INTEGRATING MATHEMATICS INSTRUCTION WITH THE FOUR
COMPONENTS OF LANGUAGE ARTS

MASTER’S THESIS

Submitted to the School of Education
University of Dayton, in Partial Fulfillment
of the Requirements for the Degree
Master of Science in Education

by

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DEDICATION

I want to thank my husband and son for all of the support and understanding they have given me. They have stood by me with patience and love throughout my graduate work at The University of Dayton. Without their willingness to cope in my absence, I could never have completed my goal to the best of my ability.
CHAPTER I
INTRODUCTION

Purpose for the Study

Imagine students in an elementary classroom engaged in mathematics instruction. The classroom is quiet. All that can be heard is the movement of pencils across sheets of paper and an occasional comment from the teacher. Work is being done in silent isolation, rules are memorized, and many routine problems are worked using rules few of the children understand. Mathematics is not making sense to some of the children. The teacher is heard saying, “Do it this way,” as another problem is written on the chalkboard. Instructions are also given such as, “When you finish, work the next ten problems in the book.”

Luckily, something more exciting is now happening in many elementary school classrooms! There is a shift in emphasis in the teaching and learning of mathematics. Teachers are encouraging children to investigate, discuss, question, and verify. Explorations of mathematical concepts and dialogues about reasoning and problem solving are a focal point in the classroom. Various strategies to assess students’ progress are being used. These classrooms can be noisy due to the sounds of students actively participating in the class. Teachers and students are excited about mathematics in these classrooms because mathematics has become more than rote memorization and a paper-pencil task. Students are engaged in conversations with the teacher and with one another. They are solving mathematical problems through talking.

Major reforms in school mathematics are advocated in reports that call for changes in the curriculum, in student program evaluations, in instruction, and in the classroom
environment. Students need a strong academic foundation to enable them to expand their knowledge, to interpret information, to make reasonable decisions, and to solve increasingly complex problems through a variety of approaches (Burton et al. 1991). The blueprint for reform is the Curriculum and Evaluation Standards for School mathematics (NCTM 1989a). It identifies a set of standards for the mathematics curriculum in grades kindergarten – twelve (Leiva, 1991).

A primary goal of the movement is to give children experiences that promote the ability to solve problems. Furthermore, mathematic experiences should come from situations generated within the context of everyday events. Students are also expected to make conjectures, to reach conclusions, and to discuss their reasoning in words, both written and spoken (Leiva, 1991).

The study of mathematics should be a living, exciting activity for children. It can give children a tool for solving real problems and a way of looking at and communicating about their world. This writer believes that the integration of the four language arts components and mathematics instruction enhances the learning experience by presenting mathematics in real and meaningful contexts and as part of everyday events. Furthermore, it is the writer’s belief that there is better retention and understanding of mathematical skills and concepts by the students when mathematics instruction and language arts are integrated.

**Problem Statement**

The purpose of this study was to analyze the opinions of primary grade teachers toward the integration of the four components of language arts into mathematics instruction.
Assumptions

In order to carry out this study the writer made the following assumptions. A Likert-type questionnaire was used to gather and analyze opinions of primary grade teachers toward the integration of language arts and mathematics instruction. The writer assumed that the instrument was reliable. The writer assumed that the teachers selected to complete this questionnaire would answer honestly and in a manner which accurately reflected their personal teaching experience in mathematics.

Limitations

One limitation of this study was the sample size of the primary grade teachers questioned.

Definition of Term

Language arts. Language arts encompasses the areas of reading, writing, listening, and speaking.

Primary. Primary grades are kindergarten, first, and second.
CHAPTER II

REVIEW OF THE LITERATURE

In this study, the writer reviewed literature related to the topic of integrating mathematics instruction and language arts. The chapter is divided into three sections. The sections are reasons to use children’s literature during mathematics instruction, reasons to use writing activities during mathematics instruction, and reasons to use oral communication (speaking and listening) activities during mathematics instruction.

Reasons to Use Children’s Literature During Mathematics Instruction

One reason to use children’s literature during mathematics instruction is that children’s books can be an enjoyable way for children to learn mathematics. Along with the idea that books can be an enjoyable way to learn mathematics, Smith and Wendelin (1981) present some other practical reasons for using children’s books to teach mathematical concepts. Books can serve as a supplement to the traditional mathematics materials. Furthermore, books are useful with individuals and with groups and are usually easy to obtain.

Another reason to use children’s literature during mathematics instruction is that books can form a bridge between the concrete and abstract. Harsh (1987) contends that in the early years of childhood the development of language skills is of great importance. A young child’s curiosity creates an interest in all relationships and categories of a complex world. One of the more difficult areas to master is that of the abstract concept. For example, time, distance, size, shape, and mass need to be clarified and amplified in books. An example of the abstract concept of shape being clarified and made more
meaningful by the use of literature, can be illustrated in the book *My Very First Book of Shapes* by Carle (1974). This is a wordless, split, board book, where the lower pages have a colorful picture and the upper ones have corresponding shadows, but the shadows are in a different order. Children flip the pages until they match the picture to the shadow. This book introduces shapes that are meaningful to the children. These shapes are useful to them. Early experiences with shapes should allow children to explore the variety of shapes around them. Learning shapes does not mean naming just circle, square, triangle, and rectangle. This book by Carle is an enjoyable and fun way to initiate the study of shapes.

Children's literature can contribute to the learning of the abstract concept of relative size. Children identify themselves as small, kittens as small, crayons as small, and buttons as small. How can all of these things be small when none are the same size? Six and seven year olds are beginning to outgrow the egocentric thinking of early childhood and are beginning to understand the concept of relative size. *Thumbelina* by Hans Christian Andersen and *The Three Billy Goats Gruff* by P.C. Asbjørnsen are two examples of children's books that illustrate the comparisons of size in an imaginative way.

Using children's literature as a springboard for mathematical experiences allows language and mathematics learning to grow together naturally and imaginatively which is another reason to use children's literature to reinforce mathematics instruction. Radebaugh (1981) suggests that using fairy tales and nursery rhymes can teach number concepts to very young children. For instance, when number is emphasized throughout a story, many opportunities for understanding its meaning have been provided. Radebaugh
contends that the pictorial stage, which is one level more abstract than concrete experience, begins at an early age. For example, bright, colorful illustrations in children's books may be used to distinguish geometric shapes in familiar objects.

Using children's literature to reinforce mathematics instruction can help students understand the meaningful contexts that support mathematical thinking. Griffiths and Clyne (1991) maintain that using children's literature during mathematics is advantageous because books help students explore mathematical ideas in natural, familiar, and meaningful contexts. If a story is first read and enjoyed for its literary content, it can spark students' interest in a mathematics lesson.

If children can relate to and enjoy the plot, setting, and characters of a story, the new mathematics skill will be associate with the meaningful contexts. Furthermore, Griffiths and Clyne suggest that children can take mathematical ideas from stories and use them in their own situations. They continue to assert that stories pose problems that children are intrinsically interested in solving. Griffiths and Clyne believe students in upper grades, as well as children in primary grades, are highly motivated by stories. Mathematical connections to literature exist in higher level books and can serve to motivate older students to investigate and explore mathematical concepts.

Another reason to use children's books during mathematics instruction is that children's literature can be an important vehicle to use when exploring various mathematical concepts (Whitin and Gary, 1992). Stories can help students understand the meaningful contexts that support mathematical thinking. Stories present a nonthreatening avenue to try out current ideas about important mathematical concepts.
A further reason to use children's literature during mathematics instruction is that literature is a practical way to introduce a new concept. Ohanian (1989) and Nevin (1992) assert that stories can provide a literature link to mathematics by modeling concepts in ways that can be recreated using manipulatives. The books can be good models and can put concepts into a meaningful context.

If teachers develop interconnections between literature, mathematics, and higher order thinking skills, teaching time can be saved which is a reason to use children's literature during mathematics instruction. The use of interdisciplinary studies not only save time but also add to children's insight into all curriculum areas involved (Welchman-Tischler, 1992). Teachers become frustrated by the lack of time to cover all the curriculum areas children are exposed to. An interdisciplinary approach to teaching can alleviate the frustration.

A further reason to integrate children's literature with mathematics instruction is that the literature celebrates mathematics as a language. According to Whitin, Mills, O'Keefe, and Thiessen (1994) learning to communicate mathematically is an essential goal for mathematics instruction. Mathematics can be thought of as a language that must be made meaningful for students to adequately communicate about mathematics. Communication plays an important role in helping children construct links between their informal, intuitive notions and the abstract language and symbolism of mathematics.

After the writer reviewed the literature related to the topic of integrating mathematics instruction and language arts, the writer concluded that using children's literature during mathematics instruction has many positive benefits for children and teachers.
The writer further reviewed literature that expanded on the idea of using writing activities during mathematics instruction. This is explained in the next section.

Reasons to Use Writing Activities During Mathematics Instruction

One reason to use writing activities to reinforce mathematics instruction is children are able to create their own mathematical problem or situation. This illustrates that the students have reached a higher level of thinking. Furthermore, good writing is a part of the problem-solving process (Skypek, 1981). For example, in a basic algebra course students who have difficulty with story problems could rewrite problems they do not understand, thereby helping them to see the key words and the relationships expressed. A further example that illustrates this idea is that students could be asked to rewrite a page or paragraph in their textbook that they consider unclear in its present form. The thinking necessary to do this in a meaningful way should facilitate the retention of the concept in the students' minds. For this reason, students need the opportunity to use and refine writing skills in a mathematical context.

Writing about something involves many of the thought processes mathematics teachers would like to foster in their students which is a reason to use writing activities during mathematics instruction. Writing is a mode of language that particularly lends itself to the acquisition of new knowledge. Performing a writing task requires students to reflect on, analyze, and synthesize the material being studied in a thoughtful and precise way (Davison and Pearce, 1988). Not only will the opportunity to practice writing improve a student's ability in written expression, but using writing to practice
mathematical tasks will also assist students in comprehending mathematics concepts and improve their ability to communicate mathematically. The inclusion of writing activities potentially has additional value when the kinds of activities are varied and writing is treated as an attempt at communication. Writing activities can involve students in useful and enjoyable mathematical activities. These in turn can encourage students to become more proficient in mathematics.

Representing mathematical thinking in various forms, such as written and oral language, drawings, and so on increases a child’s avenues for understanding which is a reason to use writing activities during mathematics instruction. Increasing a child’s options for expression increases their opportunity for understanding. Thus, students have more chances to represent their ideas in different ways (Whitin and Gary, 1994).

Another reason to use writing activities to reinforce mathematics instruction is that students who are required to write must do considerable thinking and organizing of their thoughts before they write, thus cementing in their minds the concepts studied (Johnson, 1983). If students can write clearly about mathematical concepts, then it is apparent that they understand them. After students complete the written work, it is then available for their own use at a later time. Students can share their written work with other students who have difficulty with the same concept. Finally, the entire process should give students valuable practical experience in expressing their thoughts in writing.

A further reason to use writing activities to reinforce mathematics instruction is that studies have shown that students in remedial mathematics classes have increased motivation toward learning after writing activities have been used during instruction (Brown, 1991). A study completed by Brown in her own classroom resulted in the
increased motivation and interest in mathematical concepts by her students. Brown asked students to write original story problems for the concepts of addition, subtraction, multiplication, and division. Students traded papers, and each tried to write the numerical problem from the other's explanation of the problem. Brown was delighted to see her students actually interested in this activity. The problems were then given to the English teacher who had the same students in class. This teacher used the problems with the same students for editing practice.

The activity was extended further by allowing the students to use a word-processing program to type each of their problems into the computer. The various problems were compiled by Brown into one file and printed. Bound copies of the problems were put together and distributed. Seeing their names in print impressed the students. Brown indicated that after this experience, the student authors were more willing to attempt story problems. Brown further indicated that classroom comments from students showed that they realized English and mathematics were both needed when writing a mathematics problem.

The increased ability by the teacher to evaluate students' understanding of mathematical concepts and processes based upon what the children have written is a reason to use writing activities to reinforce mathematics instruction (Evans, 1984). A meaningful type of writing that clarifies concepts and processes is an activity called "Troubleshooting". This activity requires students to explain, in writing, any errors in their homework or quizzes using specific details. Such feedback is helpful for teachers, as well as for students, to determine if a simple mistake or a complete lack of understanding caused the student to miss the problem. Evans maintains that teachers
learn more about how their students think and how well they understand mathematical processes when they write about them. Having students explain how to do something, describing processes in a journal, or explaining mistakes made during problem solving helps teachers gain a clearer picture of students’ understanding of various mathematics concepts.

After the writer reviewed the literature related to the topic of integrating mathematics instruction and language arts, the writer found several reasons to use writing activities during mathematics instruction. The writer further reviewed literature that expanded on the idea of using oral communication activities during mathematics instruction. This is explained in the next section.

Reasons to Use Oral Communication Activities During Mathematics Instruction

One reason to use oral communication activities to reinforce mathematics instruction is that giving students the opportunity to talk is one possible way to increase the time spent on developmental tasks (Liedtke, 1988 and Kennedy, 1991). Evidence suggests that increasing the time spent on developmental tasks and student participation and decreasing the time students spend on practice can have a positive effect on mathematics achievement. A strategy that is conducive to the implementation of developmental activities gives students the chance to talk about mathematics. Being able to talk about a skill or idea implies that it is understood. Since talking can lead to understanding or better understanding, teachers need to promote talk with their students (Liedtke, 1988).
Many valuable learning outcomes can be accommodated in a setting where the focus is on student discussion and participation. For example, students may encounter a page in the mathematics text that shows twenty-five or more practice tasks. Liedtke contends that the last thing teachers should do in this case is request the completion of each item by every student. Few valuable learning outcomes for such a setting result. Many more learning outcomes can be accommodated by letting students talk about these items and by having students respond to questions about the items. Letting students talk and listen to their responses should give valuable insight about their level of conceptual understanding of a given topic. This insight is important for future lessons.

In the process of talking about their experiences and perceptions, and in listening to others talk about theirs, students learn to modify or expand their own internalized structures and to develop verbal codes for communication without ambiguity which is a reason to use oral communication activities to reinforce mathematics instruction (Skypek, 1981). In the mathematics classroom, the activities that correspond to this level of verbal coding might include asking students to talk about “what they see” in mathematical experiences. Their communication becomes more meaningful. Purposeful verbal interactions in an environment of common experiences are a time for further development of thoughts and language.

Appropriately designed learning activities that require students to write or speak about mathematics are helpful in developing the ability to form mathematical concepts which is a reason to use oral communication activities to reinforce mathematics instruction (Cangelosi, 1988; Wright and Stevens, 1983; Burton, 1985). Effectively embedding mathematics lessons within language arts activities requires teachers to relate the
informal structures of students' language to the formal structure of mathematics. For example, students manipulate variables whenever they use pronouns, formulate open-ended sentences by asking questions, and estimate probabilities when expressing anticipation.

Communication in and about mathematics helps to enhance understanding which is another reason to use oral communication activities to reinforce mathematics instruction (Mumme, 1991). Expressing their ideas will help students deepen their understanding of mathematics. Engaging in discussions and listening to others help students strengthen their understanding of mathematical concepts. Furthermore, students construct understanding on the basis of their experiences. Communication supports their construction of knowledge by helping them clarify their thinking. Moreover, Mumme contends that many students fail to grasp mathematical ideas when they are presented as rules and procedures to be memorized and mastered rather than as to be discovered and shared.

The literature reviewed by the writer supported the practice of integrating language arts instruction and mathematics instruction. The writer found that research supported the growing movement to give children experiences that promote the ability to solve problems. The research supported the goal of providing mathematical experiences that come from within the context of everyday events.
CHAPTER III
PROCEDURE

Subjects

The subjects selected for this survey were primary grade teachers. The total number of teachers surveyed was twenty-four. Thirty-seven percent of the teachers surveyed were second grade teachers. Forty-two percent of the teachers surveyed taught first grade. Kindergarten teachers made up twenty-one percent of the total number of teachers surveyed.

Of the teachers surveyed, fifty-five percent have been teaching less than ten years. Thirty-two percent of the teachers surveyed have between eleven and twenty years teaching experience. Furthermore, twelve percent of the teachers surveyed have more than twenty years teaching experience.

Fifty percent of the teachers surveyed have completed a master’s degree in education.

Sixty-two percent of the teachers surveyed have been trained in a hands-on mathematics course. These teachers were trained in either Math Their Way or Box-It, Bag It Mathematics.

Setting

School. The survey took place in an area suburban school. There are over seven hundred and fifty children attending the school in grades kindergarten through second. There are approximately two-hundred and fifty kindergarten students, two-hundred and seventy first grade students, and two-hundred and thirty second grade students. The
average number of children in each classroom is twenty-five. Minority students make up less than one percent of the student population. There are no minority teachers at this school.

Students in this school system normally score well on standardized tests. Approximately, ninety percent of the fourth and sixth grade students passed all sections of the proficiency test. There are approximately forty-five first grade students receiving Title I services in remedial reading. There are approximately forty first and second grade students receiving mathematics intervention.

Community. The survey took place in a suburban district located in southwest Ohio. It is a prosperous and growing community. Fifteen years ago, the district could have been considered a rural community. The building of new houses has helped the district gain an average of one hundred students each year for the past five years.

The majority of parents in this community work in professional positions rather than labor. The district is ranked sixth in the state of Ohio for average family income. The majority of housing in the community is single family dwellings. The average cost of a new home is 225,000.

Data Construction

Construction of the Data Collecting Instrument. The instrument was a Likert-type questionnaire. The author constructed a survey consisting of thirty-seven questions. There were five choices for each question. The choices were strongly agree, agree, undecided, disagree, and strongly disagree. The instrument was constructed on
information assembled from the review of the literature thus, the author claims content validity. The instrument addressed the topic of integrating mathematics instruction and language arts instruction.

The following topics were presented in the survey: demographics, using children’s literature during mathematics instruction, using writing activities during mathematics instruction, and using communication activities during mathematics instruction.

The instrument was field-tested by five primary grade teachers from a nearby school district.

Administration of the Data Collecting Instrument. Necessary revisions were made by the writer, and the surveys were administered to the participants on March 18\textsuperscript{th} along with a cover letter that included instructions on where to return the questionnaire. The date for the return of the questionnaire was by March 25\textsuperscript{th}. The return rate was twenty-four surveys returned out of twenty-four surveys given. This is a one hundred percent return rate.
Chapter IV

RESULTS

Presentation of the Results

The results of each question on the survey are presented in three tables. Table I is titled Results From All Respondents to the Theme of Using Children's Literature During Mathematics Instruction. Table II is titled Results From All Respondents to the Theme of Using Writing Activities During Mathematics Instruction. Table III is titled Using Communication Activities During Mathematics Instruction. For each table, each question from the survey is restated. The question is followed by the number who answered each question. The percent of respondents who replied to each of the five choices is also given.
Table 1

Results From All Respondents to the Theme of Using Children’s Literature During Mathematics Instruction

Question #9  Using children’s literature to teach mathematics is an enjoyable way for children to learn mathematics.

Choices:     N    SA    A    U    D    SD
Responses:   24    67%  33%   0    0    0

Question #10 Using children’s literature to teach mathematics helps form a bridge for young children between the concrete and the abstract.

Choices:     N    SA    A    U    D    SD
Responses:   24    67%  33%   0    0    0

Question #11 Using children’s literature to teach mathematics can help students understand the meaningful contexts that support mathematical thinking.

Choices:     N    SA    A    U    D    SD
Responses:   24   63%  29%   8%   0    0

Question #12 Using children’s literature to teach mathematics helps students see mathematics as a natural part of everyday life.

Choices:     N    SA    A    U    D    SD
Responses:   24   71%  29%   0    0    0

Question #13 The use of children’s literature is a practical way to introduce a new mathematical concept.

Choices:     N    SA    A    U    D    SD
Responses:   24   67%  33%   0    0    0

Question #14 Connecting children’s literature and mathematics experiences allows language and mathematics to grow naturally.

Choices:     N    SA    A    U    D    SD
Responses:   24   63%  29%   8%   0    0
Question #15  Teaching time can be saved when interconnections between literature, mathematics, and higher order thinking skills are developed.

<table>
<thead>
<tr>
<th>Choices:</th>
<th>N</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses:</td>
<td>24</td>
<td>25%</td>
<td>63%</td>
<td>12%</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Question #24  Using children’s literature during mathematics instruction increases motivation to learn for remedial students.

<table>
<thead>
<tr>
<th>Choices:</th>
<th>N</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses:</td>
<td>24</td>
<td>25%</td>
<td>63%</td>
<td>12%</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Question #31  I use children’s literature during mathematics instruction to introduce a new concept only.

<table>
<thead>
<tr>
<th>Choices:</th>
<th>N</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses:</td>
<td>24</td>
<td>0</td>
<td>12%</td>
<td>0</td>
<td>59%</td>
<td>29%</td>
</tr>
</tbody>
</table>

Question #32  I use children’s literature throughout the study of a mathematics concept.

<table>
<thead>
<tr>
<th>Choices:</th>
<th>N</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses:</td>
<td>24</td>
<td>17%</td>
<td>63%</td>
<td>8%</td>
<td>12%</td>
<td>0</td>
</tr>
</tbody>
</table>

Question #33  I never use children’s literature during mathematics instruction.

<table>
<thead>
<tr>
<th>Choices:</th>
<th>N</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses:</td>
<td>24</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>29%</td>
<td>71%</td>
</tr>
</tbody>
</table>
### Table II

Results From All Respondents to the Theme of Using Writing Activities During Mathematics Instruction

<table>
<thead>
<tr>
<th>Question #16</th>
<th>Using writing activities to reinforce mathematics instruction will assist students in comprehending mathematics concepts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choices:</td>
<td>N</td>
</tr>
<tr>
<td>Responses:</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question #17</th>
<th>Representing mathematical thinking in forms, such as written and oral language, drawings, and so on increases a child’s avenues for understanding.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choices:</td>
<td>N</td>
</tr>
<tr>
<td>Responses:</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question #18</th>
<th>Requiring students to write forces them to do considerable thinking thus, cementing the concepts studied in the students’ minds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choices:</td>
<td>N</td>
</tr>
<tr>
<td>Responses:</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question #19</th>
<th>Requiring students to write forces them to organize their thoughts, thus cementing the concepts studied in the students’ minds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choices:</td>
<td>N</td>
</tr>
<tr>
<td>Responses:</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question #20</th>
<th>Using writing activities during mathematics instruction increases motivation to learn for remedial students.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choices:</td>
<td>N</td>
</tr>
<tr>
<td>Responses:</td>
<td>24</td>
</tr>
</tbody>
</table>
Question #21  Using writing activities to evaluate students' understanding of mathematics concepts increases the teacher's ability to assess student achievement.

Choices:  N  SA  A  U  D  SD
Responses: 24  21%  54%  25%  0  0

Question #22  Using writing activities to evaluate students’ understanding of mathematics processes increases the teacher’s ability to assess student achievement.

Choices:  N  SA  A  U  D  SD
Responses: 24  17%  58%  21%  4%  0

Question #23  Writing about something involves many of the thought processes mathematics teachers would like to foster in their students.

Choices:  N  SA  A  U  D  SD
Responses: 24  29%  46%  25%  0  0

Question #34  My students keep a mathematics journal.

Choices:  N  SA  A  U  D  SD
Responses: 24  0  12%  12%  46%  30%

Question #35  My students are asked to explain in writing the processes they use to solve mathematical problems.

Choices:  N  SA  A  U  D  SD
Responses: 24  0  46%  17%  20%  17%
Table III

Results From All Respondents to the Theme of Using Communication Activities During Mathematics Instruction

Question #25 Being able to talk about a skill implies it is understood.
Choices: N SA A U D SD
Responses: 24 8% 68% 12% 12% 0

Question #26 Learning activities that require students to write or speak about mathematics help the students form mathematical concepts.
Choices: N SA A U D SD
Responses: 24 37% 59% 4% 0 0

Question #27 Communication in and about mathematics helps to enhance understanding of the concepts.
Choices: N SA A U D SD
Responses: 24 37% 59% 4% 0 0

Question #28 Communication in the classroom promotes a comfortable learning environment.
Choices: N SA A U D SD
Responses: 24 75% 25% 0 0 0

Question #29 Using communication activities during mathematics instruction increases mathematics vocabulary, which enables students to become active questioners.
Choices: N SA A U D SD
Responses: 24 46% 54% 0 0 0
Question #30  Using communication activities during mathematics instruction increases mathematics vocabulary, which enables students to become active problem creators and problem solvers.

Choices: N SA A U D SD
Responses: 24 42% 50% 8% 0 0

Question #36  My students are asked to explain orally the process they use to solve mathematical problems.

Choices: N SA A U D SD
Responses: 24 46% 50% 4% 0 0

Question #37  My students share explanations of the processes they use to solve mathematical problems with one another.

Choices: N SA A U D SD
Responses: 24 37% 54% 4% 4% 0
The first nine questions on the survey dealt with the demographic questions of the survey. The results of these were discussed under subjects in Chapter III.

**Using Children’s Literature During Mathematics Instruction.** Question number nine on the survey dealt with the use of children’s literature during mathematics instruction. The question was “Using children’s literature to teach mathematics is an enjoyable way for children to learn mathematics.” All twenty-four respondents were either in strong agreement or agreement with this statement.

“Using children’s literature to teach mathematics helps form a bridge for young children between the concrete and the abstract” was question number ten. Sixty-seven percent of the respondents were in strong agreement with this statement. Thirty-three percent of the responses were in agreement.

The next question, “Using children’s literature to teach mathematics can help students understand the meaningful contexts that support mathematical thinking,” was strongly agreed to by fifteen of the teachers. Seven of the teachers were in agreement with this statement while only two of the teachers were undecided.

Question number twelve had seventy-one percent of the teachers who responded in strong agreement with “Using children’s literature to teach mathematics helps students see mathematics as a natural part of everyday life.” Twenty-nine percent of the teachers who responded were in agreement with this statement.

The question, “The use of children’s literature is a practical way to introduce a new mathematical concept,” had sixteen teachers who strongly agreed while eight agreed.
The next question, "Connecting children's literature and mathematics experiences allows language and mathematics to grow naturally," was strongly agreed to by sixty-three percent of the teachers who responded. Twenty-nine percent of the teachers who responded were in agreement with this statement while eight percent were undecided.

Question number fifteen dealt with "Teaching time can be saved when interconnections between literature, mathematics, and higher order thinking skills are developed". Six teachers strongly agreed while fifteen teachers agreed. Three teachers were undecided this statement.

Question number twenty-four dealt with "Using children's literature during mathematics instruction increases motivation to learn for remedial students." Twenty-five percent of the respondents were in strong agreement while sixty-three percent were in agreement. Twelve percent of the respondents were undecided.

"I use children's literature during mathematics instruction to introduce a new concept only" was question number thirty-one. Three percent of the respondents were in agreement while fifty-nine percent were in disagreement with this statement. Twenty-nine percent of the respondents strongly disagreed with this statement.

The next question, "I use children's literature throughout the study of a mathematics concept," had four teachers respond in strong agreement while fifteen responded in agreement. Two teachers were undecided and three teachers responded in disagreement with this statement.

Question number thirty-three dealt with "I never use children's literature during mathematics instruction." Twenty-nine percent of the respondents were in disagreement while seventy-one percent were in strong disagreement.
Using Writing Activities During Mathematics Instruction. “Using writing activities to reinforce mathematics instruction will assist students in comprehending mathematics concepts” was question number sixteen. Twelve respondents were in strong agreement and ten were in agreement. One teacher was undecided and one teacher was in disagreement with this statement.

The next question dealt with “Representing mathematical thinking in forms, such as written and oral language, drawings, and so on increases a child’s avenues for understanding.” One half of the respondents were in strong agreement with this statement and one half were in agreement.

“Requiring students to write forces them to do considerable thinking thus, cementing the concepts studied in the students’ minds”, had thirty-seven percent of the responses in strong agreement and forty-two percent in agreement with this statement. Seventeen percent of the teachers were undecided while four percent were in disagreement with the statement.

Question number nineteen dealt with “Requiring students to write forces them to organize their thoughts, thus cementing the concepts studied in the students’ minds.” Thirty-three percent of the teachers were in strong agreement with this question. Forty-two percent of the teachers were in agreement while twenty-five percent were undecided on this question.

The next question, “Using writing activities during mathematics instruction increases motivation to learn for remedial students”, had less than one half of the responses in agreement with the statement. Four percent of the participants were in strong agreement while forty-two percent were in agreement. However, thirty-three percent of the
participants were undecided and twenty-one percent of the participants were in disagreement with the statement.

Question twenty-one dealt with "Using writing activities to evaluate students' understanding of mathematics concepts increases the teacher's ability to assess student achievement." Seventy-five percent of the teachers were in agreement. Twenty-five percent of teachers were undecided.

"Using writing activities to evaluate students' understanding of mathematics processes increases the teacher's ability to assess student achievement," had four respondents in strong agreement to the statement while fourteen of the respondents were in agreement. There were five respondents who were undecided and one respondent who was in disagreement with this question.

The next question dealt with, "Writing about something involves many of the thought processes mathematics teachers would like to foster in their students." Three-fourths of the participants were in agreement with this statement. Twenty-nine percent of the participants were in strong agreement while forty-six percent were in agreement. Twenty-five percent of the participants were undecided.

To the question, "My students keep a math journal," more than one half of the teachers were in disagreement with the statement. Eleven of the teachers were in disagreement while seven of the teachers were in strong disagreement. There were three teachers in agreement with this statement and three undecided teachers.

Using Communication Activities During Mathematics Instruction, "My students are asked to explain in writing the processes they use to solve mathematical problems," had forty-six percent of the respondents in agreement to this statement. Seventeen percent of
the respondents were undecided. Twenty percent of the respondents were in disagreement while seventeen percent were in strong disagreement with this statement.

Question number twenty-five dealt with “Being able to talk about a skill implies it is understood.” Eight percent of the participants were in strong agreement while sixty-eight percent were in agreement with this statement. Twelve percent of the participants were undecided as well as twelve percent of the participants were in disagreement with this statement.

The next question, “Learning activities that require students to write or speak about mathematics help the students form mathematical concepts,” had nine teachers in strong agreement while there were fourteen teachers that were in agreement with this statement. One teacher was undecided.

“Communication in and about mathematics helps to enhance understanding of the concepts” was the next question. All respondents were in agreement. Thirty-seven percent were in strong agreement which left fifty-nine percent of the respondents in agreement.

Question number twenty-eight dealt with “Communication in the classroom promotes a comfortable environment for learning.” Eighteen of the participants were in strong agreement with this statement. Six participants were in agreement.

“Using communication activities during mathematics instruction increases mathematics vocabulary, which enables students to become active questioners,” was the next question. All of the teachers were in agreement with this statement. Eleven of the teachers were in strong agreement and thirteen were in agreement.

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The next question, “Using communication activities during mathematics instruction increases mathematics vocabulary, which enables students to become active problem creators and problem solvers,” had forty-two percent of the respondents in strong agreement and fifty percent of the respondents in agreement. Eight percent of the respondents were undecided about this statement.

Question number thirty-six dealt with, “My students are asked to explain orally the process they use to solve mathematical problems”. Eleven participants were in strong agreement and twelve participants were in agreement with this statement. One participant was undecided.

The last question, “My students share explanations of the processes they use to solve mathematical problems with one another,” had thirty-seven percent of the teachers in strong agreement and fifty-four percent as agreement. Four percent of the teachers were undecided. Four percent of the teachers were in disagreement as well.

Discussion of the Results

Using Children’s Literature During Mathematics Instruction. By analyzing the survey results, the author believes that the primary grade teachers in the district surveyed believe that using children’s literature during mathematics instruction is an important instructional technique. This statement can be supported by the fact that one-hundred percent of the respondents indicated agreement that using children’s literature to teach mathematics helps form a bridge for young children between the concrete and the abstract. The research by Harsh (1987) supports the results of the survey. Harsh contends that abstract
concepts are difficult to master. Children’s literature can illustrate the concept and make it clearer for the learner.

Furthermore, one hundred percent of the respondents indicated agreement that using children’s literature to teach mathematics is enjoyable and is a practical way to introduce a new concept. Research by Smith and Wendelin (1981) and Ohanian and Nevin (1989) supports the responses from the survey. Smith and Wendelin assert that books can serve as a supplement to traditional mathematics materials. Ohanian and Nevin believe books can be a good way to model concepts in ways that can be recreated using manipulatives.

Further support comes from the fact that ninety-two percent of the respondents indicated agreement that using children’s literature to teach mathematics can help students understand the meaningful contexts that support mathematical thinking. The research by Griffith and Clyne (1991) supports the results from the survey. They contend that children can take mathematical ideas form stories and use them in their own situations.

The results mentioned support the author’s belief that the teachers surveyed believe using children’s literature is an important instructional technique.

**Using Writing Activities During Mathematics Instruction.** Results from the survey also suggest that the primary grade teachers surveyed support the idea that using writing activities during mathematics instruction is a beneficial teaching strategy. This statement is supported by the fact that ninety-two percent of the respondents agreed that using writing activities to reinforce mathematics instruction will assist students in comprehending mathematics concepts. The research by Davison and Pearce (1988) supports the results form the survey. Davison and Pearce contend that performing a
writing task requires students to reflect, analyze, and synthesize material being studied. Higher order thinking skills indicate a greater understanding.

Further support is in the fact that on hundred percent of respondents agreed that representing mathematical thinking in forms, such as written and oral language, drawing, and so on increases a child’s avenues for understanding. The research by Whitin and Gary (1992) supports the survey results. Giving students more chances to represent their ideas in different ways increases the opportunity for understanding.

Over seventy-five percent of the respondents also agreed that requiring students to write forces them to do considerable thinking and organizing of their thoughts which cements mathematical concepts studied in the students’ minds. The 1983 research by Johnson supports the survey findings. Johnson maintains that student who can write clearly about mathematical concepts understand them more clearly.

The survey results also suggest that the primary grade teachers surveyed believe using writing activities during mathematics instruction increases remedial students’ motivation to learn. The research by Brown (1991) completed in her own classroom resulted in the increased motivation and interest by her students in mathematics. This research supports the study findings.

The results mentioned support the belief that the teachers surveyed believe using writing activities during mathematics instruction is a beneficial teaching strategy.

Using Communication Activities During Mathematics Instruction. The survey results also suggest that the primary grade teachers surveyed believe that using communication activities during mathematics instruction is beneficial to students. This statement is
supported by the fact that one hundred percent of the respondents agreed that communication in and about mathematics helps to enhance understanding of the concepts. The research by Mumma (1991) supports the study findings. Mumma contends that students deepen their understanding of mathematics by expressing their ideas.

The survey findings suggest that the teachers believe that learning activities that require students to speak about mathematics help the students form mathematical concepts. Research by Cangelosi (1988), Wright and Stevens (1983), and Burton (1985) maintains that effectively embedding mathematics lessons within language arts activities requires teachers to relate the informal structures of students' language to the formal structure of mathematics.

Further support of the suggestion is that ninety-six percent of the teachers surveyed agree that they ask students to explain orally the process they use to solve mathematical problems. Research by Liedtke (1988) and Kennedy (1991) maintains that giving students the opportunity to talk is a possible way to increase the time spent on developmental tasks. Their research suggests that increasing student participation and decreasing rote practice has a positive effect on mathematics achievement.

The results mentioned support the belief that the teachers surveyed believe using communication activities during mathematics instruction is beneficial to students.

Analyzing the results of the survey, suggests that the primary teachers surveyed, believe that using language arts components during mathematics instruction enhances the learning of mathematics and is a beneficial teaching strategy to use in the classroom.
Chapter V
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Headlines in educational news today often focus on a comparison between public schools in the United States and schools in other countries. In many areas, schools in the United States rank high in standards of excellence. However, there is one area in education where it seems that the United States lags behind. This area is in mathematics instruction.

Major reforms in school mathematics are advocated in reports that call for changes in the curriculum. Changes in instruction and the classroom environment are also called for in these reports.

A primary goal of the reform movement is to give children experiences that promote the ability to solve problems. Mathematics instruction should come form the context of everyday experiences. This writer believes that the integration of the four language arts components with mathematics instruction will enhance the mathematics learning experience. Thus, mathematics instruction in the United States will compare at a higher level with schools in other countries.

The purpose of this study was to analyze the opinions of primary grade teachers toward the integration of the four components of language arts into mathematics instruction.

The information obtained that answered this problem statement was gathered from the survey. The survey was given to twenty-four primary grade teachers in a suburban school.
district. The teachers were given seven days to complete and return the survey. The return rate of the survey was high with one hundred percent of the surveys sent out being returned. The demographic questions showed that fifty-five percent of the teachers surveyed have been teaching for less than ten years. Fifty percent of the teachers surveyed have completed a master’s degree in education. Sixty-two percent of the teachers have been trained in a hands-on mathematics course.

The results indicated that the primary grade teachers in this district believe that integrating language arts with mathematics instruction is an effective teaching strategy and useful in the classroom.

Conclusions

The author has summarized the prominent conclusions reached as a result of the survey in the following paragraphs.

The author believes one of the conclusions that can be made from the results was that the primary grade teachers surveyed believe using children’s literature during mathematics instruction is beneficial to the children’s learning experience. The teachers believe using children’s literature is an enjoyable way to learn mathematics. The teachers believe using children’s literature helps students see mathematics as a natural part of everyday life. Furthermore, the teachers believe that teaching time can be saved when interconnections between literature, mathematics, and higher order thinking skills are developed.

The author concluded from the responses given in the survey that there was a belief that writing activities integrated with mathematics instruction enhances the mathematics
learning experience. Results indicated that the teachers believe that using writing activities will assist students in comprehending mathematics concepts. The teachers believe that writing activities involve many of the thought processes mathematics teachers would like to foster in their students. However, the teachers do not believe that using writing activities increases motivation to learn for remedial students.

The author concluded from the results that the teachers surveyed believe using communication activities during mathematics instruction is beneficial to mathematics learning. The teachers believe that requiring students to speak about mathematics helps the students form mathematical concepts. Furthermore, the teachers feel that communicating about mathematics helps to enhance understanding of the concepts.

Recommendations

The author recommends that primary grade teachers integrate language arts components with mathematics instruction. This teaching strategy makes the study of mathematics an exciting activity for children. Integration of the two disciplines enhances the learning experience for the child.
Integrating Language Arts and Mathematics Instruction

Please answer all of the following questions to the best of your ability. There are no right or wrong answers. I am interested in your opinions regarding the integration of language arts and mathematics.

1. What is your gender?  male _______  female_____

2. Including this year, how many years have you been teaching?
   1-5____  6-10____  11-15____  16-20____  21-25____  25+_____

3. What grade level do you presently teach? _________

4. How many years have you taught at this grade level?_________

5. What is the highest degree you hold?
   Bachelor’s______  Master’s______  Doctorate _______

6. How many students are in your classroom? _________

7. Do you consider your school setting to be:
   suburban _______ urban _______ rural _______

8. Have you been trained in Box-it, Bag-it or Math Their Way? _________

For the following statements, please circle your level of agreement/disagreement.
SA=strongly agree, A=agree, U=undecided, D=disagree, SD=strongly disagree

9. Using Children’s literature to teach mathematics is an enjoyable way for children to learn mathematics.  SA  A  U  D  SD

10. Using children’s literature to teach mathematics helps form a bridge for young children between the concrete and the abstract.  SA  A  U  D  SD

11. Using children’s literature to teach mathematics can help students understand the meaningful contexts that support mathematical thinking.  SA  A  U  D  SD
12. Using children’s literature to teach mathematics helps students see mathematics as a natural part of everyday life.

13. Children’s literature is a practical way to introduce a new mathematical concept.


15. Teaching time can be saved when interconnections between literature, mathematics, and higher order thinking skills are developed.

16. Using writing activities to reinforce mathematics instruction will assist students in comprehending mathematics concepts.

17. Representing mathematical thinking in forms, such as written and oral language, drawings, and so on increases a child’s avenues for understanding.

18. Requiring students to write forces them to do considerable thinking and organizing of their thoughts, thus cementing the concepts studied in the students’ minds.

19. Using writing activities during mathematics instruction increases motivation to learn for remedial students.

20. Using children’s literature during mathematics instruction increases motivation to learn for remedial students.
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<tr>
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<th>Using writing activities to evaluate students' understanding of mathematics concepts and processes increases the teacher's ability to assess student achievement.</th>
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<tr>
<td>21.</td>
<td>SA</td>
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<td>Writing about something involves many of the thought processes mathematics teachers would like to foster in their students.</td>
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<td>22.</td>
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<td>Being able to talk about a skill implies it is understood.</td>
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<td>Learning activities that require students to write or speak about mathematics help the students form mathematical concepts.</td>
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<td>Communication in and about mathematics helps to enhance understanding of the concepts.</td>
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<td>25.</td>
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<td>Communication in the classroom promotes a comfortable environment for learning.</td>
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<td>26.</td>
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<td>Using communication activities (speaking and listening) during mathematics instruction increases mathematics vocabulary which enables students to become active questioners, problem creators, and problem solvers.</td>
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<td>I use children's literature during mathematics instruction to introduce a new concept only.</td>
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<td>28.</td>
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<td>I use children's literature throughout the study of a mathematics concept.</td>
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<td>I never use children's literature during mathematics instruction.</td>
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<td>My students keep a mathematics journal.</td>
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References


