Chapter 67
The Use of Ubiquitous Learning for Children with Down Syndrome

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ABSTRACT

Ubiquitous computing is opening new opportunities for learning. Researchers and philosophers are still debating what learning theory best explains computer ubiquitous learning. Meanwhile, as it has happened many times throughout history, individuals with disabilities are not able to benefit from such advances until late in the adoption curve. This chapter discusses (a) several learning theories that have the potential to explain computer ubiquitous learning, (b) uses of computer ubiquitous learning for and by individuals with Down syndrome, and (c) a new emerging model for computer ubiquitous learning.

INTRODUCTION

John was born on a sunny day in July into a loving home nine years ago. His parents and sister were anxious to receive him as they had decided not to find out his sex. Given that they already had a daughter, John's parents were very happy when they learned that he was a boy. Then the doctor came and delivered the news to John's dad: he had been born with Down syndrome. John's dad response was "just the same. He is beautiful."

Mobile computer and ubiquitous learning has taken off with the advances of technology. It is

more common to see a learner using a portable device than to see one with computing technology plugged into a wall outlet and an Ethernet cable to be able to connect to cyberspace. Situated learning/situated cognition, distributed cognition, and contextual learning have being discussed among researchers even before technology became commonplace. However, mobile computer and ubiquitous learning, paired with situated learning and distributed cognition, are rarely read along the topics of special education or Down syndrome.

This chapter discusses how different types of learning (situated, distributed, authentic,

lifelong learning), paired with mobile computer and ubiquitous learning, can help children with Down syndrome in particular, and special needs in general, learn in formal and informal environments. Some applications of computer ubiquitous learning will be discussed in the context of Down syndrome and their use by special needs children.

MOBILE AND UBIQUITOUS LEARNING, OR JUST LEARNING?

While some authors consider mobile computer learning to be a synonym of computer ubiquitous learning, El-Bishouty, Ogata, Rahman, and Yano (2010) argue that computer ubiquitous learning is the use of enhanced computing for learning by combining many computers present in the physical environment to be used in an invisible way. On the other hand, Hill, Reeves, and Heidemeier (2000) state that ubiquitous computing is the use of multiple networked computers that offer the ability to have just-in-time, when-needed computing. By extension, the construction of knowledge that happens when using mobile computer devices connected through wireless networks is ubiquitous learning. However, explaining learning takes more than using devices; it requires incorporating a theoretical framework, one or many learning theories and approaches that attempt to explain how the use of these tools mediates knowledge construction. Some of these theories and approaches to learning will be briefly discussed in the following sections.

A THEORETICAL FRAMEWORK FOR COMPUTER UBIQUITOUS LEARNIN

More than a decade ago, Spiro, Feltovich, Jacobson, and Coulson (1992) explained constructivism from the cognitive flexibility and situated cognition theories perspectives. They stated that, in constructivism, "one must bring together, from various knowledge sources, an appropriate ensemble of information suited to the particular understanding or problem solving needs of the situation at hand" (p. 64, emphasis added). So, in a way, Spiro and partners connected constructivism (the self-construction of knowledge) with situated cognition. Even longer than that, Brown, Collins, and Duguid (1989) established that learning and acting are indistinguishable from each other because learning is actually a lifelong process that results from actions taken accordingly to situations faced; thus learning can be explained through situated cognition and lifelong learning. They also discussed that for learning to take place, three components need to be present: activity, concept, and culture – elements that are interdependent. Given the interdependency of the three components, it is not possible to understand one of the elements in isolation. As an extension, the use of tools (electronic or otherwise) to carry on an activity has deep implications for learning, as it will be impacted by the culture of the user. Furthermore, lifelong learning, as understood by Sharples (2000), explains the connection between this type of learning and ubiquitous learning when he states that "the abilities, approaches and tools for learning that a person gains from childhood onwards provide a context and resource for learning and performing in later life" (p. 178). Finally, Fischer and Konomi (2005) discuss that the understanding of the interactions between humans and technology can be explained by distributed cognition. That is, distributed cognition provides a theoretical framework to understand how human-technology interactions (what humans do with technology and how these are arranged) happen in a specific environment. The following section will explore each theory in the context of computer ubiquitous learning and children with Down syndrome.

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