

CURRICULUM CONNECTIONS: LINKING LITERATURE AND MATH

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ABSTRACT

Action research involving curricular integration of Math and reading is described in a personal account. Research supporting the benefits of subject integration is illustrated. An Action Research project in a third grade classroom of 26 participants was designed to determine and analyze students' connections between math and literature. The research project entailed journals to record connections and teacher's reflections of her students' ability to integrate math and literature and the effects on students' learning and motivation. The teacher's reflection of a positive teaching experience is portrayed. A list of books used in action research project is given.

INTRODUCTION

"You know, you can think of everything as a math problem," says the main character in Jon Scieszka's popular book, Math Curse. This female character, vexed by a "Math Curse," is told by her teacher that almost anything can be a math problem. The author throughout her life, has always enjoyed seeing math in everyday things and learning about the subject. Math is indeed everywhere, and in her opinion, it is one of the most important subjects one studies in school. She carried this passion for math with her into the career of teaching a vivacious group of third graders, and strive to instill a love of math in these learners.

Math should be an enjoyable, not a tedious and boring, experience for students. One way to achieve this in a classroom is to make math meaningful and hands-on. Another useful strategy in teaching math is the use of math-related literature. Knowing that students love being read to, storybooks are utilized in math lessons in order to increase motivation and interest. Recognizing the importance of integrating subject matter in order to increase understanding, the author set out on an adventure to research the following question: What kind of mathematical connections can students make to literature?

Review of Literature

In today's world, Mathematics is different from what it used to be. Rather than teaching skills and concepts in isolation, there is more of a focus on embedding

concepts and weaving them together in order to make learning more meaningful and permanent. Mathematics education has evolved into "real mathematics," the mathematics found everywhere. This type of mathematics is not a set of isolated skills; it is reasoning, thinking, problem solving, communicating, and making connections (Hellwig, Monroe, & Jacobs, 2000). Subject integration makes Math meaningful for students, assists them in making connections, helps them to acquire understanding of Math concepts, and improves their attitudes towards mathematics. In addition, integrating subjects helps teachers to meet difficult time demands. For these reasons, curricular integration has become increasingly popular.

In addition to helping with curricular and time demands, curricular integration allows learners to make meaning of material and enables them to retain information and/or concepts learned. It also helps students with application of skills and encourages positive attitudes. As a result of integrating math and literature, students learn about both subjects, and they find an increased enjoyment and understanding (Kliman, 1993). The National Council of Teachers of Mathematics (NCTM) also supports this integration, as students who have opportunities for listening, speaking, reading, and writing in Math instruction not only learn to communicate mathematically, but they also communicate to learn mathematics (NCTM, 2000).

Additional benefits of connections made across the

curriculum help support curricular integration. When Math and reading are integrated, students' mathematical skills and their behavior improve as a result. Integrating reading engages all types of learners and shows students that Math can be found everywhere (Steele, 2001). The use of trade books in Math enables students to make meaningful connections between the real world and experiences gained within the classroom (Hellwig, et al., 2000). Children's literature guides students to a better understanding of mathematical processes and a discovery of how others utilize Mathematics to learn (Roth McDuffie & Young, 2003).

The effects of Math and reading integration have also been analyzed in research studies. Mink & Fraser (2000) examined how a program entitled Project SMILE (Science and Math Integrated with Literary Experiences) impacted the attitudes of students toward three core subjects: Mathematics, reading, and writing. The project was successful in encouraging positive attitudes toward Math, allowing students to learn math concepts with the use of children's literature, and producing positive changes in classroom climate (Mink & Fraser, 2000).

An additional study also found that the integration of Math and Language arts is effective in enhancing students' attitudes towards Mathematics. Knill-Griesser (1999) found that using quality math and literature materials helped her to improve her elementary students' attitudes towards Mathematics. As supported by her data, the use of Literature in Math instruction improved students' attitudes towards Math.

There have been many articles about curricular integration and its benefits, as well as additional studies that examine the impact of integrating math and language arts. These address the importance and relevance of integrating Mathematics with language arts to increase positive attitudes towards Math and to foster achievement. After learning more about the value of curriculum integration, an Action Research Project was designed to find out not only how students would make math connections in literature, but also whether they would make them accurately.

Action Research Project

Description of Participants/Setting

The Action Research Project was conducted with the 26 third graders, 19 boys and 7 girls. Twenty are of average reading abilities, and six students are of low-average ability in reading. Most of the students are of average ability in Math as well. The majority of the students in the class (24) were Caucasian; two were African-American.

Part of each reading period consists of a block of time for students to read self-selected literature independently. It was during this time period that the Action Research Project was conducted.

Design of Study

Pondering over the original question of how students make Mathematical connections in literature, many questions arose such as, *Are those connections accurate? How do they feel about the integration of math and literature? Are they aware of literature as a tool of learning mathematics? Does the use of literature during math instruction increase motivation for learning math?* A study was designed to answer these questions.

Over a three-week period, students were encouraged to make mathematical connections while engaging in independent reading. To begin the study, the students collaboratively brainstormed a brief list of Math topics to look for in their reading. Some concepts included were time, money, measurement, and number operations. Next, they were guided in extending the class' list to include some additional concepts such as fractions and geometry. Afterwards, a small number of concepts were added to the class list when they appeared in their literature.

This list remained posted to assist students in recording their concepts. It guided them in determining the proper connections and the spelling of those connections.

Modeling with Self-Adhesive Papers

To model how to find connections, Math Curse by Jon Scieszka was read to them. This book was selected for its many math connections and for its interesting way of showing children how Math is all around us. The students were supposed to learn how to find the math ideas that

are buried in literature, and to model how reading about Math is enjoyable. Soon the other lessons also began by modeling how to make connections in text through read-aloud, such as Counting Sheep by Dr. Julie Glass and Pigs in the Pantry by Amy Axelrod. All the modeled lessons, demonstrated how to make math connections and how to identify these connections and mark the locations with the use of self-adhesive notes.

Journal Entries

After modeling, the students were instructed to read silently and to note connections and to mark them accordingly. They also wrote a journal entry to record the books read and connections found. The journal entries enabled the students to reflect on their math connections and to communicate them in their writing. The journal texture were compared with the connections marked with the self-adhesive notes and were helpful in keeping track of the books read by each student.

Collection of Data

Upon students' completion of the lessons, the books were collected and the types of connections on a data chart were recorded by coding them. Incorrect connections made by the students were also noted as to identify their misunderstandings.

On the first day of the lesson, the student were very involved in identifying connections and some students made great connections with the text. For example, Susan recognized that when determining a very large number, estimation is used to predict a close guess for the number. Although she needed assistance with the word "estimation," she recognized the concept independently. She was a student who was referred for Special Education testing. At the end of this lesson, Sarah, who frequently misbehaves in the class, said, "This was fun! Can we do this again?"

Despite the enthusiasm and motivation, it was observed that while students found many connections in the text, they were not all accurate. The connections in the subsequent lessons, however, appeared to be made more carefully. After instructing them to focus on finding math connections and reminding them that it is better to

make a few connections accurately than to make many inaccurately, the students made fewer, but more accurate connections. Analyzing the results from these lessons created a feeling of confidence, that the students were indeed making connections in the text. It was also noted that they were enjoying this by observing the excitement and smiles in the room throughout the lesson. Stephen, a student of average ability, made a math connection while he was reading The Indian and the Paintbrush. Excitedly, he explained that he found Math in his book and showed the word "multiplied" in reference to the growing plants in the text. During another lesson, more motivation and interest in reading the books was observed in students as they made more math connections. They dutifully wrote on their "sticky notes," marked connections made, and wrote in their journals. For example, Allison, a low-average Math student, referred to the book modeled in the day's lesson and compared it to her book. She said, "Just like you read about counting by numbers, I had counting by fours in my book." She made accurate connections and even compared connections in different texts. The students were indeed finding math connections, and with more accuracy than before. This initial research project was concluded and it supported the original idea: students are indeed capable of finding math connections in text.

A Changed Course

Although the project was nearing completion there was more to come. Andy approached during his self-selected reading time and said, "Remember how we found Math in reading? I have a book of poetry from the library and it has math in it." He proceeded to show a poem from There's a Bug in Teacher's Coffee and pointed out an accurate math connection in the text. This incident gave rise to questions like *Would other students do this without prompting? Would they recognize math connections without specific directions for finding them? Would they even want to read these types of books willingly?* These questions prompted to take this project one step further. The next day, a variety of books were distributed for self-selected reading, half of which were books used in the math connection lessons. The books

were presented to the students and no mention was made of finding math connections, but each child was allowed to select one book to read for self-selected reading.

Math and Literature Explosions

The students were eager to choose the math books to read. Twenty out of twenty-three students present selected Math books. In fact, so many students wanted to read the Math books that a system of "picking a number" had to be created to obtain order and fairness in this activity. There were even quite a few books that were desired by five and six children! In addition, students were recommending them to each other. This showed that they really enjoyed the books and were showing much eagerness towards reading them. There was practically fireworks in the room about reading and Math. In addition to this overwhelming enthusiasm, fantastic conversations were overheard from the students. Not only they were switching books and recommending them to others, but they were also talking about math during their independent reading times! Timmy, a student of low-average ability (one who appeared very frustrated in previous lessons and expressed an inability to find math connections) came and asked for a "sticky-note" and he accurately located six math connections in his book! For instance, he noted that dogs jumping off a raft and gradually decreasing in number in *A Dozen Dogs* were examples of subtraction. He also noted a pattern in the pages, as the dogs decreased one by one. Next, he asked an average student, Jonathan, to join him, and the two boys enthusiastically read four books and accurately labeled them with math connections! Cara, another student of low-average ability, had a revelation during this activity. She not only made a connection in a book that was not selected as a "math book," but she connected the text with a previous math lesson! When she saw an Egyptian pyramid in the book, she showed and said, "Look-- this is kind of like the pyramids we made with the marshmallows and toothpicks (in Math)!" The students found pleasure in reading these books and found math connections in the texts.

Conclusion and Findings

Throughout the course of the research, much data was addressing and answering the questions, and it was found enlightening to note students' ability to connect Math and Literature and to enjoy reading about Math. Not only did the students connect Math with Literature, but also they enjoyed it. It justified the teaching philosophy that learning should be enjoyable and meaningful for the students. When learning is a fun for them, it seems that more learning takes place and their desire to learn more and to refine their knowledge has also increased. The energy of the students in the classroom throughout these lessons has increased each day and can be compared to fireworks, each explosion becoming louder, brighter, and more powerful than the previous one.

In spite of this, the most important result was within the soul of the author as a result of this project. This is a time where many of us feel that the job of teaching is overwhelming and sometimes impossible. At times it feels that we spend so much time in assessing and so little time in teaching. We feel that we just aren't good enough and don't "teach to the tests" enough. We feel that if we aren't teaching "by the book" and stick to the scheduled minutes, we aren't doing a good job. The author took a risk by teaching outside of the curriculum to complete an Action Research project. At the end of it all, she learned something so valuable: sometimes it is OK to take risks and to follow our hearts. Our students will learn amazing things, and teachers will be reminded of what teaching is all about: the magic and excitement of seeing students learn. Teaching is indeed a special profession, with "paychecks" made out of such joyful moments instead of money. I suppose that is what keeps us coming back year after year, even with rigorous demands and often unappreciative students and parents.

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- Picture Books Arranged Alphabetically by Title
- [26 Letters and 99 Cents](#)
 - [100th Day Worries](#)
 - [Alexander, Who Used to be Rich Last Sunday](#)
 - [Bunny Money](#)
 - [Counting Cows](#)
 - [Counting Sheep](#)
 - [Dozen Dogs, A](#)
 - [Dragon's Scales](#)
 - [Each Orange Had 8 Slices](#)
 - [Eating Fractions](#)
 - [Fraction Fun](#)
 - [Get Up and Go!](#)
 - [Great Book of Optical Illusions, The](#)
 - [Icky Bug Counting Book](#)
 - [Inch by Inch](#)
 - [Math Curse](#)
 - [Math Riddles](#)
 - [Miss Bindergarten Celebrates the 100th Day of Kindergarten](#)
 - [Monster Math](#)
 - [Mother Goose Math](#)
 - [On Beyond a Million](#)
 - [One Guinea Pig is Not Enough](#)
 - [One Potato](#)
 - [Pigs go to Market](#)
 - [Pigs in the Pantry](#)
 - [Remainder of One](#)
 - [Spaghetti and Meatballs for All!](#)
 - [Too Many Things for Kangaroo to Do!](#)
 - [Twenty is Too Many](#)
 - [Very Hungry Caterpillar, The](#)

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