

## Chapter 43

# Integration of the Computer Games into Early Childhood Education Pre-Service Teachers' Mathematics Teaching

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### ABSTRACT

*Mathematics experiences in the early years of education can help children be more prepared for the future. Mathematics is known to be one of the most difficult learning areas. Computer games in today's technological world seem to offer a way to educate young children in mathematics in a fun and engaging way. However, success does not rely solely on the technology itself, but also how it is used during instruction. For that reason, early childhood teachers have a responsibility to integrate technology into their instruction, and to understand such technologies with regard to content and audience. Therefore, this chapter provides an example of how to incorporate educational computer games into upper-level education courses. The instructor designed the course described in this chapter to teach early childhood teachers how to integrate educational computer games for the purpose of teaching mathematics to young children.*

### INTRODUCTION

Educating young children has been one of the main concerns for societies in recent years because the early years of education can help members of societies be more prepared for the future. The importance of early childhood education gives birth to the debates on what an early childhood

education curriculum should include, and which methods should be used to meet curriculum goals. Many education experts advocate that one of the fields to be taught from early years is mathematics. According to Smith (2006), mathematics should be taught in early years to prepare children for the future. Moreover, Fuson (2004) states that learn-

DOI: 10.4018/978-1-4666-7363-2.ch043

ing mathematics in early years contributes to later learning and success in mathematics.

One of the main critiques of early childhood education literature also provides a clear solution on which methods should be used to meet curriculum goals. This critique is that young children's academic achievements are frequently emphasized in early childhood education. Beauchat, Blamey and Walpole (2010) criticized this emphasis by saying that it causes a reduction in the amount of playtime that a young child can engage in. Ginsburg (2007) advocates that play has a potential for providing both children's learning and enjoyment, saying that "[a]s we strive to create the optimal developmental milieu for children, it remains imperative that play be included along with academic- and social-enrichment opportunities and that safe environments be made available to all children" (p. 188). In other words, children can learn many things during the playing, and even if the aim is the children's enjoyment, play can also be used as a method for enriching education (Pramling Samuelsson & Johansson, 2006).

Making children search, find and construct their own answers, and teaching them to use technologies to effectively do these activities, is important. According to Pramling Samuelsson and Johansson (2006), creativity can be fostered if young children are given an opportunity to reflect their ideas freely, and play is a way to provide this opportunity. Pramling Samuelsson and Johansson (2006) state that dimensions such as joy, creativity, creation of meaning and children's possibilities to control and form goals are important both for play and learning and for that reason, difference of these two concepts are less well defined.

The advantages of using play for educational purposes are counted by Johnson, Cristie, and Yawkey (1999) as the following:

- **Positive Effect:** Play is fun and enjoyable,
- **Nonliterality:** Play helps children learn about the meanings of objects and actions during play,

- **Means Over Ends Orientation:** Activity gains importance, rather than goals or outcomes,
- **Learning Different Skills:** Different skills, such as writing, speaking, recognition and comprehension, can be learned during play.
- **A Broad Spectrum of Learning Opportunities:** Play can provide many learning opportunities, such as observation, exploration, experimentation, peer collaboration, teacher scaffolding, practice and teachers' instructional links.

Moreover, Pound (2008) believes that play is also an effective and fun way to teach mathematics to young children. There are two approaches advised in the literature on how play should be used (Johnson et al., 1999). One of these approaches is play-generated curriculum, and the other is curriculum-generated play. In the first one, children are observed during play and curriculum content is then extracted (Johnson et al., 1999). Sandberg and Pramling Samuelsson (2003) give the name "free play" name to this approach. In the second one, play is devised according to curriculum content, which is then taught through play (Johnson et al., 1999).

Computer games with growing audiences (Brand, Knight, & Majewski, 2003), are among the popular indoor play activities of young children (R. Clements, 2004; Cherney & London, 2006; Dwyer, 2007) and take the place of outdoor play time (e.g. R. Clements, 2004; Cherney & London, 2006; Dwyer, 2007; Li & Atkins, 2004). In today's technological world, computer games seem to provide a promise of educating children while providing them with fun times (Paraskeva, Mysirlaki, & Papagianni, 2010), and simultaneously giving young children technological skills (Sandberg & Pramling Samuelsson, 2003). However, the computer games only make this promise real if they are aligned with curriculum goals,

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