Chapter 2
Empowering Students to be Scientifically Literate through Digital Literacy

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ABSTRACT

The objective of this chapter is to discuss the relationships between the three literacies that are mentioned above: digital literacy, science literacy and multiple literacies. The chapter will define digital literacy and scientific literacy and argue that being digitally literate would enhance the development of scientific literacy. It will look at the similarities in skills required for the two literacies (i.e., skills derived from learning science and learning to use digital technology). These are skills at both the operational and conceptual levels. The chapter will draw on these similarities to discuss how being digitally literate could better support the independent and personalized learning of science in the development of individuals who are scientifically literate. The use of multiple literacies pedagogy, the multimodal means of learning and communicating, as bridging the two literacies will be made. Specific examples will be used to illustrate the objective of this chapter. The chapter will conclude with a conceptual framework for the development of digital literacy in empowering students to become scientifically literate.

INTRODUCTION

We live in a society driven by science and technology. As more science and technology issues dominate public debates at national and international levels, it is important that we have global citizens who are scientifically literate. Science and technology based issues include those that concern personal and community safety, have impact on the environment or are ethically-based. People who are scientifically literate have sufficient knowledge and understanding of science to enable them to think critically in order to make sensible decisions about science related matters that affect their own lives. Since science is a mandated key learning area for primary and junior secondary students in most schools around the world, it is appropriate to teach students to be scientifically literate at these

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levels in order to prepare them for a society where science and technology are integral to their everyday living.

A similar argument to being scientifically literate is that of being digitally literate. Digital technologies are tools that are becoming more central to the individual's learning and social wellbeing. They are also central to the economic development and advancement of businesses and corporations. On the importance of digital literacy in terms of the economy and employment rates, Maria Wynne and Lane Cooper (2007, p. 4) had stated that:

At a national level, a growing number of experts predict that a lack of digital literacy will have a dampening impact on economic prospects. Consider that in the next eight years, according to Monthly Labor Review Online (November 2005 p.6) six out of every 10 new jobs will be in professional and service-related occupations requiring, at a minimum, a basic level of proficiency in computers……. Economic advantage and competitiveness will rest heavily on our ability to equip the 21st century workforce with competitive digital literacy skills

At the level of the individual, Berson and Berson (2003) noted that the youth of today are accessing a vast amount of information through the various media outlets and are simultaneously creating and disseminating their own messages and creative products through digital technologies. Due to the difficulties in parental or institutional control of young people's access to information from these outlets (for example, television and the Internet), educating them to be digitally aware is the most effective way of safeguarding them from being exposed to harm that being in these environments could bring. Berson and Berson (2003) also assert that effective citizenship is derived from a digitally literate population. This is a similar argument to a scientifically literate citizenship.

Equipping students with scientific and digital literacies and skills in order to prepare them for the 21st century workforce and citizenship are not separate educational processes. Multiple literacies,, a concept similar to 'multiliteracies' that was first proposed by The New London Group (1996), is based at one level on the influence of communication technologies on meaning making in education. A multiple literacies pedagogy focuses on multimodal ways of conveying understanding and digital technology offers multimodality that enables students to learn as well as demonstrate understanding in science.

DIGITAL TECHNOLOGIES

In the context of this chapter, digital technologies refer to a subset of electronic technologies that include hardware and software and which are used by children and adolescents for educational, social and/or entertainment purposes in the school and at home. These technologies would include desktops, mobile devices (laptops, tablet PCs, ultramobiles, mobile phones, smartphones, PDAs, games consoles), resources on the Internet (information, multimedia and communication resources), digital recording devices (cameras, voice and video recorders), data logging equipment and the myriad of software for different devices that are either commercial or free on the World Wide Web (WWW).

Digital Literacy

Accompanying the rapid growth of computer-based technologies and associated resources has been the increase in a range of terms related to its literacy. As a result there are many terms similar in definition to 'digital literacy'. Included in the array of computer-related literacies are ICT literacy, information technology literacy, technology literacy, media literacy, information literacy, net literacy, online literacy and digital literacy. At-