Chapter 14
Mathematical Literacy and Young Children:
Incorporating Technology in the Early Childhood Classroom

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ABSTRACT

This chapter focuses on three web-based applications and describes how each may be used to promote mathematical literacy in developmentally appropriate ways. The web-based applications described in this chapter are a selection of those provided at no cost by The Math Learning Center. The Number Rack Application is a calculating frame composed of 2 rows of 10 beads each. The rows of movable, colored beads encourage learners to think in groups of fives and tens, helping them to explore and discover a variety of addition and subtraction strategies. The Number Line Application helps students visualize number sequences and illustrate strategies for counting, comparing, adding, subtracting, multiplying, and dividing. The Money Pieces Application helps students visualize and understand money values and relationships. The strategy of Number Talks is used to promote mathematical literacy using these applications. A Number Talk is a short, ongoing daily routine with a focus on mental math strategies that provides students with meaningful practice with computation.

INTRODUCTION

Technology has become a central part of the curriculum for most educational settings and plays a major role in the lives of many children. The National Technology Education Plan Update released by the U.S. Department of Education (2017) explains that "The Conversation has shifted from whether technology should be used in learning to how it can improve learning to ensure that all students have access to high-quality educational experiences." (p. 11). With the proliferation of technology use by young learners, the question must be asked, how can this technology be incorporated into the curriculum in meaningful and appropriate ways? This chapter will examine strategies for practitioners to incorporate technology into instruction as they provide their students with opportunities to engage in learning around the concept of mathematical literacy.

BACKGROUND

The International Reading Association, in their position statement regarding 21st century technologies (2009) states: "To become fully literate in today's world, students must become proficient in the new literacies of the 21st-century technologies. IRA believes that literacy educators have a responsibility to integrate information and communications technologies (ICTs) into the curriculum, to prepare students for the futures they deserve." (n.p.). Hutchinson and Reinking (2011) explain that a majority of educators use these technologies as technological integrations as opposed to curricular integrations. That is, these technologies are viewed as a separate piece of, rather than a vital component of, the curriculum. This chapter aims to offer ways in which 21st century technologies can be fully integrated into the curriculum to teach the skills of mathematical literacy.

The process of developing literacy skills is fairly well known: first, we learn sounds, then letters, then how the letters and sounds make words (Siena, 2009). By contrast, the process of becoming mathematically literate is not as common. Yet, children learn mathematics and language in a similar progression. Starting in infancy, language and literacy skills develop over time as children build their vocabulary, sentence length, and sentence complexity. Harris and Peterson (2017) found that learning early math involves a similar progression as children initially learn basic math vocabulary, then how to recognize math in the world around them.

Siena (2009) defines mathematical literacy as the ability to use numbers and to understand the *language* of mathematics to help solve real-world problems. It helps students to decipher what a question is actually asking by understanding the terminology. For example, the word *volume* has multiple meanings. It can refer to a series of printed sheets bound in book form. It can also denote the intensity of a sound. In mathematics, *volume* refers to the amount of space occupied by a 3-dimensional object. Teachers must help students make connections between common English meanings and mathematics meanings.

Oxford Learning, a company that specializes in tutoring school-age children in mathematics, offers guidance as to what mathematical literacy looks like (2010). They include problem solving, reasoning, and the ability to analyze information in their description of mathematical literacy. For a student to acquire and apply these competencies, they must know the fundamentals of the basic operations (addition, subtraction, multiplication and division) to free the brain to allow for growth.

Early development of mathematical literacy is also supported by the National Council of Teachers of Mathematics (NCTM). According to the NCTM, 'Effective teaching of mathematics facilitates discourse

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