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ABSTRACT

The view of the researcher is that students in the upper elementary to middle school range need to increase their problem-solving skills by making logical deductions and organizing and structuring their thoughts through the use of word problems. Giving children a daily word problem challenged and introduced them to the lesson. This activity improved their math test scores and critical thinking. Active learning and thinking allow the student to better understand the various methods of solving problems. Through the integration of their background knowledge and newly learned knowledge, students should be able to apply it to similar or new situations. The hypothesis of this experiment was stated as follows: There is no difference between those students that experience traditional mathematical instruction and those who are receiving the extra word problems at the 0.05 level of significance as measured by the book tests. One of the goals of a teacher, especially a math teacher, is to help students become better problem-solvers and develop their critical thinking skills. Problem solving is not just word problems or math problems; it is a way of thinking and reasoning. Solving a problem is not just about getting the right answer; the importance of solving a problem is how that solution is reached. There are a variety of methods and strategies that can be used to solve a problem. Past knowledge and experiences, communication, a willingness to experience new things, and being open to look at things from more than one direction are all a part of the problem solving experience. These things, used in conjunction with exploration and experimentation, can enhance critical thinking and problem solving. The research study took place in a fifth grade class in an eastern Tennessee school that is strongly suburban. The researcher taught four units which included addition of whole numbers and decimals, subtraction of whole numbers and decimals, multiplication of whole numbers and decimals, and division of whole numbers and decimals. The first and third units were the control group, while the second and fourth units were the experimental groups. Each unit was two weeks long. A posttest was given at the end of each unit, testing the content of that particular unit. The results of this research showed no significant difference between the means of the posttests in the traditional group and the experimental group. The null hypothesis of this experiment stated that there would not be a difference between those students that experienced traditional mathematical instruction to those who received the extra word problems at the 0.05 level of significance as measured by the book tests. According to the results, there was a 0.081 level of significance; therefore, the researcher retained the null hypothesis. At the beginning of the experiment (during the traditional instruction), the students seemed unsure about the steps of problem solving, and they were stuck on the idea that there is only one way to solve a math problem. By the end of the experiment, especially during the units with the extra word problem at the beginning, the students were looking for different ways to solve problems, and their answers were more detailed. The students could tell another person exactly how they solved the problem, and they had developed a true understanding of why their method worked as well as one or two other methods in the class. (Contains 43 references.) (Author/ASK)

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ABSTRACT

TEACHING FIFTH GRADE MATHEMATICAL CONCEPTS: EFFECTS OF WORD PROBLEMS USED WITH TRADITIONAL METHODS

An Action Research Project
Presented to
The Department of Teacher Education
Of Johnson Bible College

In Partial Fulfillment
Of the Requirement for the Degree
Master of Arts in
Holistic Education

By
Jessica Coy
March 2001

ABSTRACT

"To teach for thinking, it's not enough to teach skills and strategies. We need to create a culture that 'enculturates' students into good thinking practices (Perkins, 1993, p.98-99)." The view of the researcher is that students in the upper elementary to middle school range need to increase their problem-solving skills: make logical deductions and organize and structure their thoughts through the use of word problems. Giving children a daily word problem challenged and introduced them to the lesson. This activity improved their math test scores and critical thinking. Active learning and thinking allow the student to better understand the various methods of solving problems. Through the integration of their background knowledge and newly learned knowledge the student should be able to apply it to similar or new situations.

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One of the goals of a teacher, especially a math teacher, is to help our students to become better problem-solvers and to develop their critical thinking skills.
Problem solving is not just word problems or math problems; it is a way of thinking and reasoning (Barb, p.536-542). Solving a problem is not just about getting the right answer. The importance of solving a problem is how the person reaches that solution. There are a variety of methods and strategies that can be used to solve a problem. Past knowledge and experiences, communication, a willingness to experience new things, and being open to look at things from more than one direction are all a part of solving a

problem. These things used in conjunction with exploration and experimentation can enhance critical thinking and problem solving (J. Moore, p. 877-878).

The research study took place in a fifth grade class in an eastern Tennessee school that is strongly suburban. The researcher taught four units, and they were addition of whole numbers and decimals, subtraction of whole numbers and decimals, multiplication of whole numbers and decimals, and division of whole numbers and decimals. The first and third units were the control group, and the second and fourth units were the experimental groups. Each unit was two weeks long. A posttest was given at the end of each unit testing the content of that particular unit.

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APPROVAL PAGE

This Action Research Project by Jessica Coy is accepted in its present form by the Department of Education at Johnson Bible College as satisfying the action research project requirements for the degree Master of Arts in Holistic Education.

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Chapter 1

INTRODUCTION

Significance of the Problem

Jean Piaget, one of the most well known cognitive learning theorists, states that there are various stages of cognitive development that every child goes through. Strong evidence that these stages exist is found in the realm of mathematics. Every child goes through Piaget's stages of cognitive development. The four stages of cognitive development, according to Piaget, are sensory-motor stage (birth-2 years of age), preoperational stage (2-7 years of age), concrete operations stage (7-11 years of age), and formal operations stage (11-16 years of age) (Singer and Revenson, p.4). The cognitive development stages are fixed and unchanging, yet children go through the stages at various rates (Singer and Revenson, p.19).

This research project focused on the third stage, which is the concrete operational stage, and it occurs between the ages of 7 to 11 years old. During this stage, children begin to classify objects correctly, conserve, use socialized language, and generally view the world with more logic (Singer and Revenson, p.40). Children have the ability to reason logically, to organize one's thoughts into coherent and complete structures, and to arrange them in sequential relationships (Pulaski, p.55). Their thinking is faster and more flexible (Pulaski, p.56). They are able to group things together, and their goals and values are more stabilized (Flavell, p.200).

Considering this third stage of cognitive development, the researcher believes that fifth graders, who are mostly in this stage, need more work and practice with organizing their thoughts improving their problem-solving abilities and solving problems more with logic than with instinct. This researcher believes that solving word problems is a good activity that gives children more practice in all of these areas.

Statement of the Problem

The view of the researcher is that students in the upper elementary to middle school range need to increase their problem-solving skills: make logical deductions and organize and structure their thoughts through the use of word problems. Active learning and thinking allow the student to better understand the various methods of solving problems. Through the integration of their background knowledge and newly learned knowledge the student should be able to apply problem solving skills to similar or new situations. Giving children a daily word problem would possibly challenge and introduce them to the lesson.

Definition of Terms

Critical Thinking- thought processes that are characterized by careful, exact evaluation and judgment.

Problem-solving- the process of devising and implementing a strategy for finding a solution or for transforming a less desirable condition into a more desirable one.

Problem-solving methods- working simpler problems, restating a problem, decomposing, or recombining a problem, drawing figures, making charts or organized lists, exploring related problems, using logical deduction, using successive approximations, using trial and error methods, and working backwards (Barb, p. 536-542).

Mathematical Traditional Instruction/Traditional Instruction- using the math curriculum of the school to teach mathematical concepts and skills.

Word Problem- a question written in paragraph or sentence form that contains a mathematical concept that needs to be considered, solved, or answered.

Limitations

This research study had several limitations. The main limitation was that the class was not randomly chosen. The sample being tested was grouped together by their mathematical ability. The fifth grade teachers determined who would be placed in each math class by the scores of the math placement test and teacher recommendations from the fourth grade teachers that the students had last year. The researcher had no input in the math placement of the students.

Another limitation was that the teacher and researcher in the experiment are the same. The researcher will be teaching the math units to the class.

A third limitation was that the school had a brand new math curriculum this year. There was the possibility of mistakes in the new curriculum. Plus, since it was new, the units must go in order according to the timeline of Knox County, and Knox County did not send the tests until the time the unit should be over.

A fourth limitation was the small size of the classroom and the lack of desks for the students. The researcher states this as a limitation because there was the possibility that the students were easily distracted by one another, being so close together.

Assumptions

The differential reading ability of the subjects did not affect the comprehension of the mathematical concepts. If they were unable to comprehend what information was provided by the word problem that would have hindered their ability to solve the problem.

The subjects were already familiar with the content. The regular classroom teacher would have taught an introductory lesson, so that the students would have seen the content in some form or another.

The researcher and the regular classroom teacher taught the mathematical lessons in the same manner. The students were used to the teaching style of the regular classroom teacher but not that of the researcher. There were no major differences in the manners of teaching between the researcher and the classroom teacher that would affect the outcomes of this action research project.

Hypothesis

There is no difference between those students that experience traditional mathematical instruction to those who are receive the extra word problems at the .05 level of significance as measured by the book tests.

Chapter 2

LITERATURE REVIEW

"All the math we really learn is to resolve problems" (Krech, p.1). We studied addition, subtraction, measurements, algebra, etc. to enable us to solve real life problems. One of the goals of a teacher, especially a math teacher, is to help the students to become better problem-solvers and to develop their critical thinking skills. One article suggests giving children "tune-ups," which are daily questions that they spend 5 to 15 minutes solving (Krech, p.1). After the children work on it individually, the class comes together to discuss the answer and all of the possible methods of getting that answer (Krech, p.1).

Critical Thinking, and Cognition

The ability to think critically and the cognitive developmental level of the child affect problem solving. Using Piaget's theoretical stages of cognitive development, the teacher will be enabled to discover the level at which any one student might have attained. This estimate of the extent of development will enable the teacher to know which problems would challenge the student. Shifting the problems to higher or lower levels of development will ensure more success in problem solving (Pulaski, p.55-56). Education today deals not only with age appropriate materials and teaching but also developmentally appropriate practices (O'Brien, p. 100).

Other than Piaget's stages of cognitive development, there are also studies that have been done on cognition by Dewey, Sternberg, Waldrop, Jensen, Lave and Wenger, Rumelhart and Ortony, Marshall, Kant, Bereiter, Perkins, Brown, Gardner, and many others (Moore, B., p. 161-171). Dewey and Sternberg studied the function of intelligence, mental processes, and mental adaptation. Dewey valued learning as being participatory within society, but at the same time recognizing the individual essence and vitality of a learner's cognition. A 1921 consensus described a then accepted definition of intelligence "as mental adaptation to changing environmental stimuli . . . sometimes called the capacity to learn." Both the cognitive and situative theories attempt to take a portion of that definition and declare it to be whole and complete. Cognitive theory tends to focus on individual mental processes. Situative theory is more relationship-oriented, deductive, and genetic. It is the experience of knowledge, instead of the acquisition of knowledge. Sternberg identifies three main parts of intelligence within the individual: social, occupational, and cultural environments (Moore, B., p.161-171).

Waldrop and Jensen studied how the brain processes information (Moore, B., p.161-171). They both follow the view that learning is constructive and builds itself on a basis of relationships. Lave, Wenger, Rumelhart, Ortony, Kant, and Marshall studied schema (Moore, B., p.161-171). Schemata are mental representations of experience that are used to increase the efficiency of interpreting related situations. It is a network of relationships. Lave and Wenger associate the definitions of schema with the acquisition of ability rather than the acquisition of structure. Kant pointed out that "the mind is no mere tabula rasa, the inactive victim of sensation, but a positive agent, selecting and reconstruction experience as experience arrives (Moore, B.2, p.161-171)." People solve problems, make decisions, and build their knowledge according to what they have experienced and learned. They integrate their background knowledge with their newly learned knowledge. With each new experience, a person becomes more knowledgeable and more informed about the world around him.

Bereiter's research focused on the transfer of learning, and Perkins, Brown, and Schoenfeld studied metacognition. Bereiter claimed that the transfer of learning is dependent upon the deepest and most thorough understanding. That deep understanding needs to be so completely incorporated in our perception and comprehension that a person does not have to "remember" but will experience it automatically. Perkins says that learning involves such metacognitive faculties as planning, monitoring, evaluating, anticipating, and the regulation and management of cognitive processes. Brown focused on knowing when, where, and how to remember, including such things as internally cued mnemonics. Schoenfeld began his studies on the basis of common sense (Moore, B., p.161-171).

Gardner focused on multiple intelligences, which showed the different ways a person could learn. Gardner remarked that he "disagreed with the traditional view, which places abilities in the head and stipulates that certain skills and performances necessarily follow from these abilities; yet he recognizes that individuals have the potential to use certain skills or intelligences (Moore, B., p. 161-171)." There is a growing awareness of the relationship between critical thinking, cognition, and learning styles (Gadzella, p. 1248-1250). Overall, there is shift in thinking from plugging the learner into knowledge to more holistic and egalitarian experiences of mind as the full experience of being "individual, learner, teacher, and partner" in the creation of knowledge. (Moore, B., p. 161-171).

Teaching children by using various instructional methods and strategies can increase and build upon a child's capacity for mathematical thinking and reasoning (Mevarech, p. 195). One cognitive learning program developed by David Weikart advocates that children should be actively involved in their learning. Children should first solve problems using concrete objects and ideas. From there they can move onto solving problems with more abstract symbols and ideas (Weikart, p. 42). For a child to solve a problem, they have to make reasonable and logical deductions from the information given to them about the problem and from their own background knowledge (Singer and Revenson, p 40). Children need to be able to rearrange the information, be flexible in their thinking, organize their thoughts into complete and coherent ideas, and to understand the concept of sequence (Pulaski, p.55).

D'Arcangelo interviewed five educators and researchers who are known for their research on the brain. The educators and researchers were Diamond, Wolfe, Sylwester, Caine, and Jensen (D'Arcangelo , p.20-25). According to these researchers, memorization is important to solving problems and making decisions. It is never too late to increase a child's critical thinking or cognitive skills. The brain's capacity for learning and change is limitless; contrary to the old saying "an old dog can't learn new tricks." However the person has to be willing to seek new experiences and opportunities for learning and growing. Children should be taught to be life long learners and excellent critical thinkers (D'Arcangelo, p.20-25).

Critical thinking skills allow children to think for themselves and to find the answers on their own. Children learn to question what is around them and to learn through that questioning. Students often need to resort to the use of trial and error, along with many other strategies. Through the use of critical thinking in solving math problems or word problems, children are able to apply those problem-solving skills or methods to real life problems and other situations (Moore, B., p. 161-171).

There are seven strategies that encourage neural branching or extend a person's thinking. One is hypothetical thinking, and basically this is trying to answer "what if" type questions. Another strategy is reversal. A person switches the information around and looks at if from another angle or perspective. The third strategy is application of different symbol systems. This is when a person tries to represent the problem through a picture, a story, a chart, a graph, etc. Analogy is the fourth strategy, where a person looks for relationships or comparisons with other things. Analysis of point of view is the fifth strategy. This means that a person needs to sometimes evaluate and go beyond his or her own mind-set. Completion is the sixth strategy. People have the natural urge to try to complete something. For example, when they see a picture with part of it missing, then they want to fix it. The final strategy is web analysis. This is brainstorming, webbing, listing, or mind-mapping. All of these strategies promote divergent or critical thinking. In addition, all of these strategies can be used as various methods of problem solving (Cardellichio, p. 33-36).

Education is in a "cognitive revolution," and some say it has been for a few decades now. There is a trend towards discovery learning, active learning, exploration, creative problem solving, and constructivism. It is believed that children should be active participants in their education so that not only learning, but understanding as well, should take place. Children should be taught to think and make decisions. School should be a place that promotes individuality, awareness, thinking, understanding, and creativity (Brown, p. 327-330). "Concepts and ideas initiated by students are explored through sensory stimulation, creative problem solving, and reflection (Eriksson, p. 21)."

Creating a culture and environment that fosters thinking is a major concern in education today. Teaching is no longer just rote memorization and pencil and paper assignments. Thinking about the facts rather than just memorizing them helps students to learn and understand those facts. Thinking about information creates a web of connections in a person's mind and links all information (old and new) together (Perkins, 1993, p. 84-85). Exemplars, interactions, and explanations are all components of a culture that induces thinking dispositions. "To teach for thinking, it's not enough to teach skills and strategies. We need to create a culture that 'enculturates' students into good thinking practices (Perkins, 1993, p.98-99)."

Misconceptions of Critical Thinking

There are often misconceptions in regard to critical thinking. It is often conceptualized in terms of skills, processes, procedures, and practice. When thinking of critical thinking as a skill, it separates critical thinking from knowledge, understanding, and attitudes (Bailin, p.270-271). Critical thinking is more than a process as well. It integrates all of the mental processes together (Bailin, p.273-276). We teach students to notice fallacies, we motivate students to make valid arguments and be on the lookout for invalid ones, and we teach students to orient themselves where certain kinds of receptions are sought (Bailin, p.275). Critical thinking is more than a step-by-step process or procedure. Although heuristics are useful in learning critical thinking, it is not the central feature of critical thinking (Bailin, p.278). Since critical thinking is not solely a skill, a process, or a procedure, then it cannot be developed through mere practice or repetition. Knowledge needs to be applied to a variety of contexts, and the student needs to reflect upon past problem-solving attempts. Knowledge is arranged and rearranged by the student in various contexts (Bailin, p.280-282).

Problem-Solving

"Understanding the problem, which leads to discovering the equation, is the focus of problem solving" (Barb, p.536). Polya, in 1957, looked at problem solving as "problem doing" (Barb, p. 536-542).. He said there are various strategies that help people to understand problems better. The strategies are simpler problems, restating a problem, decomposing or recombining a problem, drawing figures, making charts or organized lists, exploring related problems, using logical deduction, using successive approximations, using guess-and-check methods, and working backward (Barb, p. 536-542).

With the trends in education leaning towards more problem solving and critical thinking skills, there are a variety of new models out there that foster problem solving and thinking skills. Isaksen and Parnes proposed another creative problem solving model. It has six steps and deals with the knowledge, attitudes, and behavior regarding creative problem solving and creative thinking skills (Isaksen, p. 1-29).

Solving a problem is not just about getting the right answer. The importance of solving a problem is how the person reaches that solution. There are a variety of methods and strategies that can be used to solve a problem. Past knowledge and experiences, communication, a willingness to experience new things, and being open to look at things from more than one direction are all a part of solving a problem. These things used in conjunction with exploration and experimentation can enhance critical thinking and problem solving (J. Moore, p. 877-878). People use strategies that they have tried and that have worked for them. When motivated or challenged, a person will try anything to find the solution. The more time and effort a person invests in the problem, then the more willing and perseverant they are at trying to solve it.

Pajares and Miller conducted a study on the relationship between a student's confidence and their problem solving ability. Gender was also a factor in their study. When students are active in their learning, confident in their problem solving skills, and think through the information, then they are able to work harder and longer. They are also able to solve more problems and make more confident decisions (Pajares and Miller, p. 213-228).

Curriculum has been changing in the past couple decades, especially mathematics. Problem solving is not just word problems or math problems; it is a way of thinking and reasoning. The National Council of Teachers of Mathematics (NCTM) now emphasizes the problem solving in their Curriculum and Evaluation Standards for School Mathematics (Barb, p.536-542). The standards state that children in grades 3-5 should be able to build new mathematical knowledge through problem solving; solve problems that arise in mathematics and in other contexts; apply and adapt a variety of appropriate strategies to solve problems; monitor and reflect on the process of mathematical problem solving (NCTM, p. 182).

> A problem-centered approach to teaching mathematics uses interesting and well-selected problems to launch mathematical lessons and engage students. In this way, new ideas, techniques, and mathematical relationships emerge and become the focus of discussion. Good problems can inspire the exploration of important mathematical ideas, nurture persistence, and reinforce the need to understand and use various strategies, mathematical properties, and relationships (NCTM, p.182).

Word Problems

If one would look at today's mathematical curriculum, they would see more and more word problems and less and less computational problems (McIntosh, p.26). In fact the current Silver Burdett Ginn Math curriculum includes a problem of the day for each lesson. In grades 5-8, according to the Standards, there is an increased emphasis on word problems (McIntosh, p.26). The Standards want students to focus more on pursuing open-ended problems, and extended problem-solving projects, investigating and formulating questions from problem situations, connecting mathematics to other subjects and to the world outside the classroom, and applying mathematics (McIntosh, p. 27).

Open-ended questions are a big part of teaching math when using word problems. They reveal the student's knowledge. They allow students to communicate their train of thought and methods. Open-ended questions increase the students' understanding. The teacher can see the level of the student's sense of number, numerical relationships, and operations (Chappell, p. 470-474).

Word problems combine the areas of reading, logic, and mathematics. Several books and programs are used to incorporate word problems into their curriculum or teaching. One such program is called "Apples and Oranges." The underlying theme of this program is that both reading skills and analytic proficiency are essential to examining the world (Stephens, p.754). Children would be more interested in solving math problems are set in the context of a story rather than just doing a list of math problems (Stephens, p. 754). There is also the possibility that the story would enhance their understanding of the problem-solving skills involved.

Adamovic and Hedden developed a model that shows that the use of word problems develops problem solving skills. Also they found that word problems lowers students' frustration levels and created a positive environment for problem solving (Adamovic and Hedden, p. 20-23). Word problems make problem solving more realistic and applicable to the students' lives. Murphy writes math books for children with the view that children are not taught math in the way that they experience it. He feels that math should be presented visually, and that math should be relevant to the students' lives. Even though Murphy focuses on visual aids when he writes his books, he claims that all types of learners can benefit from his approach to math, even across grade and ability levels (Elliot, p. 42-44).

Teaching using word problems is more than just getting the right answer from the students. The methods the students use to get their answers are just as important and should be emphasized. One can learn a lot from a wrong answer (Manning, p. 85). Also it is important to see if students can generate their own word problems (Chappell and Thompson, p. 471).

Another part of solving word problems that may be often overlooked is common sense and teachable moments. Saul is worried that the Standards may abandon common sense (Saul, p.182). He feels that through teachable moments students have ownership of their learning (Saul, p. 183). There is a time and place for all kinds of teaching (Saul, p. 183). He is right, and the trends in education today are moving more towards learner-centered teaching and individual learning styles. Teachers should feel free to use a variety of techniques and styles to teach (Saul, p. 183).

Reading Comprehension in Math

"Word problems are often considered to be the most challenging problems students have to solve in mathematics education" (Bernardo, p.149). The most difficult aspect for students is to find the mathematical problem structure that is embedded in the text (Bernardo, p. 149). Their proficiency in language and their reading skills could be a stumbling block for them in solving word problems (Bernardo, p.149-150). Abstract and/or ambiguous language could lose the students (Bernardo, p. 153). A student's inability to solve a word problem may have more to do with their reading and language skills than their mathematical skills.

If a child cannot read, then they will have a hard time solving word problems. Teachers need to instruct their students in how to use and involve, logic, natural thought, and language and verbal skills when doing math (Fuentes, p. 81). Learning to read word problems are different than learning how to read stories or poems. Mathematical concepts and relationships are often hidden, assumed, or implied (Fuentes, p. 81).

When students say that they are having a hard time solving word problems often have one of the following three problems. The first one is that they cannot decide what information in the problem is important and what is not. The second problem is students cannot determine which information is helpful and which is put there as distracters. The third problem is students cannot figure out how to compute the solution once they know what the problem is (McIntosh, p.28). Students have semantic, syntactic, contextual, and structural difficulties when solving word problems (McIntosh, p.29). Students need to be taught how to look at the literal, interpretive, and applied aspects of a word problem (McIntosh, p. 29).

Children basically have to learn a new language, the language of mathematics. In teaching them to learn the language of mathematics, a teacher should use pictures and sight words (Elliot, p.6). In reading, students are taught basic vocabulary, and math should be taught the same way. Students need to be taught a list of basic math words (Elliott, p. 6). The language of mathematics involves the science of numbers and abstract thinking (Manning, p.85-86). And the words in mathematics have precise meanings. In the English language, words vary in meanings and the meanings are relative in nature. When working with and solving word problem, the students are required to know both languages (Manning, p. 85-86).

Understanding and Insight

When we teach students to think creatively on how to solve problems, then we teach not only for the development of those skills but for understanding as well. If the students truly understand how to think for themselves and how to solve problems, then they will be able to apply problem-solving skills to life in many situations.

One of the current goals in the mathematical realm of teaching is to teach for understanding performances and insight. The word *insight* means a particularly deep understanding (Perkins, 1994, p.1). Understanding is more a matter of what people can do than something they have, and it involves action more than possession (Perkins, 1994, p.3). Understanding goes beyond stored information, and it deals with what the person can do. An understanding performance consists of an explanation in the learner's own words, fresh and original analogies, generalizations, the ability to apply it to other situations, and so on (Perkins, 1994, p. 2).

To create thoughtful learning that leads to understanding performances, there are three important elements to be considered. The first one is constructing curriculum out of generative topics that engage students deeply and encourage connection making. The second one is deploying ways of teaching for understanding that help students to build understanding performances. To emphasize assessment in context is the third element (Perkins, 1994, p.3). During all of this the teacher's role should be supportive and more like that of a coach. They should use models and open-ended questions to guide the students through learning (Perkins, 1994, p.3-4).

Teaching for transfer is another goal in the realm of mathematics today. Transfer goes beyond regular learning, because the learner has to be able to apply the skill or knowledge in a new and different context (Perkins, 1988, p.22). Creative and critical thinking is another reason to teach for transfer. It is important for students to develop their creative and critical thinking skills (Perkins, 1988, p. 23). Two techniques used to teach for transfer are bridging and hugging. Hugging teaches in order to better the conditions for low road transfer (Perkins, 1988, p. 28). Low road transfer can be described as the automatic triggering of well-practiced routines in circumstances that is similar to the original learning context (Perkins, 1988, p.25). Bridging teaches to better the conditions for the high road transfer (Perkins, 1988, p. 28). The high road transfer depends on deliberate thought out abstraction of the skill or knowledge from one context to another (Perkins, 1988, p.25).

Teaching for understanding takes time, because it takes students time to actively argue, inquire, and articulate their understanding (Unger, p.9). They need time to work with the information and build their thinking. Unger conducted an experiment and research on teaching for understanding. Unger's team's teaching was within the Teaching for Understanding framework, developed by the Harvard Graduate School of Education (Unger, p.8).

Unger, Simmons, and Perkins all agree that assessment should be a part of the teaching and learning for understanding and that it should be an ongoing process. Teachers have to seek evidence of understanding in the performances of the students (Simmons, p.22). Ongoing assessment uses things like exhibitions, student explanations, students' writings, or any performance that is thought-demanding (Simmons, p.22). Teacher guidance and feedback, peer critiques, and self-evaluations help the students to build on their knowledge and understanding. They are also able to demonstrate and consolidate their knowledge and understanding (Simmons, p.23). Students cannot passively listen to the feedback, however. They must reflect on it and use it to improve their work (Simmons, p.23). Students and teachers should collaborate to come up with criteria of the work being done (Simmons, p.23).

Problem Solving in a Social Context

Problem solving can be done both individually or in a cooperative group. However the methods and answers are all discussed in a group. These discussions allow to students to express their ideas in a safe and open environment. There is really no one right answer. Problem solving skills and critical thinking enable students to make better and more informed decisions in all areas of their lives. Word problems are usually based around real life situations.

Problem solving skills, which aids decision-making, has cut down on suicides, depression, and social isolation (Sharma, Petosa, and Heaney, p.465). Problem solving skills decreases emotional stressors and increases positive mental health (Sharma, Petosa, and Heaney, p.465). Students are able to recognize the stressors and use problem solving to work through them. Students build self-confidence and learn to work through real life problem (Sharma, Petosa, and Heaney, p. 466). The theory is that problem solving skills enable people to be more objective about the structure of the world and the structure of personality.

Word problems often relate math to real life situations, things students are familiar with and can relate to. Students are engaged in their learning and have a feeling of ownership of their learning. Students are able to make connections among their background knowledge and new knowledge. They are able to express their ideas and methods. They can communicate with others to improve their work and/or knowledge. Students can apply what they have learned to other contexts (Perrone, p.11-1).

Learner-Centered Teaching

There are a variety of learning styles, and in a classroom you will find all kinds of learners. To develop understanding and active learners and life long learners, teachers are finding that they need to adapt their teaching to the variety of individual needs found within their classrooms (Sparkes, p.183-188). Understanding, learning styles, critical thinking, discovery learning, etc. are all becoming key words and phrases in today's educational trends (Sparkes, p.183-188). Some students are "holists" in that they look at things as a whole, but other students are "serialists" in that they like to follow step-by-step procedures (Sparkes, p. 183-188). Both types of students have a right to learn, and so teachers should teach to both types of students. The same philosophy applies to visual learners, audio learners, and kinesthetic learners.

Problem-solving and critical thinking involve self-reflection and feedback. Intrapersonal intelligence is important to intellectual development, mental as well as emotional. Intrapersonal intelligence is the ability to self-reflect, have an awareness on one's strengths/weaknesses, feelings and thought processes that deal with one's knowledge of self. Self-awareness, constructivism, and self-regulation are all apart of intellectual development in a society that values individuality and the development of personal identity. Defining intelligence has been difficult and controversial. However the most recent trend in our country has been "to include aspects of thinking and learning that emphasizes its highly personalized and self-reflective nature" (Shepard, Fasko, and Osborne, p.633-642).

Summary Statement

The trends in education today lean toward more problem solving, teaching for understanding, holistic education, child-centered learning, and constructivism. The learner becomes a part of the learning process. Problem solving is not just about "doing" the problem or finding the "right answer." It is about teaching people how to think, how to make decisions, and true understanding. Problem solving is not just about the end result. It is also about the "how" and the "why." Critical thinking leads to problem solving which leads to decision-making. All of these things are needed for a person to survive throughout life. People need to be able to sort through information, and they need to be able to make well-informed decisions. If we teach critical thinking and problem solving through math, as well as integrating other subjects, then we have given them life long skills that they can use to solve real life problems.

Chapter 3

METHOD

Selection of Subjects

The research study took place in a fifth grade class in an eastern Tennessee school that is strongly suburban with 16% of the students receiving free lunches. There were 750 students enrolled in the school. There were 28 subjects in the sample. The 28 subjects experienced both the traditional instruction and the experimental instruction. They were not randomly selected as stated in the limitations, but instead they were placed in this group based on their math placement test that they took at the end of their fourth grade year. There were four levels of ability in the 5th grade: low, average, high average, and high. The group in the researcher's classroom was the high-average class.

Testing Procedures

The researcher taught four units: the first unit was addition of whole numbers and decimals; the second unit was subtraction of whole numbers and decimals; the third unit was multiplication of whole numbers and decimals; and the fourth unit was division of whole numbers and decimals. The first and third units were the control group, and the second and fourth units were the experimental groups. Each unit was two weeks long. A posttest was given at the end of each unit testing the content of that particular unit. The researcher compared the combined scores of the traditional units of instruction with the combined scores of the experimental units of instruction.

The first unit of math covered addition of whole numbers and decimals. The class met together for an hour each day five days a week (Monday-Friday). In that unit, they received traditional mathematical instruction for every lesson. The lessons were taken directly from the book and taught in the normal style of the teacher. At the end of the unit they were given a posttest. The third unit was taught in the exact same way, except that the third unit covered multiplication of whole numbers and decimals. At the end of the third unit, another posttest was given.

During the second unit, the class went over subtraction of whole numbers and decimals. Since the topics are related, there may have been a slight review of addition as they learned subtraction. Each day they were given one word problem at the beginning of class to solve. The word problems were solved individually within the first 5 minutes of class. Then for another 5-10 minutes, the class discussed their answers and various methods together. Then the rest of the time the experimental group received traditional mathematical instruction. The word problem introduced the mathematical concept taught that day. They were given a posttest at the end of this unit.

The fourth unit of study covered division of whole numbers and decimals, and it was taught in the same manner as the second unit. As with addition and subtraction, multiplication and division build on another, so there may have been a slight review of addition, subtraction, and multiplication in the third and fourth unit.

The only difference between the instructions of both groups was the daily word problems given in the experimental units.

Time on Task

The research study consisted of four units, and each unit lasted approximately two weeks. Every day, Monday-Friday, the students had math for an hour in the mornings. During the experimental unit, the first 15 minutes of math, the students worked on one or two word problems. The next 45 minutes consisted of traditional instruction and class work time.

Statistical Analysis

The researcher combined the scores for addition and multiplication into a single score for each student receiving traditional instruction. The researcher also combined the scores for subtraction and division into a single score for each student receiving experimental instruction. The researcher compared the 28 traditional scores with the 28 experimental scores using a t-test.

Chapter 4

RESULTS

Results

The results of this research showed no significant difference between the means of the posttests in the traditional group and experimental group. The null hypothesis of this experiment stated that there would not be a difference between those students that experienced traditional mathematical instruction to those who received the extra word problems at the .05 level of significance as measured by the book tests. According to the following statistics, there was a .081 level of significance, and therefore in this experiment the researcher retained the null hypothesis.

Paired samples of the raw scores of the posttests were used to compare the means of the traditional group and the experimental group. The following statistics were the results (see TABLE 1).

TABLE 1
A Comparison of the Mean Scores of Traditional and Experimental Conditions

Groups	N	Mean	Mean Difference	Std. Error of Means	T ratio	Sig. 2-tailed
Traditional	28	30.89	.68	.37	1.811	.081
Experimental	28	30.21				

Not Significant at .05 level

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Twenty-eight fifth grade students from a suburban school in Eastern Tennessee participated in this study. They were taught four units of math, and each unit dealt with whole numbers and decimals. The units were the addition of whole numbers and decimals, subtraction of whole numbers and decimals, multiplication of whole numbers and decimals, and division of whole numbers and decimals. Each teaching session with the students lasted an hour every day for two weeks. At the end of each of the four units, a posttest was given. The first and third units were addition and multiplication, and they were the traditional scores. The second and fourth units were subtraction and division, which comprised the experimental scores.

The difference between the instruction of the traditional group and the experimental group was that the experimental group had a word problem that they had to solve and discuss during the first 15 minutes of class. The emphasis of the discussion was the methods of solving the problem as well as the answer to the problem. The null hypothesis stated that there would be "no difference between those students that experience traditional mathematical instruction to those who are receiving the extra word problems at the .05 level of significance as measured by the book tests."

Conclusions

The results of this experimental research on critical thinking and problem solving showed that there was a level of .081 significance between the scores of the traditional group and the control group. Therefore the researcher retained the null hypothesis.

In contrast to the results of the test scores, the researcher observed differences in the students' problem solving abilities. At the beginning of the experiment (during the traditional instruction) the students seemed unsure about the steps of problem solving, and they were stuck with the idea that there is only one way to solve a math problem. By the end of the experiment, especially during the units with the extra word problem at the beginning, the students were looking for different ways to solve problems, and their answers were more detailed. The students could tell another person exactly how they got the problem, and they had developed a true understanding of why their method worked as well as one or two other methods in the class.

Recommendations

The researcher recommends that this experiment be tried again with some changes. One change would be to have a larger sample size and a more random sample. Another change would be to have two separate groups of students (traditional and experimental) and teach them the exact same unit.

Another suggestion would be that the students in the experimental phase should keep a journal of their daily word problems and solutions. That way they can look back on their progress and see how their critical thinking skills and problem-solving skills have improved.

The tests may need to be altered slightly in order to better assess critical thinking and problem-solving skills. In order to do this, there would need to be more word problems or logic problems on the test. The units in the school curriculum are not specifically geared towards teaching thinking, but they are geared towards teaching mathematical skills. There is nothing wrong with that, but students need to learn how to think for themselves. In addition, the steps of problem solving and their critical thinking skills can be used to solve more problems in life than just mathematical equations.

BIBLIOGRAPHY

BIBLIOGRAPHY

BOOKS

Flavell, J. (1963). The Developmental Psychology of Jean Piaget. New Jersey: D. Van Nostrand Company, Inc.

Friedman, S., Klivington, K., & Peterson, R. (1986). The Brain, Cognition, and Education. United Kingdom: Academic Press.

Ginsburg, H. & Opper, S. (1988). Piaget's Theory of Intellectual Development. New Jersey: Prentice-Hall, Inc.

Lowery, L. (1989). Thinking and Learning Matching Developmental Stages with Curriculum. California: Midwest Publications.

Murray, F., Ph.D. (1979). The Impact of Piagetian Theory on Education, Philosophy, Psychiatry, and Psychology. Maryland: University Park Press.

National Council of Teachers of Mathematics (NCTM) (2000). Principles and Standards for School Mathematics. Virginia: The National Council of Teachers of Mathematics, Inc.

Pressley, M. & Woloshyn, V. (1995). Cognitive Strategy Instruction that Really Improves Children's Academic Performance. Michigan: Brookline Books.

Pulaski, M.A.S., Ph.D. (1980). Understanding Piaget: An Introduction to Children's Cognitive Development. New York: Harper & Row, Publishers.

Singer, D.G. & Revenson, T.A. (1996). A Piaget Primer: How A Child Thinks. USA: Penguin Books USA, Inc.

PERIODICALS

Adamovic, C. & Hedden, C. (1997). Problem-solving Skills. The Science Teacher, 64(6), 20-23.

Alexander, M. (1999). The Art of Teaching Students to Think Critically. The Chronicle of Higher Education, 45(48).

Bainlin, S., Case, R., Coombs, J., & Daniels, L. (1999). Common Misconceptions of Critical Thinking. Journal of Curriculum Studies, 31(3), 269-302.

Barb, C. & Quinn, A. (1997). Problem Solving Does Not Have to be a Problem. The Mathematics Teacher, 90(7), 536-542.

Bernardo, A. (1999). Overcoming Obstacles in Understanding and Solving Word Problems in Mathematics. Educational Psychology, 19(2), 149-163.

Brown, R. (1999). Middle School Social Studies and the Cognitive Revolution. The Clearing House, 72(6), 327-330.

Cardellichio, T. &Field, W. (1997). Seven Strategies That Encourage Neural Branching. Educational Leadership, 54(6), 33-36.

Chappell, M. & Thompson, D. (1999). Modifying Our Questions to Assess Students' Thinking. Mathematics Teaching in the Middle School, 4(7), 470-474.

D'Arcangelo, M. (1998). The Brains Behind the Brain. Educational Leadership, 56(3), 20-25.

Elliott, R. & Zhang, Q. (1998). Interference in Learning Context-Dependent Words. Educational Psychology, 18(1), 5-25.

Fuentes, P. (1998). Reading Comprehension in Mathematics. The Clearing House, 72(2), 81-88.

Gadzella, B. (1998). Relation Between Measures of Critical Thinking and Learning Styles. Psychological Reports, 83(3), 1248-1250.

Krech, B. (1999). Make Time for Tune-Ups. Instructor, 108(6), 11-12.

Manning, M. (1999). Building Reading Skills in Math. Teaching Pre K-8, 29(7), 85-86.

McIntosh, M. (1997). Guide Students to Better Comprehension of Word Problems. The Clearing House, 71(1), 26-32.

Mevarech, Z. (1999). Effects of Metacognitive Training Embedded in Cooperative Settings on Mathematical Problem Solving. Journal of Educational Research, 92(4), 195-205.

Moore, B. (1998). Situated Cognition Versus Traditional Cognitive Theories of Learning. Education, 119(1), 161-171.

2. Moore, B. (1998). Situated Cognition Versus Traditional Cognitive Theories of Learning. Education, 119(1), 161-171, citing Durant, W. (1926/1953). The story of philosophy. New York: Pocket Books.

Moore, J. (1999). Getting an Answer Right. Journal of Chemical Education, 76(7), 877-879.

Pajares, F. & Miller, D. (1997). Mathematics Self-Efficacy and Mathematical Problem Solving: Implications of Using Different Forms of Assessment. The Journal of Experimental Education, 65(3), 213-228.

Perkins, D. (1993). Creating a Culture of Thinking. Educational Leadership, 98-99.

Perkins, D. & Salomon, D. (1988). Teaching for Transfer. Educational Leadership, 22-32.

Perkins, D. (1994). Educating for Insight. Educational Leadership, 1-5.

Perkins, D. (1993). Thinking-Centered Learning. Educational Leadership, 84-85.

Perrone, V. (1994). How to Engage Students in Learning. Educational Leadership, 11-13.

Saul, M. (1997). Common Sense: The Most Important Standard. The Mathematics Teacher, 90(3), 182-184.

Sharma, M., Petosa, R., & Heaney, C. (1999). Evaluation of a Brief Intervention Based on Social Cognitive Theory to Develop Problem-Solving Skills Among Sixth Grade Children. Health Education and Behavior, 26(4), 465-473.

Shepard, R., Fasko, D., & Osborne, F. (1999). Intrapersonal Intelligence: Affective Factors in Thinking. Education, 119(4), 633-642.

Simmons, R. (1994). The Horse Before the Cart: Assessing for Understanding. Educational Leadership, 22-23.

Sparkes, J. (1999). Learning-centered Teaching. European Journal of Engineering Education, 24(2), 183-188.

Stephens, G. (1997). Apples and Oranges: Word Problems From Great Books. The Mathematics Teacher, 90(9), 754.

Unger, C. (1994). What Teaching for Understanding Looks Like. Educational Leadership, 8-10.

ERIC DOCUMENTS

Eriksson, G. (1984). Developing Creative Thinking Through an Integrated Arts Programme for Talented Children. Harvard University International Conference on Thinking. (ERIC Document Reproduction Service No. ED260981)

Isaksen, S. & Parnes, S. (1985). Curriculum Planning for Creative Thinking and Problem Solving. Journal of Creative Behavior, 19(1), 1-29. (ERIC Document Reproduction Service No. EJ319929)

O'Brien, L. (1997). Turning My World Upside Down: How I Learned to Question Developmentally Appropriate Practice. (Report No. ISSN-0009-4056). Childhood Education, 73(2), 100-102. (ERIC Document Reproduction Service No. EJ536372)

APPENDICES

KNOX COUNTY SCHOOLS
ANDREW JOHNSON BUILDING

Dr. Charles Q. Lindsey, Superintendent

October 7, 1999

Ms. Jessica Coy
Box #192
Johnson Bible College
Knoxville, Tennessee 37998

Dear Ms. Coy:

You are granted permission to contact appropriate building-level administrators concerning the conduct of your proposed research study entitled, "Teaching Fifth Grade Mathematical Concepts: Effects of Word Problems Used with Traditional Methods." In the Knox County schools final approval of any research study is contingent upon acceptance by the principal(s) at the site(s) where the study will be conducted.

In all research studies names of individuals, groups, or schools may not appear in the text of the study unless *specific* permission has been granted through this office. The principal researcher is required to furnish this office with one copy of the completed research document.

Good luck with your study. Do not hesitate to contact me if you need further assistance or clarification.

Yours truly,

Samuel E. Bratton, Jr.

Samuel E. Bratton, Jr., Ed.D.
Coordinator of Research and Evaluation
Phone: (423) 594-1740
Fax: (423) 594-1709

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Project No. 010

November 3, 1999

Dear Parents,

This year I am doing a year-long internship in [redacted] 5th grade classroom, and I have the pleasure of working with your student in [redacted] math class. As part of my internship, I am required to do a research project, and I have chosen [redacted] math class as the group that I will use to conduct my research.

As for the research that I will be conducting, the topic is problem solving, which is why the math class is a perfect group to work with. My belief is that if students are taught problem solving skills and given extra practice with word problems than their math skills will improve. The focus of the research is on problem solving skills and the use of word problems.

Every student in the math class will receive the same amount of instruction and work, and the project will span over four units of study. The units of study are addition, subtraction, multiplication, and division of whole numbers and decimals. The first and third units of study (addition and multiplication) will not be taught any differently, except that I will be doing the teaching instead of [redacted] During the second and fourth units of study, they all will receive normal instruction as well. The change will be that the students will begin each math class working individually on a word or logic problem. Then we will not only discuss the answers, but we will also discuss the various methods and strategies that the students used to solve or try to solve these problems.

I would really appreciate your help with my research project by allowing your student to participate. Word problems and problem solving skills are a very important part of learning, and they are a major concern for this age group. Below is a place for you to sign giving your permission for you child to participate in my research project. Please sign this and return this to [redacted] or I ASAP. If you have any questions, comments, or concerns or if you simply would like to know more about the project, please feel free to call me at the school or at home. My home phone number is [redacted]

Thank you,

Researcher: ______________________________

Teacher: ______________________________

Principal: ______________________________

___Yes, I will allow ______________________________ to participate in your research project.

___No, I will not allow ______________________________ to participate in your research project.

Parent/Guardian Signature: ______________________________
Date: ____________________

Questions/Comments:

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