

## Chapter 76

# Integrating Technology in Preschool Science and Inquiry

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### ABSTRACT

*Technology has brought about considerable changes in our private, social and professional lives, as well as in our culture and values. Therefore, educational frameworks should make an effort to become more relevant for young students and prepare them for the future in all aspects of career and life, with a focus on Science, Technology, Engineering and Math (STEM). This chapter will discuss the opportunities and challenges of integrating technology into preschool classrooms (3-6 years of age). It attempts to determine the essence of judicious, proportionate, and beneficial integration of technology in preschool, with a particular focus on science and inquiry. Consideration is given to maintaining the children's creativity, their joy of play, their concrete and sensory exploration, their unmediated observation of their environment, their social interactions, and their safety. Examples of actual practices from preschool classrooms are presented followed by recommendations for successful technology integration in preschool curriculum.*

### INTRODUCTION

In July of 1859, a British philosopher named Herbert Spencer published an essay titled “What Knowledge is of Most Worth?” Spencer wished to define the biggest thing that ought to be taught in the educational system at that time. This same question is still asked today (NEA, 2010; Luna Scott, 2015): What should be studied in educational frameworks to prepare our children for life in a global digital economy?

Technology has brought about considerable changes in our private, social and professional lives, as well as in our culture and values. The technologies that exist today are just the tip of the iceberg; some are only in their initial phase of development, and others will be replaced by newer and more sophisticated technologies. Consequently, certain knowledge, skills, and competencies have become redundant, while other knowledge, skills, and competencies have become essential (Zhao, 2012). The Next Generation

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Science Standards (NGSS, 2013) addressed the need for new Science and Technology standards, noting the competitive global economy, the need to prepare for the demands of new careers in the modern workforce, and the need for an educated society, literate in science and technology (NAE & NRC, 2014). Educational frameworks, therefore, should not only make an effort to become more relevant for young students, but should also prepare them for the future in all aspects of career and life, with a focus on Science, Technology, Engineering and Math (STEM) (Scott, 2012; Zhang, et al. 2010).

This chapter will discuss the opportunities and challenges of integrating technology into preschool classrooms (3- to 6- years of age) in general, with a particular focus on science education and inquiry. The term *technology* has a broad meaning. In this chapter, *technology* refers to digital technology (Instance & Kools, 2013); i.e., all kinds of modern computers, information and communication technology (ICT), and digital media.

## **BACKGROUND**

### **The Dilemmas**

With the ever-growing ubiquity and accessibility of technology and digital devices, today's children spend increasingly more time in front of all types of screens (television, computer, tablet computer, smart phone, hand-held mobile devices, game consoles, and other digital means). One of the dilemmas related to the use of computers, information and communication technology (ICT) and digital media in the preschool classroom concerns children's screen time. A child who sits in front of a screen for protracted periods of time is physically inert. This leads to dwindling physical and motor activity, which result in additional health problems, all of which can be traced to prolonged sitting and staring at a flickering screen (APP, 2016). To avoid these health concerns authorities recommended that screen time limits be set for young children (De Decker, et al., 2012; Lauricella, Wartella, & Rideout, 2015), both at school and at home.

The American Academy of Pediatrics (AAP, 2016), spoke out against allowing screen time of any kind for children under the age of eighteen months. Parents of children aged 18 months to 2 years who choose to introduce digital media into their children's lives should opt for high-quality programs. The parents should watch these programs together with their children, to help the children understand what they are seeing and how it is related to their own life and environment. The AAP recommended that screen time not exceed one hour a day for children between the ages of 2 to 5 years. Other authorities working to prevent obesity in children (Reynolds, et al., 2013), and those who work for the benefit of public health (Hobbs Vinluan & Hofman, 2014) are even more stringent. These authorities have also called upon educators to convince parents to limit their children's screen time at home. These recommendations underscore the depth of concern regarding the ubiquity and accessibility of digital means of all kinds (Lerner & Barr, 2014; Tremblay, et al., 2012).

Another dilemma is related to the benefits of computers and digital media in early childhood. For more than two decades, the professional literature has been investigating whether computer use inhibits (Cordes & Miller, 2000) or enhances (Christakis, 2014; Clements & Sarama, 2003) young children's learning and development. Although the academic discourse has not yet resolved the matter (Radetsky, Schumacher, & Zuckerman, 2015; Strasburger, 2015), research persists to examine how to improve learning and development in technology-rich environment (Billington, 2016; Stephen & Plowman, 2008). Educators (Blackwell, et al. 2013; McCarrick & Li, 2007; Siraj-Blatchford & Siraj-Blatchford, 2006)

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