Chapter XXII
Integrating Computer Literacy into Mathematics Instruction

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ABSTRACT

The focus of computer literacy in education has evolved from teaching computer programming to integrating information and communication technology (ICT) across subjects. However, most schools in Hong Kong or elsewhere consider computer literacy as a stand-alone subject. One important question is how teachers integrate computer literacy into other subject teaching. There is no simple method, however a well-defined pedagogical strategy might help teachers and educators to better understand the issues and opportunities that the integration provides for meaningful learning. This chapter endeavors to report a case study of integrating computer literacy into mathematics instruction in a Hong Kong secondary school which focused on exploring essential conditions to the integration from the different ways students and teachers experienced the implementation of the curriculum integration. Four conditions emerged from the data analysis, namely, student performance and preference, pedagogical approach, student satisfaction, and perceived constraints.

INTRODUCTION

Nowadays, policymakers see mastery of information and communication technology (ICT) as one of the key features of a competitive modern economy (Pearson, 2001). Computer literacy as a course of study was indeed first introduced in 1965 at colleges and universities (Hess, 1994). As a result of the marketing of desktop computers to both businesses and individuals in the early 1980s (Childers, 2003), the term *computer literacy* has become very popu-

lar as a buzzword describing a new type of understanding of literacy apart from reading and writing. With the proliferation of ICT, technologies have changed the way we live as well as the mode of functioning in our society, in particular the Internet technologies have been translated into a number of strategies for teaching and learning (Jonassen, Peck, & Wilson, 1999) and brought about changes in classrooms (Garner & Gillingham, 1998; Law et al., 2000). Although the literature on computer literacy or technology literacy is extensive, the definitions of the phrase seem to reflect on the different authors' academic backgrounds, preferences, and emphases, indicating that it is a multifaceted idea (Childers, 2003). Computer literacy courses are believed to play a critical role in providing students with fundamental computer concepts and skills. Nevertheless, there is still no consensus as to how this educational goal should be achieved (Hess, 1994).

Karsten and Roth (1998) conducted a study to identify the relationships that exist among computer experience, computer self-efficacy, and computer-dependent performance in an introductory computer literacy course. Results suggest that it is the relevance, rather than quantity, of computer experience students bring to class that is most predictive of performance. Accordingly, only computer self-efficacy was found to be significantly related to computer-dependent course performance. In a regression analysis on whether completion of course prerequisite improves student performance in business communications, the results indicate that the computer literacy prerequisite has no effect on student performance (Marcal & Roberts, 2000). However, the concept of computer literacy still has merit (Childers, 2003), and different innovative pedagogical approaches for teaching computer literacy have been advocated. Bretz and Johnson (2000) found that students enrolled in a Web-based, self-paced, competency-based introductory computer literacy course demonstrated positive student perceptions and student learning outcomes. It is also argued that to ensure students:

...build upon a computer literacy foundation essential for much professional success and personal fulfillment, teachers need sustained hands-on guidance in learning to design and schedule classroom computer activities that both relate to the curriculum and challenge their students to learn new skills. (Hackbarth, 2001, p. 19)

The focus of computer literacy in education has evolved from teaching computer programming to integrating ICT across subjects (Hess, 1994). Can ICT be a proper subject? Pearson (2001) argued that ICT is not a stable subject since technological innovations are redefining the knowledge and skills which students need to possess, and the status of ICT as a cross-curriculum discipline is enhanced in the curriculum for technology. Jonassen et al. (1999) indicated that ICT should be used as learning tools for students to learn with.

Given that the 174 cases collected from 28 countries in Module 2 of the Second International Information Technology in Education Study (SITES M2) represented different extents of innovativeness of using technology in learning and teaching (Kozma, 2003), it would be important to note that these innovative pedagogical practices are indeed examples of integrating ICT into the curriculum. Three types of curriculum focus were found in these ICT integration: (1) single subject focus, in which ICT is used to improve students' understanding of subject matter content and concepts; (2) cross-curricula thematic focus, in which curriculum content is offered through themes and ICT is used to facilitate the implementation of lifelong learning; and (3) school-wide focus, in

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