A curriculum framework for implementing information technology in school education to foster information literacy

Siu Cheung Kong *

Department of Mathematics, Science, Social Sciences and Technology, The Hong Kong Institute of Education, 10 Lo Ping Road, Tai Po, New Territories, Hong Kong

Received 29 January 2007; received in revised form 23 March 2007; accepted 22 April 2007

Abstract

A literature review of the development of the information technology (IT) curriculum in recent decades in Hong Kong reveals that the aim of the curriculum has shifted from Computer Studies to the development of information literacy (IL). Based on a survey of all schools in Hong Kong and in response to the demand for IL in society, a curriculum framework is proposed that fosters the IL of students. The curriculum framework is based on the rationale of significant learning and designed on the principles of providing authenticity and creating reflection. It consists of three parts: a core IT curriculum; use of knowledge about IT and information processing across curricula; and a school culture that fosters IL. Four issues that are critical for the successful implementation of the proposed curriculum framework are discussed: school-based implementation models; the provision of service learning activities; support from parents; and reduction of the digital divide between students.

© 2007 Elsevier Ltd. All rights reserved.

Keywords: Curriculum framework; Information literacy; Information technology; School education; Significant learning; Service learning

1. Introduction

The exponential growth of knowledge and the emergence of economic globalisation since the end of the twentieth century reveal that citizens all over the world must possess the ability to process information with a global perspective (American Library Association Presidential Committee on Information Literacy, 1989; Candy, 2002; O'Sullivan, 2002; Rader, 2003; World Summit on the Information Society, 2003). With the increasing popularity of digital culture, citizens in the twenty-first century must master information and communication technology skills to cope with challenges in every aspect of daily life in the information society (Johnson, 2003; Martin, 2003). This article aims to discuss a curriculum framework in school education that fosters information literacy (IL) in the information society.

* Tel.: +852 29487646; fax: +852 29487726.
E-mail address: sckong@ied.edu.hk.

0360-1315/$ - see front matter © 2007 Elsevier Ltd. All rights reserved.
doi:10.1016/j.compedu.2007.04.005

Please cite this article in press as: Kong, S. C., A curriculum framework for implementing ..., Computers & Education (2007), doi:10.1016/j.compedu.2007.04.005
The rise of the use of microcomputers in the late 1970s and the early 1980s impelled some teachers who were keenly interested in computer education to design computer curricula and activities. Their work provided the foundation for the curriculum development of computer education from the early 1980s through the mid-1990s in Hong Kong school education (Leung, 1980; Summers, 1979). In 1979, a working group for the design of a curriculum for Computer Studies for senior secondary education was established (Summers & Willett, 1980). The epoch-making trial curriculum for Computer Studies was subsequently launched in 1982. At that time, the key learning areas of this subject included using the programming language BASIC for program- ming, acquiring knowledge of the organisation and operation of computer software and hardware, and learning the development history of computers (Moon & Tung, 1983). In 1986, Computer Literacy was introduced for the junior secondary curriculum for Computer Studies (Leung, 1988). In 1990, Computer Studies was brought into the matriculation curriculum. The aforementioned subjects that were designed for the secondary education curriculum also served to encourage secondary school students to acquire further knowledge about information technology (IT) applications (Kong, 2003). Over the past two decades, most secondary schools in Hong Kong have made considerable headway in computer education, which is in line with the global spread and growth of IT awareness. To date, almost every secondary school in Hong Kong offers Computer Literacy for students from Secondary 1 to Secondary 3 (Education & Manpower Bureau, 2005).

The emerging digital culture along with the trend towards economic globalisation and the development of a knowledge-based society has driven the need for people to master information processing skills for their learning, professional and personal activities by taking advantage of IT. This has led to the development of a curriculum for IT in education (ITEd) in Hong Kong school education since the late 1990s. In his 1997 Policy Address, the Chief Executive of the Government of the Hong Kong Special Administrative Region pledged to invest hugely in ITEd. In 1998, the government announced that it would provide the essential infrastructure for ITEd in its first strategic document on ITEd, *Information Technology for Learning in a New Era: Five-year Strategy – 1998/99 to 2002/03* (Education & Manpower Bureau, 1998).

*Information Technology Learning Targets* was issued in 2000 and gave the framework for the development of the government’s ITEd strategy. It stipulated the IT learning targets for students at different learning stages and suggested guidelines for primary and secondary schools for the integration of IT in school education (Curriculum Development Council, 2000). Because primary schools in Hong Kong had no formal IT learning targets before 2000, a set of guidelines that were specifically designed for primary schools, the Computer Awareness Programme, was included in the document (Curriculum Development Council, 2000; Appendix III) to ensure that students could achieve the IT learning targets at the stage of primary education. In 2000, some primary schools were chosen as pilot schools for the introduction of the Computer Awareness Programme (Kong & Pun, 2000).

The planning of an IT curriculum for every stage of primary and secondary education has taken place over a span of 20 years. The continuous and rapid development of IT from the early 1980s through to today has entailed the frequent revision of each IT curriculum. The popularisation of the Internet during this period has led to the rapid emergence of an information society in which a tremendous amount of information and resources are easily accessible in the digital environment via the Internet. The demand for learners who possess the requisite capacity for and attitude towards utilising online resources in the resource-rich digital environment with the use of IT has driven the changes in curriculum content and curriculum aims of the Hong Kong IT curriculum (Kong, 2003).

With regard to changes in curriculum content, the continuous and rapid development of computer science has required the designers of IT curricula to keep up with the latest developments in computer technology. For example, computer programming language, a subject that is taught in the curriculum, has changed from BASIC to Pascal, and now, C.

With regard to changes in curriculum aims, the growth of digital culture along with the emergence of a knowledge-based society has led to an emphasis on information processing skills in the planning of the IT curriculum. The IT curriculum for the new senior secondary education, for example, has changed from being content-based to being application-based. Table 1 lists the curriculum aims for Computer Studies as they are stated in the curriculum documents on secondary education in Hong Kong (Curriculum Development Council, 1999; Curriculum Development Council & Hong Kong Examinations & Assessment Authority, 2006).
The curriculum implemented in 1999 was developed with an emphasis on the development of students’ knowledge about computers and their applications. The curriculum that was drafted in 2006 was designed after the issue of the document *Information Technology Learning Targets* and placed an emphasis on the importance of IT in the development of lifelong learning. In response to the IT learning target for Stage IV (i.e., Secondary 4 and Secondary 5) that ‘students should have acquired the necessary skills in selecting and using IT tools to support their further studies and lifelong learning… In order to cope with the technological development, students should reflect on their own and others’ use of IT, and learn from experiences…’ (*Curriculum Development Council, 2000;* p. 7) which was stipulated in the document *Information Technology Learning Targets* under the guiding principle that IT helps to develop generic skills for lifelong learning, and as stated in the document *Learning to Learn – The Way Forward in Curriculum Development*, the aims of the 2006 curriculum stress the development of students’ ability to process, for learning and personal purposes, the ambient information from the massive resources which are available.

The literature review reveals that mastery of IT knowledge is not the only objective of the IT curriculum. To prepare the new generation to cope with the ever-changing needs of the information age in the digital world, the aim of the IT curriculum has shifted from the learning of discipline knowledge of IT to the development of the requisite knowledge about information processing coupled with the cultivation of proper attitudes towards information processing. These attitudes refer to the affective and the socio-cultural issues concerning information processing in the knowledge-based society. Information literacy competence addresses the aforementioned knowledge of and attitudes towards information processing.

### 2. Information literacy

In this paper, information literacy (IL) refers to the process of capacity building whereby a learner develops the capacity to work independently and socially, and participates in, benefits from and contributes to the information society and the wider global community. IL empowers people with the capabilities to gather, synthesise, analyse, interpret and evaluate the information around them (*American Library Association Presidential Committee on Information Literacy, 1989*), and enables people to understand the rationale behind using information, and to know the reasons for the behaviour of information processing (*World Summit on the Information Society, 2003*).

IL consists of four overarching dimensions: the cognitive, the meta-cognitive, the affective and the socio-cultural dimensions (*Kong, 2007; Kong, Lee, Li, & Henri, 2005*). The first two dimensions relate to knowledge about information processing. The other two dimensions concern attitudes towards information processing.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>The curriculum aims for Computer Studies that are stated in the curriculum documents on secondary education in Hong Kong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllabus for Computer Studies (implemented since 1999)</td>
<td>Curriculum for Information and Communication Technology (Drafted in 2006; to be implemented in 2009)</td>
</tr>
<tr>
<td>This syllabus aims to provide students with the opportunity to: 1. Study modern methods of information processing, their applications and implications 2. Understand the basic organisation of a computer 3. Develop problem-solving skills and programming techniques.</td>
<td>This curriculum aims to: 1. Provide students with a body of essential knowledge, concepts and applications of information, communication and computer systems 2. Equip students with problem-solving and communication skills, and encourage them to think critically and creatively 3. Develop students into competent, effective, discriminating, ethical and confident users of information and communication technologies, so as to support their lifelong learning 4. Provide students with opportunities to appreciate the impact of information and communication technologies on our knowledge-based society, so as to nurture in them positive values and attitudes to this area.</td>
</tr>
</tbody>
</table>

Please cite this article in press as: Kong, S. C., A curriculum framework for implementing ..., *Computers & Education* (2007), doi:10.1016/j.compedu.2007.04.005
2.1. Mastery of knowledge about information processing in the cognitive and the meta-cognitive domains

The cognitive dimension of IL addresses the capability to process information for decision-making and problem solving. It covers the abilities to recognise the need for information, to identify the information needed, to organise the useful information and to use the information for the purpose of decision-making and problem solving. The meta-cognitive dimension of IL addresses the capability to process information reflectively. It covers the abilities to plan and regulate the process of enquiry, and to recognise the iterative, time-consuming and effort-demanding nature of information processing (Kong et al., 2005).

The access to and use of high quality information on the Internet creates great potential for success in the information society. The abilities which are inherent in the abovementioned two dimensions of IL are vital for learners in the twenty-first century because the mastery of necessary knowledge about information processing enables learners to select and use the appropriate information from the tremendous learning resources for learning according to their own needs. Such knowledge about information processing is particularly significant for processing the mass amount of digital information and learning resources on the Internet which has been generated due to the popularity of digital culture. With the necessary IT knowledge, learners are empowered to search for and retrieve high quality information for learning purposes with the appropriate use of IT.

2.2. Cultivation of attitudes towards information processing in the affective and the socio-cultural domains

The affective dimension of IL addresses the capacity to appreciate and enjoy the process of enquiry. It covers the abilities to recognise the importance of information processing skills and the significance of freedom of information access. The socio-cultural dimension of IL addresses the capacity to empower students with greater autonomy over and social responsibility for the use of information in both their individual and collaborative learning. It covers the abilities to recognise the importance of freedom of knowledge and to transform information into knowledge (Kong et al., 2005).

The convenient and easy retrieval and storage of online information and digital resources engenders a great potential for the improper use of information which could adversely affect the access of information and hence the continual development of the information society. The abilities which are inherent in the aforementioned two dimensions of IL are pivotal for learners in the twenty-first century because the possession of proper attitudes towards information processing allows learners to appropriately process and use information by taking the sustainable development of a knowledge-based society into consideration. Such attitudes towards information processing are especially important for processing the deluge of digital information and learning resources on the Internet which has been caused by the emergence of digital culture. With the requisite IT skills, learners are enabled to process and use information for learning purposes by considering the beneficial effect of the appropriate use of information on the long-term well-being of the society.

3. The need for a curriculum that fosters information literacy

The World Summit on the Information Society (2003, para. 29) emphasised that ‘each person should have the opportunity to acquire the necessary skills and knowledge in order to understand, participate actively in, and benefit fully from, the information society and the knowledge economy’. Therefore, students not only need to master the knowledge that is necessary for information processing, but they should also have the appropriate attitudes towards information processing to develop the capacity for lifelong learning and to assume greater autonomy over – and gain social responsibilities from – their learning. Students should be empowered with the capacity to manipulate the information required with respect for the free access of information that is available in the digital learning environment (Bruce, 2002). This raises the need for the incorporation of IL elements into the IT curriculum.

To this end, the government issued Empowering Learning and Teaching with Information Technology in 2004 in which a new ITEd strategy was described (Education & Manpower Bureau, 2004). The foci of the new strategy were to guide school principals and teachers in the integration of IT into learning and teaching, and to develop the appropriate skills, knowledge and attitudes in students to ensure lifelong learning (Curriculum...
Development Council, 2000; Education & Manpower Bureau, 1998, 2004, 2005). The government stated that to realise these aims, ‘a broad framework of “information literacy”’ for students will be developed to help teachers and students have a clearer picture on the learning targets of using IT in education’ (Education & Manpower Bureau, 2004; p. 13).

That is, to help students gain the necessary knowledge and appropriate attitudes for their all-round personal development in the information society, the government proposed the implementation of an IL framework in local school education with the aim of equipping students with the necessary skills in and proper attitudes towards using IT for information processing. The focus of this IL framework for Hong Kong students is to foster learner-centred learning to empower students with greater autonomy over and social responsibility for the use of information in their individual and collaborative learning (Kong et al., 2005).

After the proposal for the development of a framework that fosters IL in school education, a questionnaire survey was conducted to collect the views of school practitioners who work in education on the need for and implementation of such a framework. A total of 3924 questionnaires were sent to all 1308 of the primary and secondary schools in Hong Kong. The participants included principals or curriculum coordinators, teachers who were responsible for coordinating IT across the curricula, teacher librarians and general teachers. A total of 2608 questionnaires were returned, with a response rate of 66.46%. Table 2 illustrates the demographic data of the questionnaire survey.

Over 95% of the respondents agreed that Hong Kong students need IL education (see Fig. 1). This indicates that practitioners in the education sector considered IL amongst students to be very significant.

There is great demand for a framework for a curriculum that fosters IL in the Hong Kong school education system according to the results of the questionnaire survey. Mastery of IT skills is the keystone for developing IL (Bruce, 2002; Bucher, 2000; Bundy, 2004). Therefore, an IT curriculum that integrates IL elements would be ideal to foster students’ IL competence.

4. Curriculum framework

This section proposes a curriculum framework that aims to equip students with the capacity to cope with the rapid, continuous and unpredictable changes in IT development in the resource-rich digital society. The
The proposed framework is designed to foster the IL of students in the process of developing knowledge of IT in school education. The cultivation of students' IL is a tough challenge because it involves students' assimilation and accommodation of meta-cognitive and affective knowledge. To address this challenge, significant learning (Fink, 2003; Rogers & Freiberg, 1994) is the fundamental rationale for the design of the proposed curriculum framework. It aims to induce significant and lasting change in students by offering students opportunities to develop new values and learn how to learn in the process of acquiring knowledge, applying acquired skills and integrating acquired knowledge into different realms of life.

To realise the approach of significant learning, two principles are applied to guide the design of the proposed curriculum framework. The first principle is the provision of opportunities for authentic learning. This enables students to acquire and apply knowledge and skills in real-life contexts. The second principle is the creation of an environment for reflection. This enables students to develop values and meta-cognition in connection with their learning and different realms of life, and to understand the personal and social implications of their learning. In this connection, service learning activities are recommended in the proposed curriculum framework. This is a pedagogy that combines knowledge acquisition with practical exposure to help students to integrate academic curriculum by participation in thoughtfully organised service activities. The key concern of the service learning approach is students’ reflection on the service learning experience (Folkestad, Senior, & DeMiranda, 2002; Tannenbaum & Brown-Welty, 2006). This pedagogical design can help students to develop appropriate attitudes towards processing information with the use of IT.

Fig. 2 depicts a curriculum framework for implementing IT in school education to foster IL. The curriculum framework consists of three parts: a core IT curriculum, use of knowledge about IT and information processing across curricula, and a school culture that fosters IL.

4.1. The core IT curriculum

The first and central part of the proposed curriculum framework is the core IT curriculum. It serves as the development basis for the other two parts of the proposed curriculum framework, because the mastery of IT skills is a stepping-stone for the development of IL in the digital era. This part aims to develop the IT and IL knowledge of students through the completion of authentic tasks in class activities.

The core IT curriculum consists of courses which involve the application of IT as a productivity tool, a communication tool, a collaboration tool, a research tool and a decision-making tool for processing information in learning and in daily life. The teaching focus for each set of IT lessons is such that IT knowledge is used for processing information; that is, the acquisition of IT skills is not the focus.

To provide students with opportunities for authentic learning, a task-based learning approach can be adopted to create authentic application scenarios. For example, the design of authentic ‘what-if’ analysis
for decision-making is the focus of the set of IT lessons for teaching electronic spreadsheets. A ‘what-if’ analysis of a price comparison between two local leading supermarket chains can be an authentic task in the IT lessons of the core IT curriculum. In the context of selecting the most suitable supermarket chain for the designated groups of consumers, students are requested to form groups to complete the decision-making task in which they need to use online information searching tools to research the prices, design the ‘what-if’ analysis model and conduct analysis with the aid of a spreadsheet, share opinions and decisions, and present findings and conclusions by using presentation software.

To offer students an environment for reflection, thoughtful instructional practices which enable students to ‘know-why’ and then ‘know-how’ can be used to stimulate students to understand the rationale and procedures of information processing. When teachers instruct students to right-click the mouse to copy files from a source, for example, they can encourage students to think of further action after copying the files to introduce the idea that copying is acceptable only for the purpose of information processing. This helps students to reflect on what a proper attitude towards information processing is.

4.2 Use of knowledge about information technology and information processing across school curricula

The second part of the proposed curriculum framework is the use of knowledge about IT and information processing across school curricula. It builds on the core IT curriculum of the proposed curriculum framework. This part of the proposed curriculum framework emphasises the creation of opportunities for students to apply IT to process information in school learning. In this case, schools have to design a school curriculum which encourages the application of IT across curricula; while teachers have to prepare tasks that, in addition to consolidating the relevant subject knowledge, use IT. With authentic learning opportunities for reflection, students can acquire subject knowledge and develop skills in and knowledge about IT and information processing.

To provide students with authentic learning opportunities, learning activities which involve the use of IT at the subject-specific level can be organised to encourage the use of knowledge about IT and information processing across school curricula. For example, in the language lessons on composition writing, teachers can organise learning tasks which ask student to find the synonyms of a word that they have used with the use of word processing software by highlighting and right-clicking the designated word for the selection of the synonym-finding feature. This offers an authentic context for students to apply IT skills while learning subject knowledge.

To create an environment in which students can reflect on their attitudes towards using IT for information processing, learning activities which involve the use of IT at the cross-subject level can be organised to promote the use of knowledge about IT and information processing across school curricula. For example, project-based learning (PBL) tasks which require choosing appropriate IT tools to search for, organise and analyse information to learn subject knowledge are another possible type of learning activity that promotes the use of knowledge about IT and information processing across school curricula. This offers students the opportunity to reflect on the legal and ethical use of the collected information by inviting them to decide whether they should assimilate the information and rephrase their work or include the source verbatim.

4.3 A school culture that fosters information literacy

The third part of the proposed curriculum framework is the cultivation of a school culture that fosters IL. Because students spend so much time at school, schools should create an atmosphere that enables students to realise the importance of the necessary knowledge about and appropriate attitudes towards using IT in information processing. As it is well documented that service learning is an effective educational strategy to cultivate students’ positive attitudes towards the use of technological artefacts and the desirable attributes of citizenship that are beneficial to society (Bonnette, 2006), it is worthwhile for schools to organise service learning activities that involve the use of IT to encourage students to develop the affective and socio-cultural dimensions of IL competence for the well-being of society. Building on the prior knowledge that has been learnt, in the proposed curriculum framework, schools can organise inside-school and outside-school service learning activities that involve the use of IT by students. By adopting a pedagogical design of service learning activities, this part aims to develop a school culture that fosters IL competence in students.
To provide students with opportunities to apply IT in authentic contexts, extracurricular activities which invite students to serve the school through the use of IT can be organised to realise a school culture that fosters IL. For example, school service activities, such as a campus television production team for the production of a school television programme with the use of multimedia production software or a student production team for the production of school newsletters with the application of IT tools for information searching, designing and editing in the production process, are feasible service learning activities inside school which provide students with opportunities to apply IT skills and perform school services in a real-life context. These activities can help students to master information processing and contribute to school development through practical experience in an authentic environment.

In addition, to offer students the chance for reflection, community-based education services can be organised. The establishment of a student IT voluntary service team for instructing those who are unskilled in IT, such as the old or parents, in basic IT skills, for example, is an appropriate service learning activity which allows students to apply their IT skills for choosing suitable software and their information processing skills for selecting, organising, analysing and presenting information in the teaching process, in addition to making a contribution to society. Through their preparation of teaching materials with the use of IT, students are stimulated to reflect on the rationale behind the legal and ethical use of information and resources.

5. Implementation issues of the proposed curriculum framework

Four issues which are critical for the successful implementation of the proposed curriculum framework are discussed. The four implementation issues include the school-based implementation models, the provision of service learning activities, support from parents and reduction of the digital divide between students. Fig. 3 shows the implementation issues of the proposed curriculum framework.

5.1. School-based implementation models

The first implementation issue is the school-based implementation models. Early research has found that the integration of IL elements into curricula is a comparatively effective method for the cultivation of IL competence in students (Bucher, 2000). In view of the differences in the sufficiency of IT resources and the profile of the IT competence of teaching staff of individual schools, there is a need for schools to develop a school-based model to meet their individual needs for fostering students’ IL competence. A long-term school-based implementation model that provides guidance for the design and implementation procedures of authentic subject learning activities which involve the use of IT in a cross-curricular learning context at different grades in the proposed curriculum framework is recommended. Such a school-based model would facilitate a more effective way to achieve the stipulated goal of the proposed curriculum framework.

![Fig. 3. Implementation issues of the proposed curriculum framework.](image-url)
Three elements of school-based implementation models are suggested. The first element makes use of existing IT/library lessons as a coordinating subject. According to Information Technology Learning Targets, term-based courses or regular IT lessons are a viable approach to develop students’ IT knowledge, skills and attitudes (Curriculum Development Council, 2000). In the report entitled Overall Study on Reviewing the Progress and Evaluating the Information Technology in Education (ITEd) Projects 1998/2003, it is stated that over 90% of the primary and secondary schools in Hong Kong offer Information Technology or Computer Studies (Education & Manpower Bureau, 2005); therefore, it is proposed that the use of existing IT/library lessons as a coordinating subject can be a possible component of school-based implementation models. In this option of the implementation model, only some teachers who are competent to teach IT are needed, while schools need only a basic IT infrastructure inside the school to teach the core IT curriculum.

The second element is the infusion of the core IT curriculum into the existing curriculum; the guidance document Information Technology Learning Targets points out that interdisciplinary coordination is another approach to equip students with capability in using IT for information processing (Curriculum Development Council, 2000). For the realisation of this option, most teachers in the school need to be proficient in IT knowledge and supportive of the school-based implementation model. In addition, schools need to be well equipped with IT resources so that teachers can access the IT facilities for the teaching and learning of IT when students are learning subject knowledge.

The third element is the teaching of the IT core curriculum through project-based learning (PBL). In the document Learning to Learn – The Way Forward in Curriculum Development, PBL is regarded as one of the useful strategies for promoting lifelong learning (Curriculum Development Council, 2001). It is also well documented that PBL is an effective pedagogical strategy for promoting the use of IT (Kong, 2005; Moursund, 2003). With the prevalence of PBL in Hong Kong as a learning mode in authentic contexts for learning across curricula, the use of PBL as a means for teaching IT in the school-based implementation model is suggested. For the realisation of this option, many teachers need to be proficient in IT knowledge and competent in leading PBL. In addition, schools need to be well equipped with open-access IT facilities for students to conduct PBL.

To investigate the preference of school practitioners regarding the implementation models which combine the elements that are discussed for implementing the core IT curriculum, participants of the questionnaire survey that was discussed in Section 3 were asked to choose two out of the above three options as the components of the school-based implementation model in their schools. The combination of the options led to the following three types of implementation models: the IT/library lessons and curriculum infusion model; the curriculum infusion and PBL model; and the PBL and IT/library lessons model. Fig. 4 shows the preference of school principals/curriculum coordinators concerning the options for building a school-based implementation model.

Fig. 4. The preference of school principals/curriculum coordinators concerning the options for building a school-based implementation model.

Please cite this article in press as: Kong, S. C., A curriculum framework for implementing ..., Computers & Education (2007), doi:10.1016/j.compedu.2007.04.005
The findings reveal that there is not one model that is preferred by school principals/curriculum coordinators. The different school-based implementation models are appropriate to cater to the diverse needs of different schools to foster IL through the proposed curriculum framework. The IT competence of teachers is considered to be critical for the selection of an appropriate implementation model of the proposed curriculum framework. According to the figures stated in the report entitled *Overall Study on Reviewing the Progress and Evaluating the Information Technology in Education (ITED) Projects 1998/2003*, as shown in Table 3, all the surveyed teachers in all of the primary and secondary schools in Hong Kong attained a Basic level with regard to level of IT competence (*Education & Manpower Bureau, 2005*).

However, there are variations among schools in the IT competence of teachers, which is reflected in the various attainments of teachers in the Intermediate, Upper Intermediate and Advanced level of IT competence. For the schools with a higher attainment profile of IT competence of teachers, the curriculum infusion and PBL model would be more suitable. For the schools with a lower attainment profile of IT competence of teachers, models incorporating the IT/library lessons as a component of the selected model would be more appropriate. In this regard, with the involvement of principals and curriculum coordinators, schools should develop their own school-based model for implementing the proposed curriculum framework.

5.2. Provision of service learning activities

The second implementation issue is the provision of service learning activities. As they are a part of the community, schools are expected to identify their role in society and play the role well. By organising service learning activities which involve the use of IT inside and outside of school, schools not only take on their social responsibility, but also provide students with chances to reinforce their acquired skills and knowledge in service learning contexts. With the goal of intentional learning and the introduction of reflection and self-regulation into the learning experience, the focus of such service learning activities is to enable students to realise authentic learning in a daily-life environment by solving real-world problems with the use of IT in both the school and the community contexts. Such service learning activities can consequently lead to a mutually beneficial situation in which the schools and community benefit from the service provided, and the students and schools benefit from the opportunity to transform information into knowledge in an authentic learning environment and enhance the school’s image by promoting its social significance, respectively. The role of the schools is to offer and arrange such service learning opportunities.

5.3. Support from parents

The third implementation issue is support from parents. This implementation issue focuses on the support of parents by offering an environment for their children to use IT for learning at home and at the same time to prevent their children from improper use of IT facilities. The former type of support is critical, for students need to practise what they have learnt at school, in the proposed curriculum framework, to develop independent learning skills, which is time-consuming and effort-demanding. However, it is equally important that parents provide suitable guidance to prevent children from over-reliance upon this learning channel. In this respect, the latter type of support from parents is vital to the proper implementation of the proposed curriculum framework.

Eliciting support from parents is a challenge for schools in the information society. To garner support from parents for the implementation of the proposed curriculum framework to foster students’ IL competence,
schools must gain their acceptance of the school-based implementation model and encourage their involvement in building an IT supportive home environment for the students. Organising Parent-Child IT Workshops for parents and children is one of the ways that schools can provide appropriate guidance for parents to support their children’s learning with the proper use of IT. This support helps to create opportunities for students to develop their knowledge of, skills in, and proper attitudes towards using IT for learning in an authentic context after school.

5.4. Reduction of the digital divide

The fourth implementation issue is the reduction of the digital divide. Although parents are expected to create a supportive environment at home for their children to apply IT in learning under the proposed curriculum framework, there is some concern that some families cannot provide sufficient support because of a lack of resources. In this situation, it is necessary for society to reduce the digital divide between students. Under the proposed curriculum framework, with regard to the goal of every student having an equal chance to acquire the essential knowledge about and attitudes towards the use of IT in our knowledge-based society, schools should act as agents to bridge the digital divide to help the needy students. Improving school IT infrastructures, extending the opening hours of school computer rooms and providing recycled computers for the needy students are only three of the ways to solve the problem of the digital divide. In addition to benefiting from a school culture that promotes the use of IT in school learning, students should be offered the chance to apply IT skills in their learning, with sufficient provision of IT resources.

6. Conclusion

A literature review of the development of the information technology (IT) curriculum in recent decades in Hong Kong shows that the aim of the IT curriculum in Hong Kong has shifted from Computer Studies to the development of knowledge about and attitudes towards information processing. Previously, the role of the IT curriculum was to provide students with the opportunity to learn the operation of IT tools. Now, its role is to equip students with information literacy (IL) competence, which encompasses the necessary knowledge about information processing and learning ability, and proper attitudes towards information processing with the use of IT.

In response to the social demand for IL, the Government of the Hong Kong Special Administrative Region has suggested that IL elements should be incorporated into school education to prepare students for the challenges in the knowledge-based society in the digital era. The findings of a questionnaire survey which aimed to collect the views of school practitioners on the need for a framework that fosters IL show that there is great demand for such a framework because of the general perception that IL is important for school education.

Because of the close relationship between IT and IL, an IT curriculum framework which enables learner-centred learning with the use of IT is proposed. To achieve the ultimate goal of fostering students’ IL, the design of the proposed curriculum framework takes significant learning as the fundamental rationale. Two principles, providing authenticity and creating reflection, are applied to guide the design of the proposed curriculum framework. The framework consists of three parts: a core IT curriculum equips students with the basic knowledge about and skills in IT and information processing; students are then encouraged to use the knowledge about IT and information processing for learning across the school curricula; and a school culture that fosters IL is established to further develop students’ necessary knowledge of and proper attitudes towards information processing with the use of IT; in addition, service learning opportunities are offered by schools to help students to develop the affective and socio-cultural dimensions of IL with the ultimate goal of equipping students with the sense of having contributed to the well-being of the community.

Four issues which are critical for the effective implementation of the proposed curriculum framework are discussed. School-based implementation models should be created for the teaching of the core IT curriculum and the integration of the IT curriculum into the learning of different subjects according to the diverse needs of different schools. Service learning activities should be provided for students to apply IT in service commitments inside and outside of school. Support from parents should be encouraged to create a healthy environment for students to develop IT proficiency at home. The digital divide between students should be reduced to...
provide equal chances for students to acquire the necessary knowledge about and proper attitudes towards information processing.

To date, more than 90% of the primary and secondary school students in Hong Kong have computers at home. Over 90% of them have access to the Internet via their computers at home (Education & Manpower Bureau, 2005). It is anticipated that the implementation of the proposed curriculum framework can get off to a good start in Hong Kong because of this relatively low digital divide among students. On top of the challenge of reducing the digital divide among the remaining 10% of students who have no computer and online access at home, there are several significant challenges in relation to the implementation of the proposed curriculum framework. One of these challenges relates to the provision of opportunities for students to apply core IT knowledge in their daily subject learning. It would be challenging for teachers to design relevant learning activities because this requires teachers have not only the subject-specialised knowledge but also the basic knowledge about IT and IL. Another challenge relates to the provision of service learning activities for fostering IL in school. It would be challenging for school education sector to motivate schools to organise service learning which is an uncommon yet emergent pedagogical arrangement in Hong Kong school education. It is worth noting that the greatest challenge is related to the support from parents. It would be challenging for parents to spur their children to make full use of IT for learning and provide guidance on the prevention of an indulgent over-reliance on the IT tools per se. Professionals in the school education sector in Hong Kong should put more effort into these challenges for the successful implementation of the proposed curriculum framework.

This curriculum framework emphasises not only the acquisition of IT skills and knowledge, but also the development of necessary knowledge of and proper attitudes towards processing information with the use of IT. Students are expected to develop IT proficiency and IL competence. The design of a school-based curriculum that encourages reflection in the authentic learning contexts of the proposed curriculum framework can help students become competitive in the knowledge-based society. Students are then in a position to fully benefit from and contribute to society in this information era.

References


