

Building the Connection

Before focusing on particular strategies or activities that integrate mathematics and literacy, it is important to take the time to clarify what is meant by the *literacy–mathematics connection*. In this chapter, I examine literacy and mathematics expectations and the barriers that often stop us from making a connection between the two. By understanding the goals and purposes for each subject area, it is easier to see the potential benefits that exist from connecting the two.

Defining Literacy

Let's first look at the definition of literacy. For anyone in the educational field, it is obvious that the meaning has changed a great deal over the years. Many years ago, a person was considered literate if that person could read and write, and those were the skills that were highly valued when anyone referred to literacy. Therefore, educators focused the majority of their time and energies on developing students' ability to do so.

Talking and listening skills were sometimes encouraged in the youngest grades through activities such as show-and-tell, but otherwise it was expected that those skills could be developed naturally without any type of educational focus. And why wouldn't we assume that? Because children learn to talk and listen at home as toddlers, many believed that these weren't skills that needed to take up limited classroom time. Furthermore, talking and listening had never been a focus of standardized tests, and often the content necessary to be successful on those exams is given priority in the classroom.

In fact, talking and listening skills were not only marginalized in educational settings but also talking was highly discouraged. A great deal of learning occurred in isolation without involvement with peers. Students were not in the classroom to have conversations with their peers—that was best left to lunch, recess, and physical education class. Instead, the

common view was that students were in school to learn, and to maximize learning the classroom needed to be full of quiet workers. The goal was quiet classrooms where students were busy working on tasks.

However, times have changed. To begin with, there is now an obvious focus in schools on collaboration and cooperative learning. Along with peers talking among themselves, the idea of facilitating growth in oral language skills is becoming more common. Through research in the field, it is clear that we need to focus our attention on oral language skills, and we need to give talking and listening their share of time in the curriculum. Research shows that all aspects of literacy are related. In fact, children with weaker oral skills (Loban, 1976) often are not as effective with their writing.

As educators, we now realize that to create citizens that can not only function in the present world but also become contributing and successful members of society, we need to help students learn to speak in an articulate manner that is appropriate for the situation, their goals, and the audience. It is also important that students can listen effectively to others, perceive biases or propaganda techniques being used, and comprehend what they are hearing. Therefore, our literacy goal must be to support students in becoming effective communicators within the classroom context and outside the school setting. As the world becomes more complex, that task becomes even more challenging.

Whereas language arts has historically comprised reading, writing, talking, and listening, *Standards for the English Language Arts* (International Reading Association [IRA] & National Council of Teachers of English [NCTE], 1996) expanded beyond those areas to include viewing and visually representing (Tompkins, 2009) as the six areas of literacy. Not only must students be able to read, write, talk, and listen effectively but also they must be able to understand what they view around them. To do this, students need the opportunity to interact with a variety of texts. Although textbooks, children's books, and other print-based media are important and have their place in the classroom, a lot of information can be gained from commercials, the Internet, films, and videos. Students must also apply metacognitive skills with these forms of text and be educated viewers.

Along with comprehending the material that they view, students need to visually represent and communicate information for various audiences to share information in a variety of ways, including through the nonprint media of drama, posters, charts, video productions, and a wide range of

other visuals. Visually representing information, as with other forms of communication, requires that students think about the information they want to convey, understand the audience who will view the creation, and determine the most effective way to share the information.

To be effective as literacy educators, we must work hard to assist students with all six aspects of literacy: reading, writing, talking, listening, viewing, and visually representing. No longer can the focus of classrooms be on traditional communicative arts. This broad-based view of literacy is the basis for this text. Preparing students for the world in which they live is not an easy task. However, unless we believe in a broad conceptualization of literacy, it is an impossible task.

Rethinking the Curricular Barriers We Create

Over the years, the value of creating cross-curriculum integration has been well documented in the literature. Educators show that an integrated curriculum is often more motivating for the learner than the traditional way of teaching (Guthrie, Anderson, Alao, & Rinehart, 1999). Not only is the content more interesting but also, when connections are made between content areas, students can more easily remember the information for problem-solving tasks later (Nuthall, 1999). Boaler's (2008) research examines how math is taught at a number of schools, including Rainside High School where students are taught in a communicative approach. The students learn to communicate mathematics through a variety of methods, including words and visual representations. Students also work collaboratively within the classroom. The results are amazing. Yet even with these studies, it appears the literacy-mathematics connections often are not made in classrooms. To make the connections, we must examine and understand why they are not currently occurring.

The topic of content area literacy is not new. For years, those involved in the educational community have researched, written, and encouraged the integration of literacy skills into other areas of the curriculum. Although many excellent books have been written (e.g., Alvermann, Phelps, & Gillis, 2006; Conley, 2007; Moore, Moore, Cunningham, & Cunningham, 2006), the majority of strategies and samples shared in those texts are not tied into mathematical content. It seems almost as if there is an invisible barrier separating mathematics and literacy. According to Harvey and Goudvis

(2007), teachers have been asking for more information on incorporating reading strategies through the mathematics connection for many years. Although obtaining the information is vital, even more important is examining how we view the content areas. We must each rethink our compartmentalization of different content areas in order for the information to be of value.

When we look at the content areas in elementary schools, one thing is clear: Even when elementary school teachers team-teach subjects, often science and math are paired together, as are social studies and language arts. This trend continues into the middle school setting. I rarely, if ever, have a practicing teacher in my graduate classes who teaches language arts and mathematics.

For adults, there appears to be a certain degree of uncertainty or uneasiness associated with merging the two fields. However, students do not see the barrier between two subjects until adults separate them by materials, time, and sometimes teachers. In fact, as Moyer (2000) states, "The separation of language and mathematics instruction in the elementary grades is very unnatural for children" (p. 255). According to her, "The world of a child involves patterns, problem solving, communication and connections" (p. 255). As adults, we must rethink our own views on the separation of those two areas to align our views with that of our youngest students. So much more learning can occur and be reinforced when we integrate the curriculum.

When we look at the learning occurring outside the educational context, we see rich learning experiences in which students must incorporate knowledge from a variety of areas. If someone wants to shop, the task requires knowledge of a complex set of skills that can't be broken down into distinct, separate topics. It is necessary to reflect on what we have heard or seen in various media to determine what we might purchase. We are often involved in writing a list, reading product descriptions and sale flyers, comparing prices and determining the cost of items, and computing the total amount owed. In the same manner, a complex set of skills is needed to view a favorite movie, plan a party, and spend a day at the zoo. If a family wants to take a trip, they read road maps and determine directions, analyze distance and time, and calculate expenses. Each of these activities demands a strong foundation in mathematics and literacy.

However, historically we have felt the need to separate the areas within the school setting. Traditionally education has felt the need to break the day and curriculum into distinct parts. Scholars describe a typical day in secondary schools as being broken up into certain periods of time, with teachers isolated within their own classrooms teaching the content for which they are responsible, and the classrooms located within a certain physical space (Moje, 2008). For the most part, this can also describe many elementary and middle schools. The unnatural barrier that separates the two fields of study needs to be removed. Only by removing these barriers will students see the relationship between what they learn in school and what occurs in their homes and communities.