



Chapter 4

Information Technology in Education: The Challenge of Adopting World Wide Web as Learning Resources

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INTRODUCTION

Teaching computer as a subject is nothing new as it has been practiced for over 20 years in many countries, but teaching Information Technology (IT) is different from teaching computer as a subject. IT is a comparatively newer terminology, which comprises of not only all the functions of a computer but also the added data communication capacities which were rare in personal computers before 1990. Some European countries use the term information and communication technology (ICT), but the term IT is adopted throughout this chapter. There is the consideration of simplicity and parsimony. In the school context, the term IT would often refer to the items associated and connected with the actual usage of IT, for example, television, radio, video, cameras, and other equipment (Au, Kong, Leung, Ng, & Pun, 1999).

Some laymen thought that IT in education was equivalent to IT education. The latter means to teach the subject knowledge of IT whereas IT in education means adopting IT as a tool for learning and teaching in education. Further, Au et al. (1999) delineated the level of IT competency for teachers who should be competent in integrating IT with three domains, that is, using IT as productivity tools, general integration of IT in education, and subject-specific integration of IT. The recent trend of adopting IT in education worldwide was probably triggered by the proliferation of Internet in our daily lives. The use of Internet in the classroom has expanded and encompassed almost every discipline (Peled & Rashty, 1999).

The Internet was initially set up in the 1960s and 1970s for supporting research in the military. It was then developed in 1981 in the academic community to

connect university computers to enhance communications between academic researchers so that they could efficiently exchange ideas about the ongoing researches (Coyle, 1997, p. 18). However, the Internet had not gained its popularity until the early 1990s when the cost of computers and communications had decreased dramatically. By 1990, the number of computers directly connected to the Internet was 300,000; onward, this number has doubled every 12 to 18 months (Coyle, 1997, p. 7) to approximately 50 million in 1998 (Phillips & Long, 1998). The easy access to information using the Internet has helped transform industrial societies to information societies. Both developed and developing countries around the globe are responding to this new way of communication by building new infrastructures which facilitate business transactions, daily operations, and personal interactions. This change calls for revising the traditional ways of teaching and learning to prepare the learners to fully utilize the potential of IT in their daily lives in general and lifelong learning in particular (Kong & Pun, 1998).

In the United States, the Clinton Administration planned to develop a "National Information Infrastructure" in 1994 and also made a commitment to bring IT into the classroom to promote lifelong learning. To facilitate teachers' readiness to use and teach with IT is one of the four pillars of their technology literacy challenge (<http://www.ed.gov/Technology/>). Inspired by the United States, the United Kingdom has developed the Superhighways and also the SuperJANET – the first education superhighway. Appreciating the importance, power, and economic implications of IT, the British government revised the National Curriculum framework in 1995 so that students would be taught the necessary IT skills. The rationale is obvious: "IT is a key enabler for the UK economy. It offers great possibilities for generating growth and increasing productivity. It has enormous potential as a learning tool" (Blunkett, 1999). Elsewhere, for example, the Committee On MultiMedia In Teacher Training has been established by the Dutch Minister of Education to draw up recommendations on the design of the learning process of the future and the role of ICT to support the learning process, with a focus on teacher training (Plomp, Brummelhuis, & Raymund, p. ix).

In the Asia-pacific region, Singapore, for example, has created in 1991 "IT2000 – A Vision Of An Intelligent Island" program to transform itself to an "intelligent island." A national high-capacity network infrastructure known as Singapore ONE has been built of which is to play "a key role in delivering advanced IT applications and services to every sector of society"

(<http://www.s-one.gov.sg/html/mainmenu.html>); it connects computers in virtually all homes, offices, schools and factories to link communities locally and internationally to improve the quality of living.

In the Peoples' Republic of China, the China Education and Research Network (CERNET) Project, launched in 1994, funded by the Government, and directly managed by the Chinese State Education Commission, "... are to: (a) establish a nation-wide backbone which connects eight regional networks, (b) establish connections to the Internet, (c) set up a national network center and several regional network centers, and (d) develop China's information resources and applications" (Birch & Maclean, 1998, p. 45). Then, by 2000, "All schools and other education and research institutions in the country will be included in the network. China's 1,900 universities, 39,412 middle schools and 160,000 primary schools will make CERNET the largest education and research network in the world" (p. 45). The Chinese efforts to harness the power and reap the benefits of IT are hardly idiosyncratic. In other Asian countries, "educationalists and policy makers are ... determined to maximize the dividends of ICT for educational development and that innovations in ICT applications in education abound in least developed and developing countries in the region" (p. 51). In sum, the major feature of the IT in education development in the U.S., U.K., Holland, Singapore, China, and other countries are similar as networked computers are deployed in the classroom as a learning resource. Most accept and believe that the use of Web as a teaching resource can benefit students (Milheim & Harvey, 1998).

In the quest for IT in education as well as education in IT, Hong Kong is a latecomer. Hong Kong Government had adopted the "laissez-faire" approach in various policy areas for many years. Although the subject computer studies was introduced to secondary 4 students of 30 pilot schools in 1982 while computer literacy was introduced to junior secondary schools in 1987 (Pun, 2000), the policy of adopting IT in education was formally announced only in 1997 when the community was caught in the Asian economic downturn. Mr. Tung Chee-hwa (1997), the Chief Executive of the Hong Kong Special Administrative Region (HKSAR), underscored that in order to maintain Hong Kong's international competitiveness into the future, it is essential that Hong Kong people are comfortable with and competent in using IT in their workplace. The Government's call for providing both IT in education and education in IT to children is timely and imperative. In this context, professional development for teachers in the IT arena becomes urgent and

essential. After all, “Teachers must be part of any systemic plan for integrating computing and communications technologies into the classroom. If we want our children to use these technologies as an integral part of their learning, as an integral part of preparing them in the workplace, then we need to squarely confront the fact that teachers are the key” (Soloway, 1996, p. 11).

Since teachers are the key enablers of IT, the Chief Executive announced in his 1997 Policy Address to promote the use of IT in education. “The main tasks are to equip our teachers with the necessary IT skills; to apply computer-assisted teaching and learning across the curriculum; and to place students in an environment where they can use this technology as part of their daily activities and grow up to use it creatively” (Tung, 1997). He also aimed to have 25% of the school curriculum taught through IT in five years’ time. Then, in 1998, he announced at his Policy Address that, in order to achieve the aim of “integrating the use of IT for the benefit of teachers and pupils alike” (Tung, 1998, para. 101), the Government has “earmarked funds totaling \$630 million in order to provide more IT training for teachers; enhance the accessibility of all students to computers; supply technical back-up to help schools manage their newly-acquired IT facilities; and employ some 250 IT coordinators to help public sector schools develop and implement their IT-based initiatives” (para. 101). Furthermore, In November 1998, four levels of IT competency for teachers and the time frame and the percentages of teachers achieving those levels were proposed (Education and Manpower Bureau, 1998).

In order to fulfill the vision of our Chief Executive, it is necessary to provide comprehensive pre-service and in-service professional development in IT in education so that teachers can acquire the understandings, skills, and confidence they need to use IT in their classrooms and to equip their students for an information-based society (Neiderhauser, 1996). The traditional approach to prepare student teachers to be IT literate was to teach them the technical know-how. It is recognized that pre-service programs cannot simply “teach about” IT which is isolated as a single course. Collis (1994) argued that the problem in using IT in teacher education was to add rather than to integrate IT into education. Faculty member in teacher education program must model teaching and learning strategies that incorporate IT across the curriculum (Harrington, 1991; White, 1995). Visser and Jain (1997) substantiated their points: “Teacher education should ensure that teachers interact and experiment with these various media and creatively reflect upon how they can best be used

in different learning environments” (p. 31).

Although many teacher educators felt that IT was a critical component in teacher education, they did not feel they had the background and preparation to teach with or about IT (Willis & Mehlinger, 1996): about 67% of the responding teachers of a study felt that their undergraduate preparation was inadequate (Topp, Thompson, & Schmidt, 1994); another study also found that teachers did not know about the different strategies for using IT in instruction and were not familiar with the software packages that supported those strategies (Novak & Berger, 1991). Thompson and Schmidt (1994) pointed out a lack of good models for integration of IT topics into teacher education. The lack of well-designed, appropriate instructional materials that support the integration of IT into teacher education may, in fact, be one of the major barriers to wider, more effective integration. In addition, some teacher educators thought that there was inadequate time to integrate IT into their teaching (Vagle, 1995). In sum, “most pre-service teachers know very little about effective use of IT in education and leaders believe there is a pressing need to increase substantially the amount and quality of instruction teachers receive about IT” (Willis & Mehlinger, 1996).

THE WEB AS A LEARNING TOOL

It is no doubt that one of the most powerful IT tools is the Internet or, more specifically, the World Wide Web (Web). Many tertiary institutes around the globe have started using Web as an instructional environment for both a primary means of information delivery and a supplement to classroom teaching (Harasim, 1999; Hiltz & Wellman, 1997). The Web is increasingly being used to promote learning free from constraints of time and place in the era of globalization and lifelong learning. The flexibility of the hypertext medium and the vast resources on the Web appeal much to educators, in particular, to cater for the new trend of student-centered and open learning. In fact, “Web search has become the third most common use of computers by students at school after word processing and the use of CD-ROM” (Becker, 1999, p. 6).

The Web supports holistic learning when the learners prefer to browse, moving between topics, exploring some in depth, and touching some on the surface. The hypermedia information structures in the Web allow for the “chunking” of information, a feature that, in light of information processing theories of



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