learners is a crucial factor in realizing the need to develop ICT curriculum standards for K-12 schools in the Philippines. The researcher believes that developing these standards is a decision making process that will dictate how Filipino students will acquire ICT concepts and skills to help them achieve the greater benefits of learning.

Introduction

Setting standards is an important and effective learning tool because they express clear expectations of what all learners should know and be able to do. For the country, standards are a common reference tool and provide a defined framework for national testing. For schools, standards provide a focus for developing new ways to organize curriculum content, instructional programs and assessment plans. For the teachers, standards will help them design curriculum, instruction and assessment on the basis of what is important to learn. They also enable teachers to make expectations clear to students, which improves their learning. For students, standards set clear performance expectations, helping them understand what they need to do in order to meet the standards (Steiner, 2000).

ICT curriculum standards for K-12 schools in the Philippines will serve as a framework for technology integration in various academic content area instructions from kindergarten through grade 12, function as a guide for curriculum decisions by providing student performance expectations in the areas of knowledge, skills and attitudes, and provide examples of classroom activities and instructional strategies utilizing ICT that will guide teachers as they design instruction to help their students meet learning expectations.

The Need to Develop ICT Curriculum Standards

The process of integrating standards into the curriculum should emphasize learning and growth for all as the natural and desired outcome of reform in the schools. From that perspective, a standards-based curriculum includes not only goals, objectives, and standards, but everything

that is done to enable attainment of those outcomes and, at the same time, foster reflection and revision of the curriculum to ensure students' continued growth (Pattinson & Berkas, 2000).

This process consists of four steps (Pattinson & Berkas, 2000): (1) developing a curriculum framework in the context of standards-based reform; (2) selecting a curriculum-planning model that further articulates the standards-based reform outlined in the framework; (3) building capacity at all levels of the educational system; and (4) monitoring, reflecting upon, and evaluating the curriculum as teachers implement it in the classroom.

Instruction integrating ICT in Philippine schools will be created based on these standards. Curriculum content will be created after carefully selecting and analyzing the standards to be met. Educators should refer to the targeted skills for each content area and grade level as they plan and implement their classroom activities. Instructional activities and assessments are to be selected and designed through which students can demonstrate mastery of standards.

Standards help to determine what students must know or be able to do to perform well on the assessment. The instructional plan should provide all students with adequate opportunities and different teaching strategies to accommodate learning styles and needs in order to learn and practice the necessary skills or knowledge provided in the standards.

Because ICT is complex, having a well-defined set of curriculum standards in the Philippines will guide educators in defining and meeting the technology knowledge and skills Filipino students need in their current academic, tertiary education and future work requirements thus making them globally competitive. With the implementation of the K-12 curriculum, a new DepEd mandate wherein students will extend for two more years in secondary school, much more funding is needed, and much more learning is expected.

While DepEd continues to grapple with the problem of improving quality and broadening access, new challenges to educational institutions have emerged within the context of globalization, the rapid development of new digital technologies, and the transition to a knowledge-based economy. In a knowledge-based economy, knowledge is the most precious asset, driving growth, wealth-creation, and employment, and education serves as the key to economic and social mobility.

ICT in Instruction

Research has indicated that the use of ICT can support new instructional approaches and make hard-to-implement instructional methods such as simulation or cooperative learning more feasible. Moreover, educators commonly agree that ICT has the potential to improve student learning outcomes and effectiveness. Integration has a sense of completeness or wholeness, by which all essential elements of a system are seamlessly combined together to make a whole (Chang & Wu, 2012). Schools have seen an exponential increase in the range of ICT being utilized for learning and teaching over the past decade, especially with the advent of the Internet. What is exciting is not just more technology but that there are more types of technology which teachers can pick and choose from, based on their own pedagogical preferences (Choy, Suan & Chee, 2012).

ICT can improve the quality of education and heighten teaching efficiency through pre-service training and programs that are relevant and responsive to the needs of the education system. This will allow teachers to have sufficient subject knowledge, a repertoire of teaching methodologies and strategies, professional development for lifelong learning. These programs

will expose them to new modern channels of information, and will develop self-guided learning materials, placing more focus on learning rather than teaching. However, it is important to point out that ICT is used to enhance teaching styles, and “should not replace the role of the teacher.”

ICTs in a Learner-Centered Environment

If designed and implemented properly, ICT-supported education can promote the acquisition of the knowledge and skills that will empower students for lifelong learning. When used appropriately, ICTs, especially computers and Internet technologies, enable new ways of teaching and learning rather than simply allow teachers and students to do what they have done before in a better way. These new ways of teaching and learning are underpinned by constructivist theories of learning and constitute a shift from a teacher-centered pedagogy, in its worst form characterized by memorization and rote learning, to one that is learner-centered (Tinio, 2002). Following are some of learning approaches ICT can promote:

Active learning. ICT-enhanced learning mobilizes tools for examination, calculation and analysis of information, thus providing a platform for student inquiry, analysis and construction of new information. Learners therefore learn as they do and, whenever appropriate, work on real-life problems in-depth, making learning less abstract and more relevant to the learner’s life situation. ICT-enhanced learning promotes increased learner engagement.

Collaborative learning. ICT-supported learning encourages interaction and cooperation among students, teachers, and experts regardless of where they are. Apart from modeling real-world interactions, ICT-supported learning provides learners the opportunity to work with people from different cultures, thereby helping to enhance learners’ teaming and communicative skills as well as their global awareness. It models learning done throughout the learner’s lifetime by expanding the learning space to include not just peers but also mentors and experts from different fields.

Integrative learning. ICT-enhanced learning promotes a thematic, integrative approach to teaching and learning. This approach eliminates the artificial separation between the different disciplines and between theory and practice that characterizes the traditional classroom approach.

Evaluative learning. ICT-enhanced learning is student-directed and diagnostic. Unlike static, text- or print-based educational technologies, ICT-enhanced learning recognizes that there are many different learning pathways and many different articulations of knowledge. ICTs allow learners to explore and discover rather than merely listen and remember.

Creative Learning. ICT-supported learning promotes the manipulation of existing information and the creation of real-world products rather than the regurgitation of received information.

Project-based learning (PBL) is a constructivist pedagogy and class-oriented learning approach involving long-term, theme-based learning and student-centered activities that focus on daily life problems. It can be an ICT-enhanced learning that allows students to use an inquiry-based approach to engage with issues and questions that are real and relevant to their lives (Curtis, 2001).

Technology for schools should focus on enhancing learning rather than minimizing work for students. ICT standards for K-12 schools in the Philippines should focus on skills that have real-life practical application, helping students function in the world in which they live. Standards will aid educators to develop lessons that will allow students to use learned skills in other academic content areas, motivate them to learn more, provide them opportunities to collaboratively learn with other learners, and help them develop various intelligences.

ICT Integration in Philippine Education

ICT is introduced at the elementary level as a subject called Home Economics and Livelihood Education (HELE) and in the secondary level as Technology and Home Economics (THE). In the majority of cases, ICT materials such as software and multimedia, are used to supplement instruction.

Philippine DepEd has policies on the use of ICT. These are: (1) technology must be studied first as a separate subject, then applied in other learning areas as a tool for learning how to learn; (2) the application of computer skills to the other learning areas is a curriculum policy that stems from the principle that teaching-learning must not be textbook-driven, and educational processes should take advantage of technological developments, including the application of ICT in teaching and learning, where appropriate; and (3) an education modernization program will equip schools with facilities, equipment, materials and skills and introduce new learning and delivery systems necessary to capitalize on recent technological developments.

The bulk of investment requirements for implementing ICT in education come from government funding. However, the DepEd involves other government agencies, local governments and the private sector to finance various components of building up a program in ICT in education.

A national population survey of public and private elementary and secondary schools was conducted by SEAMEO INNOTECH Philippines in 2001 to determine ICT capabilities of schools. A total of 45,811 schools from the 16 regions of the country were given questionnaires, with the school heads as respondent, of which 79.37% responded. The questionnaire focused on the readiness of schools in terms of infrastructure, hardware, software and manpower capabilities on ICT. Some of the major findings of the survey at the national level showed that 5,217 schools only or 14.28% have computers with the National Capital Region having the highest percentage at 87.30%, only 18.24% of schools have staff proficient in the use of computers, and only very few schools (13.13%) have school heads with ICT training in the previous 5 years.

The survey also indicated the need of these schools to implement standards for technology use. What kinds of changes in knowledge, skills and competencies are required from teachers and students in the use of ICT? In order to serve as a basis for developing knowledge, skills and competencies in the use of ICT, as well as in comparing outcomes of ICT use against goals set, few countries have set standards for technology use.

The primary factor that influences the effectiveness of learning is not the availability of technology, but the pedagogical design for effective use of ICT. The computer should be fitted into the curriculum, not the curriculum into the computer. Therefore, effective ICT integration should focus on pedagogy design by justifying how the technology is used in such a way and why. Effective ICT integration into the learning process has the potential to engage learners (Wang & Woo, 2007).

More and more, schools and universities present themselves as innovative educational institutes by utilizing web-based technology or the Internet to deliver instruction. In the last few years, there is an emergence of distance education programs in the Philippines, particularly in tertiary level, like the University of the Philippines Open University (UPOU), the largest that offers undergraduate and graduate school programs recognized by the Commission on Higher Education. From the business sector, many BPO companies cater to providing English online learning classes to students mostly outside the country. A-Plus Languages Online is a company that delivers language online instruction to some primary, secondary and tertiary private schools

in Metro Manila. Using ICT tools, students can learn Mandarin synchronously with teachers who are based in Xiamen, China.

Though there is a wide use of the Internet in the business sector, more than 70% of schools have no access to the Internet, particularly the public schools. The schools in Metro Manila, have the greatest access to the Internet, but the incidence of connectivity decreases as one goes northwards and southwards throughout the archipelago.

Government Initiatives

In 2002, the Restructured Basic Education Curriculum was conceived. This aimed to implement an interactive curriculum that promotes integrated teaching and interdisciplinary, contextual and authentic learning. Interactivity is made possible with the use of technology in instruction and the greater emphasis on computer literacy in all learning areas in every school where equipment is available.

The Philippine Education Technology Master Plan has the following operational targets by the year 2009: (1) all public secondary schools shall be provided with an appropriate educational technology package; (2) 75% of public secondary schools shall have a computer laboratory room equipped with basic multimedia equipment; (3) all public secondary schools shall have an electronic library system; (4) 75% of public secondary schools teachers shall have been trained in basic computer skills and the use of the Internet and computer-aided instruction; and (5) all learning areas of the curriculum shall be able to integrate the application of ICT, where appropriate.

The Act of 1998 (R.A. 8525) was passed to generate private sector participation in the upgrading and modernization of public schools, especially those in underserved provinces. Recipient schools were selected based on the criteria adopted under the computerization program. In all, 110 public high schools received computers in 1996 under the DOST Engineering Science Education Project (ESEP) and an additional 68 public high schools were recipients under the DOST Computer Literacy Program. DOST continues to allocate some PHP 20,000,000 to 30,000,000 (US\$ 400,000 to 600,000) annually to support computer acquisition in schools. In 2002 and 2003, 125 public high schools were to be provided with 10 to 15 computers along with the corresponding teacher training programs.

In collaboration with University of the Philippines National Institute for Science and Mathematics Education (UP-NISMED), a project to integrate ICT in the 2002 Basic Education Curriculum (BEC) was developed and served as a framework for ICT integration in Science and Mathematics for primary and secondary schools.

Centers of excellence in information technology, crossing traditional boundaries, were established in order to focus on the needs of a greater number of learners. Three information technology centers were set up, two elementary and one secondary, in each of the regions. Each center was provided with a laboratory equipped with computers, printers, peripherals, a multimedia projector, an air-conditioning unit and software programs. Teacher training was also a component. For the first year of operation, operating funds were provided by the government, and the Local Government Unit was expected to supply funds for the maintenance and continuous operation of the facilities.

Computers for Public Schools Project (PCPS), funded through a grant of PHP 600,000 (US\$ 12 million) from the Government of Japan, secured largely through the initiative of the Department of Trade and Industry. The grant has benefited 996 public secondary schools across

the country through the provision of 20 desktop computers, two printers, one fax/data/voice external modem with cable, one software package and teacher training to each of recipient-schools.

Data and information available show that the Philippines has eagerly embraced ICT in education. With facilitation by the Department of Education, and collaboration with the private sector, several initiatives have successfully equipped a number of schools with ICT facilities. Nevertheless, the initiatives have not insured that teachers fully use the facilities for teaching purposes (Belawati, 2004).

Requirements for Efficient Implementation of ICT Integration in the Philippines

Studies of ICT development in both developed and developing countries identify at least four broad steps through which educational systems and individual institutions typically proceed in their adoption and use of ICT (Majumdar, 2012). The *emerging* stage is when educators are just becoming aware of the potentials of ICT in education. The *applying* stage is the time teachers are starting to learn how to use ICT for teaching and learning. The *infusing* stage is when a host of ICT tools are used and integrated into the curriculum. Finally, the *transforming* stage involves the development of new ways of teaching and learning using ICT to explore real-world problems through innovative learning.

Implementation Plan

Recognizing the potential benefits of integrating ICTs in education systems, DepEd launched the National Strategic Planning Initiative for ICTs in Basic Education in February 2005 as part of a system-wide reform process to bring Philippine basic education out of crisis.

This National Framework Plan sets three parameters for the use of ICTs in basic education, namely, appropriateness, effectiveness, and sustainability.

Appropriateness refers to suitability in context. Factors to consider in choosing an ICT resource is the learning goal and objective to be met, the content of the material and its availability and accessibility to students. The most appropriate ICT tool does not need to be the most up-to-date or expensive available in the market.

Effectiveness refers to the extent to which stated goals and objectives are realized. When used appropriately, ICTs are powerful tools that can improve motivation and engagement in the learning process, develop multiple intelligences, facilitate comprehension of abstract concepts, promote inquiry and exploration through the use of interactive learning resources, enhance information literacy, critical thinking, problem-solving, and other higher order thinking skills. ICT can facilitate collaborative and cooperative learning by providing tools for learners to communicate and work with other learners, and develop lifelong learning skills, including learning how to learn.

Sustainability is defined as the extent to which the implementation of an ICT-based project (in the context of basic education) can continue after initial project funding or support has ended.

Teacher Training

A student's academic achievements are often used to evaluate teaching effectiveness and are influenced by the use of technology in school. In other words, a student's use of technology

represents the teacher's integration of technology into teaching and curricula and also affects the teacher's effectiveness (Chang & Wu, 2012).

A study showed that students' academic achievements are noticeably influenced by the teacher's use of technology. A teacher's technological literacy directly affects whether students can incorporate technology into the curriculum to improve students' academic achievements (Chang & Wu, 2012). Educators must be knowledgeable in their subject matter and current in the content standards and teaching methodologies of their discipline. Teacher candidates should learn to use technology in ways that support attaining the content standards.

To enhance teachers' skills and competencies in technology integration, the following are recommended (Almekhlafi & Almeqdadi, 2010): (1) deliver workshops on effective technology integration; (2) provide teachers with appropriate ICT tools in the classroom; (3) provide teachers with incentives and awards for outstanding technology integration in their classrooms; (4) provide teachers with some release time so that they can plan effectively for technology integration in teaching and learning; (5) explore the use of technology in classrooms covering all school levels, including public and private schools; (6) investigate the effect of technology integration on students' achievement and attitude; (7) evaluate technology integration in relationship to curriculum goals and outcomes .

Since 2000, DepEd has given preference in hiring Filipino teacher-applicants who were computer literate. In most teacher training institutions, computer education is now a required course. For those who are already employed as teachers, in-service training is provided. Intensive training on electronics and assembly of computers for THE teachers of 110 science and technology oriented high schools and other special science high schools is offered. The objective of this training is to ensure that teachers in schools with special science & technology programs have the appropriate technology skills.

Even though the Philippine government has initiated several programs and projects for the use of ICT in education, real implementation in day-to-day learning is still limited. Teachers' fear of technology still hinders the optimal use of ICT-related skills in their teaching activities.

Despite various training programs having been provided to Filipino teachers, there is still a need to embark on a comprehensive and sustained in-service training for teachers. Usually, public schools send a few teachers to computer literacy training, who would then pass on the training of peer teachers. Private schools hire ICT service providers to give training to their teachers. Public school teachers handling THE classes receive training on ICT. Since 1997, the DepEd has intensified the provision of ICT training to teachers of English, Science, Mathematics and THE.

Technological Leadership

To be an experienced and capable technological leader, school administrators such as the principal, must be trained in vision, planning and management. This is the most important foundation of technological leadership. A technological leader must develop a vision of how school reform will be affected by technology. Planning and establishing resources for staff development are the most important responsibilities of a technological leader, followed by ICT tools and infrastructure support and evaluation and research. Effective technological leaders must administer procedures for measuring the growth of each individual teacher. They also must set technological targets and introduce professional development plans (Chang, 2012). A systematic

development program for these leaders' needs must be implemented to change their mindset so they appreciate the value of ICT in education.

Potential Challenges

Countries everywhere are facing similar challenges in implementing ICT in their education systems. Unfortunately, many local, national and regional government bodies are still not giving ICT the attention and priority it deserves despite the benefits it brings. Providing basic access to ICT to young people living in either impoverished communities or rural locations often neglected by policy makers is one major challenge being faced (Gutterman et al, 2009).

Lack of Facilities

One of the greatest challenges in ICT use in education is balancing educational goals with economic realities. ICTs in education programs require large capital investments and developing countries need to be prudent in making decisions about what models of ICT use will be introduced and to be conscious of maintaining economies of scale. Ultimately it is an issue of whether the value added of ICT use offsets the cost, relative to the cost of alternatives. Put another way, is ICT-based learning the most effective strategy for achieving the desired educational goals, and if so what is the modality and scale of implementation that can be supported given existing financial, human and other resources?

Philippine schools use computers mainly in a technology subject (THE) for predominantly senior high school classes for formal study of the technology, with relatively limited application to other learning areas. The integration of technology across the curriculum has been constrained by the lack of ICT resources. In non-formal education, there is very limited use of information technology because out-of-school youth and adults participating in non-formal education programs generally do not have access to computers.

ICT usage depends first on whether there are enough ICT facilities. The research studies focusing on the barriers to use ICT reveal that the insufficiency or lack of ICT facilities appears as significant barriers (Usluel, Askar & Bas, 2008). Lack of basic infrastructure such as classrooms and Internet connectivity are hindrances in effective implementation of ICT curriculum standards in the Philippines.

Although the Philippines never falls behind neighboring South East Asian countries in terms of ICT infrastructures in government and corporate environments, there is much to be done with schools, especially the public schools and those in the rural areas.

Computers in Philippine schools are acquired mostly through purchases using school funds or through donations by government and private groups for many public schools. Not all elementary and high schools have their own computer lab. Philippine-based Foundation for IT for Education and Development (FIT-ED) 2002 Survey, only 13% of the schools have Internet access, 9% of schools have computers with Internet access available for teacher use and 8% of schools have computers with Internet access available for student use. A Department of Science and Technology (DOST) survey showed that among the 16 regions in the country, access to information technology at the secondary school level varies from a low of 34% to a high of 98%. Metro Manila, as the center of commerce and industry in the country, has the greatest access to computers, while the Visayas and Mindanao have the least.

Much work still needs to be done to ensure that computers and other ICT equipment deployed in public secondary schools are used to improve the quality of teaching and learning. In a 2002 survey of ICT use in 100 Philippine public secondary schools, Tinio (2002) reports that in majority of the schools surveyed, only half or less of their teachers and students had been able to use the computer as an educational tool. Moreover, the predominant use of computers was in computer classes taken by students in their junior and senior years in secondary schools. Using computers for other content areas such as math and science is still difficult for most public schools. While more secondary schools now have computers, student-to-computer and teacher-to-computer ratios remain extremely poor.

Another reason for lack of ICT integration in teaching is the limited number and variety of subject-specific educational software available in schools. Software in schools consists mostly of office software or productivity tools for word processing, slide presentations, numeric spreadsheet, or database management. Educational software for learning Science, English and Mathematics are few (Tinio, 2002).

The absence of specific curricular standards and guidelines for integrating computers into the subject areas is another important reason for the limited use of ICT in classroom instruction. IT curriculum covering basic computer and Internet literacy skills (and in some cases, basic programming) for the last two years of secondary school can be followed mostly by private schools. With the full implementation of the K-12 curriculum in 2016, schools should offer more opportunities for students to experience technology-supported learning that is interactive, interdisciplinary, collaborative and authentic.

Teachers' Knowledge, Skills and Attitude

Making computer labs available in Philippine schools is not enough. It is important for teachers to understand the precise role of ICT so that they can effectively cope with innovations in teaching students. Teachers are less likely to integrate technology into their instruction unless they accept the notion of the requirement of technology use in their classroom environment. The central questions with regard to technology acceptance are how individuals perceive technology and which factors contribute to the lack of utilization (Kiraz & Ozdemir, 2006). The lack of both technical and pedagogical knowledge and skills of the teacher to use available ICTs in the classroom becomes the major constraint.

The use of technology for teaching requires the development not only of knowledge, skills, and behaviors but also of appropriate attitudes (Kim & Baylor, 2008). Attitudes might be influenced by concerns, confidence, and so forth. For example, pre-service teachers' attitudes toward a technology are affected by their confidence in using it. Even though technology is available, and teachers have the requisite skills and knowledge, if they are not confident in using technology for teaching, they might be unwilling to do so.

Attitude toward ICT integration in instruction, and the level of knowledge and skills of teachers in the Philippines vary due to demographic, geographic, economic and regional differences.

Role of Leadership

One of the most fundamental problems in educational reform is that educators do not have a clear and coherent sense of the reasons for change, what it is and how to proceed. In order to

accomplish lasting reform, we need leaders who can create a fundamental transformation in the learning cultures of school (Fullan, 2002). In other words, working on changing the mindsets and perceptions of the end-users who are really the teachers, to make them more open to change, is as important as the technology itself. Often, the teachers who resist change are not rejecting the need for change but are resisting entering into something that they do not have the necessary knowledge and skills for (Choy, Suan & Chee, 2012).

Conclusion

ICTs can be used to improve the quality of learning. They can promote learner motivation, mastery of basic concepts, and the development of higher order thinking and lifelong learning skills.

However, ICT is complex and confusing, and it deeply encroaches on the processes of education. Lack of vision, lack of consensus and lack of policy on how to integrate ICT in education consistently, are not very helpful either (Westera, 2005). ICTs, cannot by themselves resolve educational problems in the developing world, as such problems are rooted in well entrenched issues of poverty, social inequality, and uneven development. What ICTs as educational tools can do, if they are used prudently, is enable developing countries to expand access to and raise the quality of education. Prudence requires careful consideration of the interacting issues that underpin ICT use in the school, policy and politics, infrastructure development, human capacity, language and content, culture, equity, cost, and not least, curriculum and pedagogy (Tinio, 2002).

Motivation, innovation and sustainability of ICT development programs depend on the kind of leadership that exists. Educational leaders are effective when they are able to influence members of the organization to believe what they believe. Resistance is often encountered when change is introduced. Yet, it takes a good leader to plan, persuade and perform actions that will allow the different functions to collaborate, share resources and work together to achieve a common goal. Technological leadership is a crucial component in order to develop and implement ICT curriculum standards. Teachers' attitude, skills and acceptability of utilizing ICT in the classroom pose as an apparent obstruction, however, the support coming from school principals and administrators and the government to innovate, monitor and sustain good practices is a major contributor to the success of implementing these standards.

Developing ICT curriculum standards for K-12 schools in the Philippines seems to be a long decision process, yet the urgency to do it should be realized now as technology is becoming more and more crucial in the lives of Filipinos as they follow the path of economic growth and strengthening of a nation. The researcher believes that the first step is to accept the need to formulate these standards, know and prepare for the challenges ahead, have the will to pursue it by utilizing whatever resources are available, and be able to carry on the appropriateness, effectiveness and sustainability of ICT integration in schools, keeping in mind that its success lies in the hands of Filipino educators who are committed to make their education system work in the midst of many barriers to learning.

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