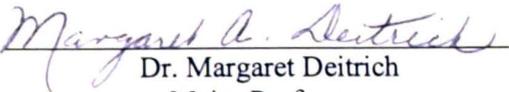


**EFFECTS OF DIRECT INSTRUCTION OF CRITICAL THINKING
SKILLS ON AT-RISK SECOND GRADE STUDENTS READING
COMPREHENSION**

BARBARA FITCH

To the Graduate Council:

I am submitting herewith a Field Study written by Barbara Fitch entitled "The Effects of Direct Instruction on Critical Thinking Skills on At-Risk Second Grade Students Reading Comprehension." I have examined the final copy of this paper for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Education Specialist, with a major in Elementary Education.

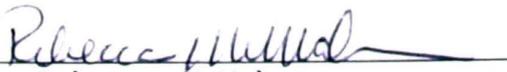


Dr. Margaret Deitrich
Major Professor

We have read this field study
and recommend its acceptance:

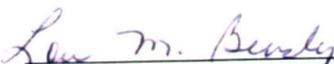


Dr. Ann Harris
Second Committee Member



Dr. Rebecca McMahan
Third Committee Member

Accepted for the Graduate and
Research Council



Dean of the Graduate School

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for an Education Specialist degree at Austin Peay State University, I agree that the Library shall make it available to borrowers under rules of the Library. Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgement of the source is made.

Permission for extensive quotations or reproductions of this thesis may be granted by my major professor, or in her absence, by the Head of the InterLibrary Services when, in the opinion of either, the proposed use of the material is for scholarly purposes. Any copying or use of the material in this thesis for financial gain shall not be allowed without my written permission.

Signature

Barbara K. Little

Date

April 30, 2003

EFFECTS OF DIRECT INSTRUCTION OF CRITICAL THINKING
SKILLS ON AT-RISK SECOND GRADE STUDENTS READING
COMPREHENSION

A Field Study
Presented for the
Graduate and Research Council of
Austin Peay State University

In Partial Fulfillment
For the Requirements for the Degree
Education Specialist

Barbara Fitch
May 2002

ACKNOWLEDGEMENTS

I would like to thank my major professor, Dr. Margaret Deitrich, for her supervision and support. I would also like to thank the other committee members, Dr. Ann Harris and Dr. Rebecca McMahan, for their useful observations and assistance. I would like to express my gratitude to my husband Mike, whose belief in me inspired me to push through to the end. I would also like to thank my son, David, whose encouragement kept me focused.

ABSTRACT

Critical thinking ability is not widespread, nor is it taught sufficiently. Most students scored lowest in problem solving and critical thinking skills on standardized test (Ivie, 1998). With the national trend toward inclusion and improving standardized test scores, the purpose of this pilot study was to discern the effects of teaching critical thinking skills on reading comprehension for special needs learners in second grade. The results of the pretest and posttest were analyzed using a *t*-Test of means to determine a significant difference between the mean scores on reading comprehension skills. The findings of this study indicated that incorporating critical thinking skills across the curriculum, twice a day, every day, may have contributed to the statistically significant difference in the mean scores between the pretest and the posttest of the treatment and control groups.

TABLE OF CONTENTS

I. INTRODUCTION -----	1
Importance of the Problem -----	1
Relationship of the Problem-----	2
Statement of the Problem -----	3
Hypothesis -----	3
Definition of Terms -----	3
Research Questions -----	4
Assumptions -----	5
Limitation -----	5
Delimitations -----	6
Preview -----	6
II. REVIEW OF THE RELATED LITERATURE -----	7
Why Teach Critical Thinking Skills? -----	7
Impediments to Teaching Critical Thinking Skills -----	8
Goals and Strategies for Teaching Critical Thinking Skills -----	11
Critical Thinking Skills and Reading Comprehension -----	13
Critical Thinking Skills Across the Curriculum -----	14
Impact on At-Risk Students -----	15
III. METHODOLOGY AND PROCEDURES -----	17
Participants -----	17

Instrument -----	18
Design and Procedures -----	20
Evaluation-----	22
IV. ANALYSIS -----	23
Analysis -----	23
V. SUMMARY, DISCUSSION, RECOMMENDATIONS -----	41
Summary-----	41
Discussion -----	44
Recommendations -----	46
LIST OF REFERENCES -----	47
APPENDICES -----	50
A. Research Involving Human Subjects -----	51
B. Letters of Inquiry -----	53
C. Informed Consent -----	59
D. Example of Critical Thinking Activity-----	62
VITA -----	69

CHAPTER 1

INTRODUCTION

Importance of the Problem

Children's reading achievement gained political attention during the Clinton administration and it has not slowed down the with Bush administration (Edmondson, 2002). Today's push for higher test scores, improved student achievement, and teacher/school accountability has been the driving force behind educational reform. Educational reform in the United States has also made critical thinking an issue that has gathered strength in the last few years. This has placed much concern and emphasis on thinking skills and reading strategies in the reading curriculum.

Pushing this issue to the forefront is also the concerns of employers, educators, and public officials that students are not being taught thinking and reasoning skills. These are skills required for acquiring and processing information in an ever-changing technological world (Gibson, 1995). To that end, Dyrud and Worley (1998), invite teachers who are striving to help their students become professionals in the real world, aim for the development of more high-level thinking skills.

According to the Foundation for Critical Thinking (2002), national assessments in nearly every subject indicate that students are performing basic skills competently. They are not; however, performing well on thinking, reasoning, analyzing, predicting, estimating, or problem solving. Gibson (1995) states that instruction should be developed so that students develop into flexible thinkers. Further, critical thinking must be taught across the curriculum, in various settings, over an extended period for real changes to occur in students' thinking (Gibson, 1995).

Relationship of the Problem

Critical thinking ability is not widespread, nor is it sufficiently taught. Most students scored lowest in problem solving and critical thinking skills on standardized test (Ivie, 1998). The method in which these skills are taught may be beneficial to all grade levels if the findings are consistent with a rise in the pretest and posttest reading comprehension scores.

The increasing emphasis on test scores has become a major deterrent to teaching critical thinking skills. Educators are teaching to the test and asking questions that require only one right answer, a method that does not encourage or promote the development of critical thinking. Research has shown that the majority of a teacher's instructional time is spent asking questions; however, 70 to 80 % of those questions asked require only factual recall. Students forget 80 to 90% of what they learn through this type questioning. Conversely, students retain 80 to 85% of what they learn with the use of higher level questioning (Savage, 1998).

The national trend toward inclusion makes it all the more difficult for teachers to teach critical thinking. Teachers now have to quantify instruction as never before to meet the demands of the wide range of abilities found in inclusive classrooms (Savage, 1998). Schools are now embracing the development of thinking skills in remedial programs. It is of the utmost importance, therefore, that teachers better monitor the amount of time students spend on task. Additionally, teachers are responsible for the percentage of learning objectives met and gains in achievement scores (Savage, 1998).

Statement of the Problem

The purpose of this study is to investigate the effects of teaching critical thinking skills on reading comprehension for special needs learners who are in second grade.

Hypothesis

At-risk second grade students receiving direct instruction in critical thinking skills across the curriculum will significantly increase their posttest reading comprehension scores from their pretest reading comprehension scores when compared to students instructed in critical thinking skills inferentially.

Definitions of Terms

At-Risk Students - Students who demonstrate a discrepancy between measured intellect and academic school functioning. This discrepancy is commonly exhibited through inappropriate or inadequate use of learning strategies.

Critical Thinking - The use of those cognitive skills or strategies that increase the probability of a desirable outcome, thinking that is purposeful, reasoned and goal directed. The kind of thinking involved in: problem solving, formulating inferences, calculating probabilities, and making decisions when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task.

Creative Thinking - The process of determining the authenticity, accuracy, or value of something, characterized by the ability to seek reasons and alternatives, perceive the total situation, and change one's view based on available evidence.

Direct Instructions - A model that emphasizes active teaching and student time on tasks. Elements of this model include explicit instruction in identified skills and concepts,

guided practice with immediate feedback, frequent reviews and checks for understanding, and independent practice.

Higher-Level Thinking - Higher-Level Thinking is any cognitive operation that places significant demands on the processing taking place in short term memory, such as analysis, synthesis, and evaluation.

Inferential Learning - Situations are created whereby students learn critical thinking skills inferentially by being placed in situations, which call for them to apply these skills.

Learning Disabilities – A developmental disorder that manifests itself in a discrepancy between ability and academic achievement.

Learning Strategies – The mental operations that individuals initiate to help him or herself learn something, solve a problem, or to comprehend something. These have traditionally been referred to as study skills, such as, note taking or summarizing.

Metacognition - The process of planning, assessing, and monitoring one's own thinking.

Thinking Skills - The set of basic and advanced skills and sub skills that govern a person's mental process. These skills consist of: cognitive and metacognition operations, knowledge and dispositions.

Research Questions

1. To what extent will second grade posttest reading scores increase from second grade pretest reading scores if critical thinking skills are taught across the curriculum utilizing direct instruction?

2. To what extent will at-risk second grade students taught critical thinking skills across the curriculum through direct instruction be able to meet the state's standard score on the T-CAP Test?

Assumptions

The following have been assumed for this research:

1. The dependent variable tests were administered and scored in a consistent manner.
2. The teachers of the experimental group and the control group are equally proficient.
3. The Hawthorne Effect was presumed to be equalized for both groups by similar disruption of the experimental arrangements for the treatment group.
4. To control for bias, a double blind procedure was used in collecting the data from both the treatment and experimental groups' pre- and posttest reading comprehension scores.

Limitations

1. Though the students are stratified via the use of the computer program, this is still considered a convenience sample.
2. It cannot be guaranteed that the population of the students will remain stable throughout this pilot study due to the nature and mobility of the military and their family members, who move to a new duty station, an average of every three years, and some low socioeconomic groups in the population.
3. Due to the high percentage of students in both classes who have parents participating in the Iraqi war, their emotional state began to deteriorate to the point the field study had to end earlier than was originally planned and did not cover the originally planned three, second half of the year marking periods.

4. The effects of any intervention are difficult to measure due to many intervening variables, which can influence children's progress, such as, health or individual circumstances.
5. Some of the students have disabilities that may interfere with their learning.
6. At-risk children often exhibit behavioral difficulties, which stem from poor self-efficacy and an inclination to avoid any task perceived to present a risk of failure.
7. At-risk children are absent more often, missing critical instruction.
8. Teacher A and Teacher B have taught roughly the same number of years, but Teacher A has four years teaching experience in second grade. This is Teacher B's first time teaching second grade.
9. Teacher A is the researcher and administrator of the treatment which may cause experimenter-treatment effect.
10. Parents will have to be given an incentive in order to ensure return of the consent forms.

Delimitations

1. Only two classes of at-risk second grade students will be addressed in this pilot study.
2. The two classes will be from the same elementary school.

Preview

The purpose of this study is to evaluate the extent second grade posttest reading comprehension scores will increase from second grade pretest reading comprehension scores when critical thinking skills are taught and used across the curriculum.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Why Teach Critical Thinking Skills?

Paul (1993) defines good thinking as thinking that does the job we set for it. Thinking that lacks purpose is aimless and for the most part, human beings are "naturals" at aimless thinking. When the mind engages in meaningless thinking, it is using little energy and results in low initiative. Conversely, purposeful thinking involves figuring things out, problem solving, or in other words, using critical thinking skills. A challenging task stimulates the mind, causing it to methodically engage in different forms of work until it successfully creates, invents, devises, or constructs conclusions which achieve its goal. Critical thinking is to the mind what exercise is to the body (Paul, 1993).

Unfortunately, many students do not know how to think critically. Their own thinking is often vague and fragmented. Therefore, students must be taught how to construct concepts from which they can generate interpretations and draw inferences. The development of student thinking must take place over an extended period of time and must be heavy dialogical. According to Paul (1993) since the basic goal of education is to foster the general, deductive, intellectual development of students, teachers must teach critically. They must create activities and an environment conducive to the general, deductive, and intellectual development of students.

The advent of the Information Age has made teaching problem solving, critical thinking, and higher-order thinking skills crucial for future success (Hopson, Simms & Knezek, 2001). The general findings from Cotton's (2001) research indicated that

virtually all of the thinking skills programs and practices she investigated made a positive difference in the achievement level of participating students. Studies, which looked at achievement over time, found that critical thinking skills instruction accelerated the learning gains of participants. In general, teachers agree that it is possible to increase students' creative and critical thinking skills. Students can learn to think well if schools concentrate on teaching thinking skills (Cotton, 2001). Paul (1993) maintains that introducing students to the logic of what they are studying is teaching them critical thinking skills. It is expected that by teaching them those skills, students will then develop judgment and the perceptions that are sound and insightful.

Impediments to Teaching Critical Thinking Skills

The implementation of critical thinking skills into the standard curriculum has not been as successful as many leaders of the movement had hoped. According to the National Council for Excellence in Critical Thinking (NCECT), critical thinking skills are in danger of becoming the latest passing educational fad.

According to Leming (1998) three of the most common contributing factors that hinder schools from teaching critical thinking are: teachers, curriculum and instructional practices. First, teachers simply impart knowledge by superficially covering a broad range of information and ideas. This type of coverage leaves little time for developing activities that challenges students to think.

An additional impediment to teaching critical thinking skills is teachers who have low expectations of students. These teachers perceive the students to be incapable of using critical thinking skills successfully. They are, therefore, unwilling to attempt higher-level thinking skills. Lack of teacher planning is another obstacle to teaching

critical thinking. Assignments for rote learning are easier to plan and grade. An added hindrance is teachers who do not share information about creative and innovative instructional practices (Leming, 1998).

Although educational literature touts the teaching of critical thinking skills, the concepts and its importance are not widely accepted by teachers (Haas & Keeley, 1998). Even though most teachers see themselves as serious and effective thinkers, they have not been specifically trained in critical thinking and some lack the confidence to make the move to incorporate the skills into their teaching.

This phenomenon is not exclusive to educators of primary age children. The California Commission on Teacher Credentialing revealed in 1977 that a survey of college and university professors revealed 89% professed that critical thinking was a primary objective of their instruction. Of that 89%, only 19% could give a clear definition of critical thinking. Some professors believed because they were critical thinkers, their students would naturally become critical thinkers, without critical thinking being promoted throughout their instruction. This is why teachers do not feel adequately prepared to teach critical thinking (Tener, 1995). Many claim their educational background and academic coursework did not adequately emphasize research, analysis, evaluation, or transfer of learning.

Curriculum is the second limiting factor mentioned by Leming (1998). Most textbooks are organized to cover content, not stimulate critical thinking. While newer mathematics and reading textbooks include a small critical thinking feature, teachers who tend to emphasis the memorization of facts, usually ignore it.

Haas et al. (1998) states that while an educator might be an excellent dispenser of information, the goal of education has moved past simply communicating knowledge. Emphasis now is placed on developing active learning and high-level thinking skills in their students. Unfortunately, there is a scarcity of methods for meaningfully evaluating curriculum programs designed to teach these essential skills. The NCECT stated that in order to keep critical thinking from meeting the usual fate of many educational catchphrases, educators must be skilled in determining the difference between quality, challenging programs versus the shallow and slick merchandising of substandard thinking skills programs.

Taylor, Peterson, and Rodriguez (2002), of the Center for the Improvement of Early Reading Achievement (CIERA) School Change Project, states that President Bush's national goal of improving children's reading achievement has added to the pressure on school districts to adopt some form of a critical thinking program. School administrators are aware that the plethora of information is not always available in a format that helps schools take action. The CIERA authors advocate local districts developing their own programs, motivated by the best research available on reading pedagogy and school change. Such programs should be implemented within a framework that involves teacher input so they have ownership of the change process. Teacher involvement enables educators to build the knowledge base and maintain the commitment necessary to meet President Bush's ambitious national set educational goals.

Finally, according to Savage (1998), the national trend toward inclusion is a further impediment to teaching critical thinking skills. It is a monumental task for teachers, not adequately trained in special education, to meet the needs of the wide range

of abilities and quantify instruction to meet these diverse abilities. Teachers are being directed to plan and teach activities for all students, the special needs, gifted, and the average student. Their efforts to meet each student's needs must be document.

Additionally, teachers are being held accountable for Individualized Education Program (IEP) requirements and gains in achievement scores.

Goals and Strategies for Teaching Critical Thinking Skills

Developing critical thinking skills in students requires specific instruction and practice. Ivie (1998) claims using the top three levels of Bloom's Taxonomy is the easy way out. While he feels the taxonomy is useful it is not an instructional program. He reiterates the fact that most students of all ages do not perform well on higher-level tasks.

Educational research activities show that even though critical thinking is significantly anchored within curricula and related teaching goal taxonomies, it is not supported or taught systematically in daily instruction (Astleitner, 2002). Some shortcomings of critical thinking can be rectified by the use of computer-based instruction, especially CDROM and Internet-based instruction. This does not mean that simply using technology will promote critical thinking. In order for technology to be of benefit, it must be used correctly and in collaborative learning. The human element has to be included, as technology cannot judge the level of motivation or the emotion of a student.

Critical thinking skills could be taught successfully if teachers create an atmosphere in which their students believe they can be successful (Haas & Keeley, 1998). Cotton (2001) questioned whether it was better for the teacher to utilize direct instruction or create situations whereby students learn inferentially by virtue of being

placed in a particular situation. Some teachers favor direct instruction to teach the steps of critical thinking. Proponents of direct instruction claim that many students, particularly those whose lives outside of school offer little exposure to higher-level thinking skills cannot be expected to develop those skills inferentially and must be taught them directly.

With that in mind, Green (1999) states that teachers must celebrate the diversity in their students. Every student should be afforded opportunities to use their varied talents and apply complex problem solving in realistic situations. Green (1999) recommends implementing Howard Gardner's eight intelligences. Gardner's pluralistic view of the mind distinguishes different facets of cognition and acknowledges that people have different mental strengths and cognitive styles. Rubado (2002) taught middle school, at-risk students whose disabilities did not allow for their instruction to be modified. Rubado chose to implement Gardner's eight intelligence as an alternative to retention and to give them the ability to make informed decisions. For her students, Rubado found that the impact of implementing Gardner's intelligences was more obvious with some children than with others. All of her students, however, were observed to have benefited from the use of Gardner's multiple intelligences.

An additional strategy is the use of the brain-based learning theory. This theory is based on the work of cognitive psychologists, and both educational and neurophysiologic research. Since there is a great deal of evidence that all people do not learn in the same way, teachers must be willing to develop and provide a variety of instructional materials, resources, grouping, as well as, assessments that meet individual learning styles. "Learning is enhanced by combining a rich environment with complex and meaningful challenges (Green, 1999)."

Critical Thinking Skills and Reading Comprehension

Reading proficiently is a creative and critical task, raising and answering probing questions through reading, generating and fashioning ideas and meanings through responses. "The ability to read, write, speak and listen as forms of disciplined reasoning, as forms of disciplined questioning become central goals of the models because each is a basic modality of reason through which we learn much of what we learn (Paul, 1993, p. 11)."

Many reading teachers continue to measure comprehension by how well children recall factual information. Children are deemed proficient readers if they can answer questions related to factual information included in the text. Test constructors, however, see the issue of comprehension quite differently. Well-published changes in the National Assessment of Education Progress (NAEP), Stanford Achievement Test (SAT-9) and numerous statewide assessments suggest a shift from objectives to more open-ended responses. Open-ended items are a better measure of children's ability to think about a story and use the information in a story to explain their thinking (Applegate, Quinn & Applegate, 2002).

Applegate et al. cite the 1998 NAEP results that suggest students in the United States are performing at historically high levels in overall reading achievement. When the assessment focuses on critical reading and responding to text, however, only a few children performed at even minimal proficiency. When the major emphasis in instruction or assessment is on literal recall, children are limited in their opportunities to discuss ideas related to the text. Unfortunately, research suggests that classroom questioning is largely literal. The reader must be taught to link their own experiences with the text and

draw a logical conclusion, requiring more complex thinking when asked higher-level inference questions.

Critical Thinking Skills Across the Curriculum

Paul (1993) states that each school subject needs to be taught in such a manner that students have to reason their way into the subject. Teachers should routinely question students so they regularly look into each basic dimension of their thinking, point of view, data, concepts, assumptions, inferences, implications, and consequences. Students would then progressively become more disciplined in their reasoning, more self-critical and self-directed in the process and products of their thinking (Paul 1993).

Students are egocentric and ethnocentric in their reasoning. The ability to be objective is limited by their own self-interest and is influenced by their social viewpoint. Critical thinking skills are not innate in students. Therefore, students can benefit from participating in classroom discussions where they are expected to construct a logical argument for their point of view (Duplass, 2002).

The advocacy of using advanced questioning and critical thinking skills is a common theme, which runs through the literature on critical thinking, regardless of the subject matter. Social studies research cites critical thinking questioning as the means to producing a better citizen. American culture has long been associated with creative thinking and problem solving, an association in which Americans have taken pride. Enabling children to become independent thinkers and problem solvers has long been one of the consistent goals of Social Studies education; a goal that contributes to the overall general goals of education. Given the ultimate outcome is to prepare students to make decisions and judgments, teachers must encourage children to strive to become adept at

critical thinking and problem solving. By nurturing curiosity, children will develop a questioning attitude and become adept at figuring out new and creative ways of doing things (Jarolimek & Parker, 1993).

That nurturing of curiosity is reinforced by Duplass and Zielder (2001). Social Studies classrooms offer opportunities for gathering and evaluating evidence, analyzing and critiquing other people's contentions, and opportunities to speak and write in support of or in opposition to an opinion. By engaging students in making assertions, supporting and defending their claims, teachers begin to establish a well-developed line of reasoning in students. Judging the effectiveness of counter arguments during discussions of social issues, students are making use of critical thinking.

Osman and Hannafin (1994) examined the effects of advanced questioning and the difference in prior knowledge on factual learning and problem solving. Overall, 90% of the participants provided at least one meaningful response to the questions that were of a conceptual nature. Of those students, 77% provided at least one personal supplemental rationale during the study. The authors cited that the concept questions increased problem solving proportionately more than factual learning. The authors concluded that concept-relevant questions can help students activate concept-relevant prior knowledge and anticipatory perspectives, which in turn aid both the selection and integration of knowledge, in other words, critical thinking.

Impact on At-Risk Students

According to Kauffman, Davis, Jakbecy and Lundren (2001), with effective instruction, the higher-level thinking of students with learning disabilities can be

improved, especially in metacognition and comprehension. Effective instruction must include (a) methodical presentation of new context or skills from previous lessons, (b) advanced organizers, and (c) extensive practice. Lending creditability to the inconsistency definition of learning disabilities is the discrepancy between IQ and reading achievement that predicts a weaker effect for cognitive training.

Special needs learners are a heterogeneous group who need extra support for academic achievement. This group is not limited to students with a learning disability, but may also include children with behavioral problems, attention deficit disorders and linguistically diverse children for whom English is their second language. These students tend to have limited self-confidence, low motivation, and difficult classroom behavior and are usually reluctant readers (Swanson, 2001).

The debate over which instructional model is the best to use with special needs learners continues. Direct instruction focuses on isolated skill acquisition to support higher-order processing, while strategy interventions are necessary for focus on routines and planned procedures of handling information (Swanson, 2001). The results of Swanson's study indicated that a general model of instruction that combines direct instruction and strategy instruction is best.

CHAPTER III

METHODOLOGY AND PROCEDURES

Participants

At a school in the northern section of a southeastern state, with a highly mobile military population, two groups of second grade students were the subjects of this pilot study. Each of the two groups began with a population of 18 children ranging in ages from seven to eight years old and of mixed academic abilities. Both groups were ethnically diverse. The sample of children was selected based on their assignment into Classroom A, the experimental group, and Classroom B, the control group. The children were selected for each classroom prior to the beginning of the school year using the computer program Elementary Classroom Assignor (ECA). Office staff typed the names of the students into the computer. The program then stratified the students based upon class size, age, repeaters, gender, and waiver students, then assigned each student to a classroom.

Classroom A's 18 students, consists of nine boys, two African American and seven Caucasian, and nine girls, three African American, one Hispanic, and five Caucasian. Five of the students are identified with a learning disability. Classroom B also consisted of 18 children, however, due to student attrition and unreturned consent forms, the final number of subjects in Classroom B was 14. There are seven boys (two African American and four Caucasian) and seven girls (three African American and five Caucasian). Of the students not participating, there is one African American male and one Asian female. Both groups are considered to possess roughly equivalent academic abilities.

The National Research Act requires that proposed research involving human subjects be reviewed and approved by an authorized group in an institution. Researchers must obtain this approval prior to the research being conducted. The research proposal was submitted on December 2, 2002. Approval was granted by the Chair of the Austin Peay Institutional Review Board on January 3, 2003 (See Appendix A for approval of research involving human subjects).

To conduct the field study, permission from the school district and the school where the study was to be conducted, had to be secured. The Director of Instructional Support and Research and Development approved the pilot study on January 29, 2003. The principal has the final authority and responsibility for approving or disapproving research conducted in his/her building. The request to conduct research at this particular school was submitted on January 31, 2003. Approval was granted that day (See Appendix B for all letters of inquiry).

Since this is a special population of minors, informed consent was elicited from the parents in the form of a letter explaining the experiment and potential benefits was submitted with the permission slip. The permission slip was to be signed and returned by the parents (See Appendix C for the permission slip).

Instrument

The Scott Foresman Reading (Tennessee Multimedia Edition) series, copyright 2000, was implemented for pretest and posttest, as well as instruction. The reading comprehension portion of the Scott Foreman Reading Grade 2 End-of-Year Benchmark Test was administered on February 11, 2003. In Grade 2, there are six Unit Benchmark Test and End-of-Year Benchmark Test. The Unit Benchmark Tests are designed to

measure student progress based on comprehension skills and strategies, literary genres, theme, types of writing, and phonics skills taught in each unit. The End-of-Year Benchmark Test measures skills covered in all six units. This test was used as the pretest to set a baseline for each group.

The reading comprehension portion of the End-of-Year Benchmark Test consists of 35 questions, 20 of which focus on the following skills: setting, character, context clues, sequence of events, drawing conclusions, inferring, predicting, comparing and contrasting, making judgments, author's purpose, using graphic sources, fact and opinion, and main idea. Thirty of the questions are multiple choice and five are essay. Questions 11 through 17 and 28 through 35 were not considered in the analysis of the skills. Those questions focused on phonics skills. Questions 8, 21, and 27 were also eliminated from the analysis due to a lack of matching questions on the End-of-Year Skills Test.

The reading comprehension of the Scott Foresman Reading (Tennessee Multimedia Edition) Grade 2 series, copyright 2000, End-of-Year Skills Test was given as the posttest on March 18, 2003. In Grade 2, there are six Unit Skills Tests. The Unit Skills Tests are designed to measure a student's progress based on specific skills taught in each unit and to help identify a student's specific strengths and weaknesses. The End-of-Year Skills tests is longer than the Unit Skills Tests and measures selected skills from all six units taught during the year. It is designed to provide a score for each subtest and a total test score.

The reading comprehension portion of this test consists of 25 comprehension questions that measure the same comprehension skills as the End-of-Year Benchmark Test, setting, character, context clues, sequence of events, drawing conclusions, inferring,

predicting, comparing and contrasting, making judgments, author's purpose, using graphic sources, fact and opinion, and main idea. All questions are multiple-choice and offer three possible answer choices. Test Works 3.2 was used to modify the End-of-Year Skills Test so that part of the multi-choice questions were changed to essay questions to match the End-of-Year Benchmark Test. Questions 4, 8, 14, 17, 19, 20, 23, 24, and 25 were eliminated from the analysis due to a lack of matching questions to the End-of-Year Skills Test. The End-of-Skills Test assesses the skills taught in all six units of the book.

Design and Procedures

The statistical design applied was a t Test for Independent Samples. This design was chosen because two groups of participants were possible. The use of a control group may serve to eliminate some threats to the internal and external validity of the pilot study. It could not be guaranteed that the composition of both classes would remain constant throughout the study due to the children of the highly mobile military population attending this school. In fact, the number of students in Classroom B dropped to 16, with only 14 of those students participating in the pilot study.

The pilot study was designed to be on going during the final three, six-weeks grading periods of the school year. Unfortunately, current world events and the deployment of roughly half the parents of students in both classes precipitated the end of the study after one six weeks. The treatment group received direct instruction across the curriculum in critical thinking, problem solving, and higher-order thinking skills. The treatment group received the treatment twice a day for each full week they were in school. The treatment group was not taken out of their regular schedule of academics in order to participate in the treatment. The treatment activities were planned in all areas

across the curriculum in accordance with Teacher A's implemented Focused Assessment Plan.

Teacher A used academic knowledge and skills in the areas of reading, math, science, and social studies, used research (library, video, computer) as well as communication skills and interrelationships. Teacher A planned and facilitated for differentiated learning styles, following the Tennessee state mandated curriculum and the currently adopted reading series. Teacher A also used activities on the computer, as well as, from the resources Critical Thinking Activities, Kagan's Brain-Based Learning Cards, Grade 2 Powerthink, Cooperative Critical Thinking Activities, How to Solve Word Problems, and Literacy Centers Activities (See Appendix D for an example of one of the activities). Teacher A has a master's degree in elementary education with a specialty in special education and has taught nine years.

Teacher B used academic knowledge and skills in the areas of reading, math, science, and social studies, used research (library, video, and computer) as well as communication skills and interrelationships. Teacher B planned and facilitated for differentiated learning styles; following the Tennessee state mandated curriculum and the currently adopted reading series. Teacher B used the traditional method of instruction, following the directions from the teacher's edition of the reading book for each comprehension activity. Teacher B also used flashcards and songs to teach vocabulary. Teacher B has a bachelor's degree in music education and elementary education and has taught seven years.

Evaluation

To evaluate the effect of the treatment on Reading Comprehension, Teachers A and B administered the End-of-Year Benchmark Test as a pretest in order to set a baseline for each group. A score of 80% is considered passing for this test. One student in Class B scored an 83%. The remaining students in both classes scored between 26 to 74%. Those students scoring below 70% were given additional instructional support. By referring to the list of tested skills, each student's strengths and weaknesses in a specific area was identified, and addressed appropriately.

Teachers A and B administered the End-of-Year Skills Test as a posttest on March 18, 2003. A score of 80% is considered passing for both the reading comprehension portion of the test and reading in second grade. Three students scored 100% in Class A. The remaining students in both classes scored between 52 to 96%. The treatment group scores showed an increase of 65% from pretest to posttest, while the control group scores showed an increase of only 24% from pretest to posttest.

The risk to participants was minimal. The data gathered is intended to investigate the effects of teaching critical thinking skills on reading comprehension for special needs learners in second grade.

CHAPTER IV

ANALYSIS

Analysis

It was assumed that the groups' scores would differ on the pretest; therefore, the important comparison between the groups is not just a test for differences on the posttest, but also a comparison of the different amounts of change from pretest to posttest in the two groups on the specific skills.

The data collected was the individual pre- and posttest scores in the two groups. The data was collected and coded by the grade-level chair. The grade-level chair made a master list of both classes, by putting the test in random order and coding the data with numbers and letters to ensure confidentiality. The compiled data was kept confidential and stored in a locked file cabinet in the administrative office of the school until this study is concluded. At the conclusion of this pilot study, the grade level chair shredded the data. This data will be published or presented in a way that does not reveal the identity of participants.

Using the statistical program, GraphPad Prism Version 3 for Macintosh, the pretest scores for the 18 students in the treatment group and the 14 students in the control group were analyzed using a *t*-Test for Independent Samples. Using a confidence level of 95%, no statistically significant difference was found between the two groups on reading comprehension on the pretest.

Table 3-1

Analysis of Difference Between Treatment Group and Control Group Pretest Scores

Statistic	Treatment Group	Control Group
No. of Scores	18	14
Mean Score	55	54
t-Value		0.1972*
Degrees of Freedom		30

* $p < .05$

Using GraphPad Prism Version 3 for Macintosh, posttest scores for the 18 students in the treatment group and the 14 students in the control group were analyzed by applying a *t*-Test for Independent Samples. Using a confidence level of 95%, a statistically significant difference was found between the mean scores of the two groups on reading comprehension on the posttest. This means the groups were roughly equivalent in their performance on the pretest prior to the treatment.

Table 3-2

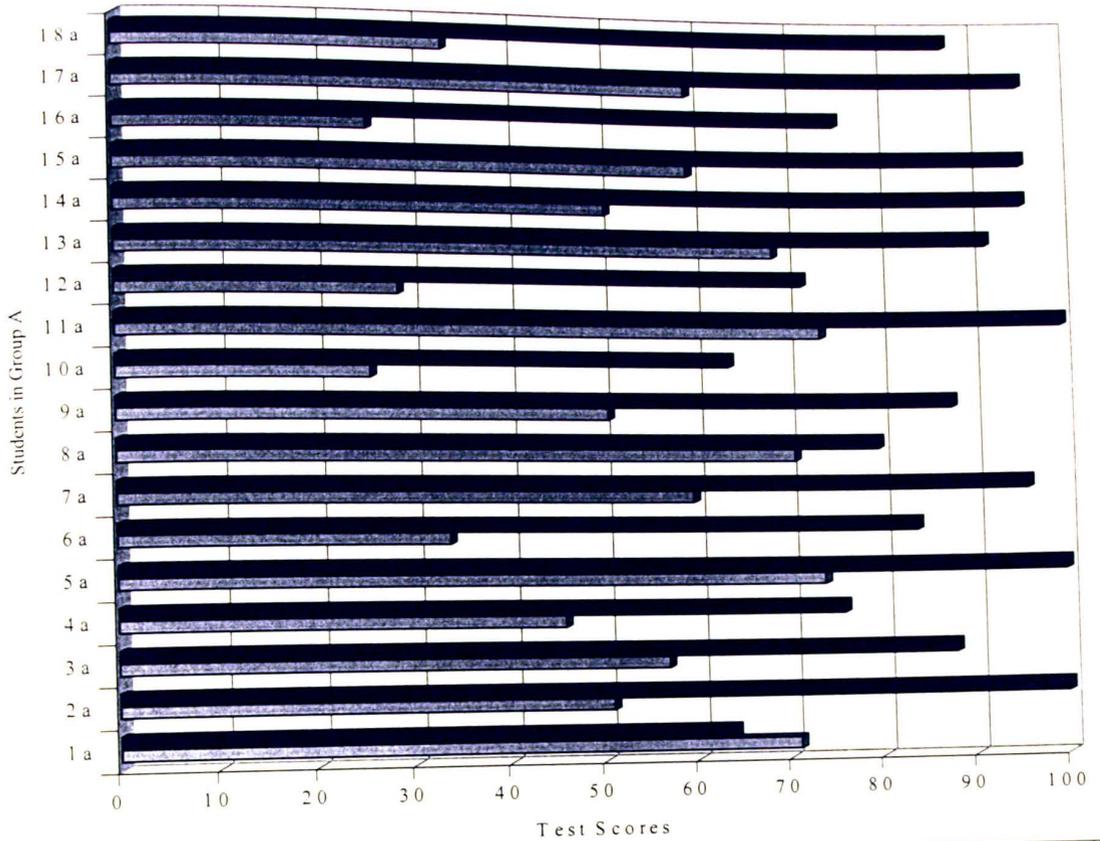
Analysis of Difference Between Treatment Group and Control Group Posttest Scores

Statistic	Treatment Group	Control Group
No. of Scores	18	14
Mean Score	86	68
t-Value		4.146*
Degrees of Freedom		30

* $p < .05$

Using GraphPad Prism Version 3 for Macintosh, pretest and posttest scores for the 18 students in the treatment group were analyzed by applying a *t*-Test for Independent Samples. Using a confidence level of 95%, a statistically significant difference was found between the pretest and posttest mean scores on reading comprehension. This means the differences in the pretest and posttest scores are probably not a coincidence and the treatment had an effect on Group A, the treatment group.

Group A Comparison of Pre-test and Posttest Scores



	1 a	2 a	3 a	4 a	5 a	6 a	7 a	8 a	9 a	10 a	11 a	12 a	13 a	14 a	15 a	16 a	17 a	18 a
■ Posttest	64	100	88	76	100	84	96	80	88	64	100	72	92	96	96	76	96	88
■ Pre-test	71	51	57	46	74	34	60	71	51	26	74	29	69	51	60	26	60	34

Figure 3-1 Comparison of pretest and posttest scores of treatment group

Using GraphPad Prism Version 3 for Macintosh, pretest and posttest scores for the 14 students in the control group were analyzed by applying a *t*-Test for Independent Samples. Using a confidence level of 95%, a statistically significant difference was found between the pretest and posttest mean scores on reading comprehension. This data signifies that the results are likely due to the treatment having a positive effect on Group A.

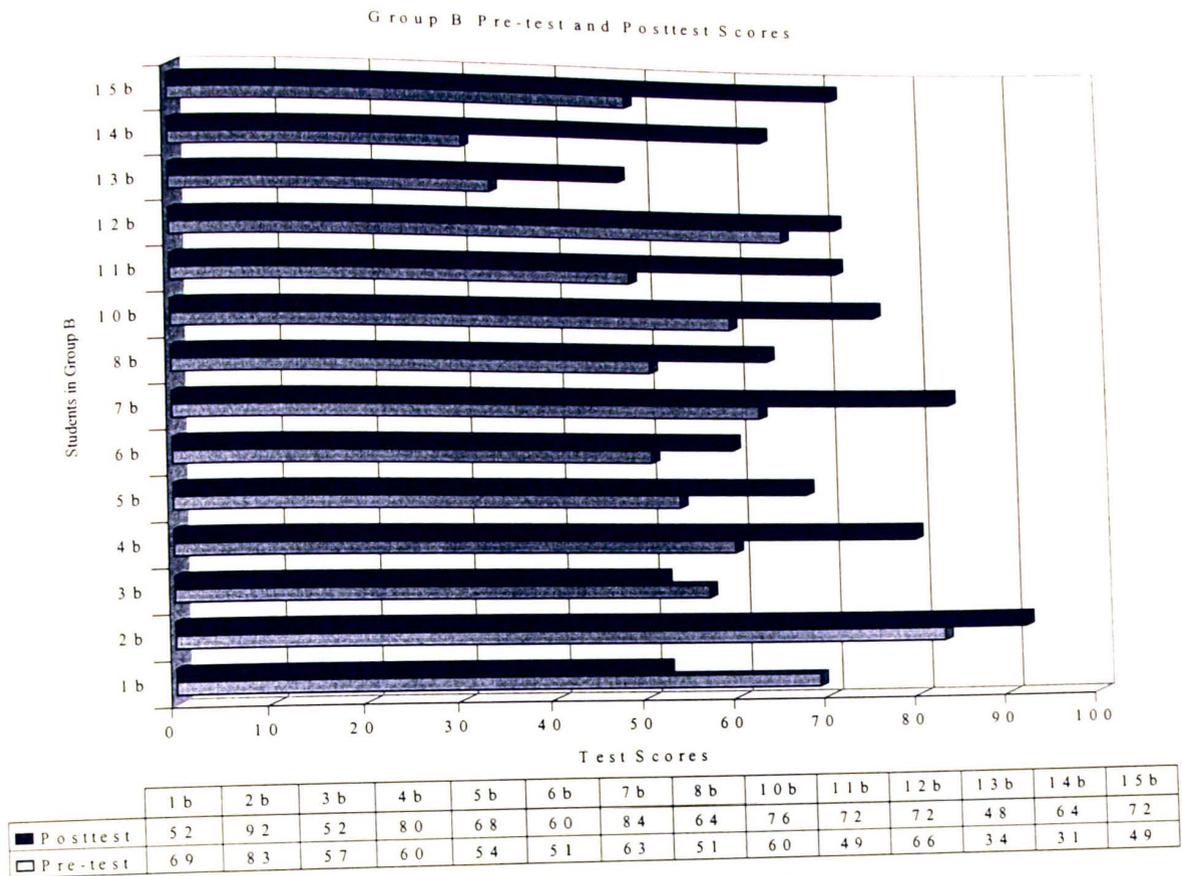


Figure 3-2 Comparison of pretest and posttest scores for control group.

The number of respondents answering correctly was analyzed using GraphPad Prism Version 3 for Macintosh using a *t*-Test for Independent Samples. The *p* value in each set of skills analyzed was less than 0.05 and a statistical significance was found in the samples. These results are shown on Figures 3-3 through 3-15. While both groups made gains between the pretest and posttest, the treatment group made more and higher gains than the control group.

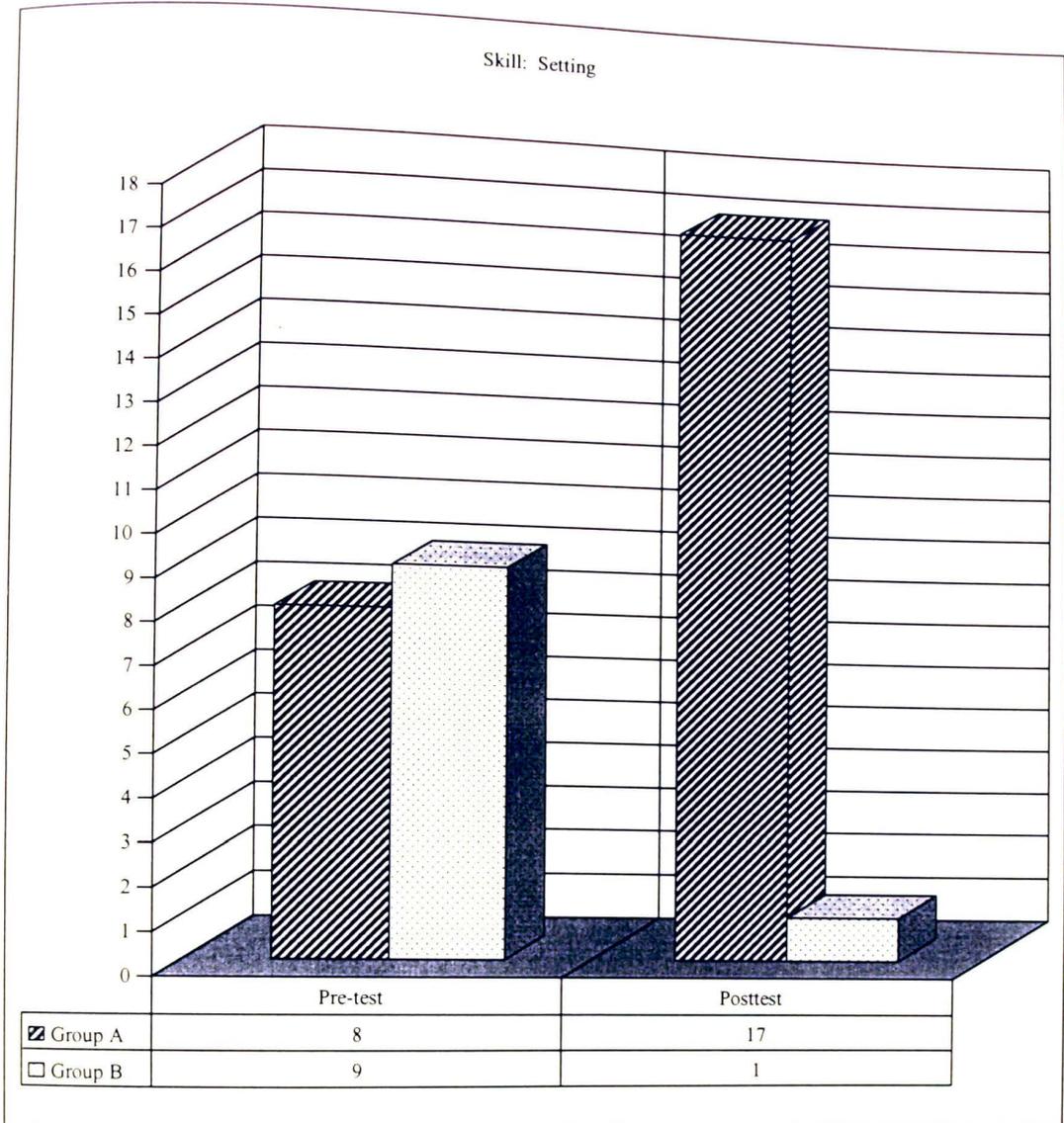


Figure 3-3 Number of students who answered the question correctly for the skill, *Setting*

Group A showed a large gain from the pretest to the posttest, while Group B showed a decrease in the number correctly answering the question for the skill, *Setting*. The test question for the skill, *Setting*, was an essay question. On the pretest both groups attempted to answer the essay question. Conversely, most of the students in Group B did not attempt to answer the essay question on the posttest and of those that did, only one correctly answered the question.

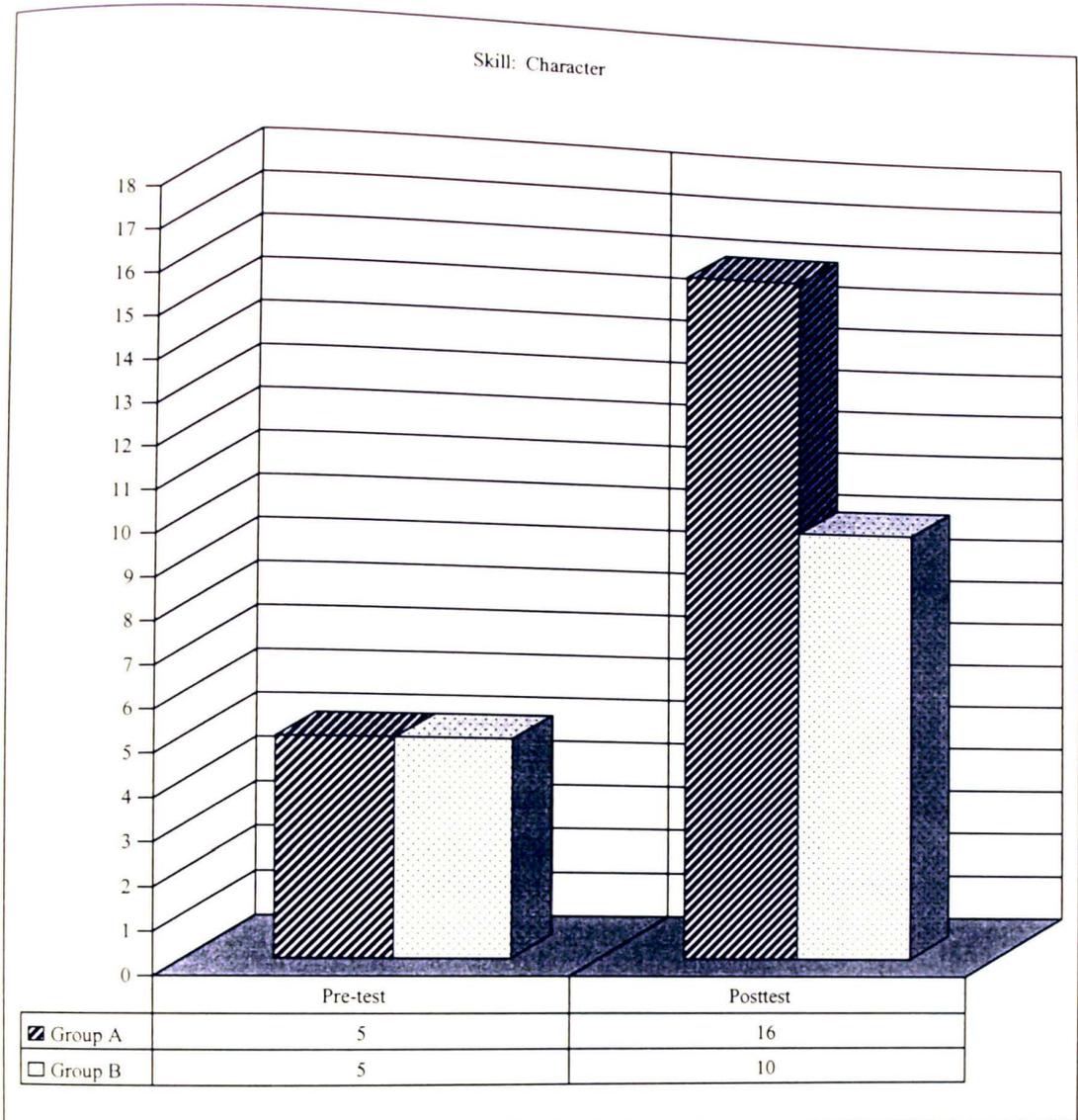


Figure 3-4 Number of students who answered the question correctly for the skill,

Character

Group A showed larger gains from the pretest to the posttest, while Group B showed a smaller gain in the number correctly answering the question for the skill, Character. On the pretest, the same number of students answered this question correctly in both groups. While both groups made gains, Group A tripled in the number of students correctly answering the question.

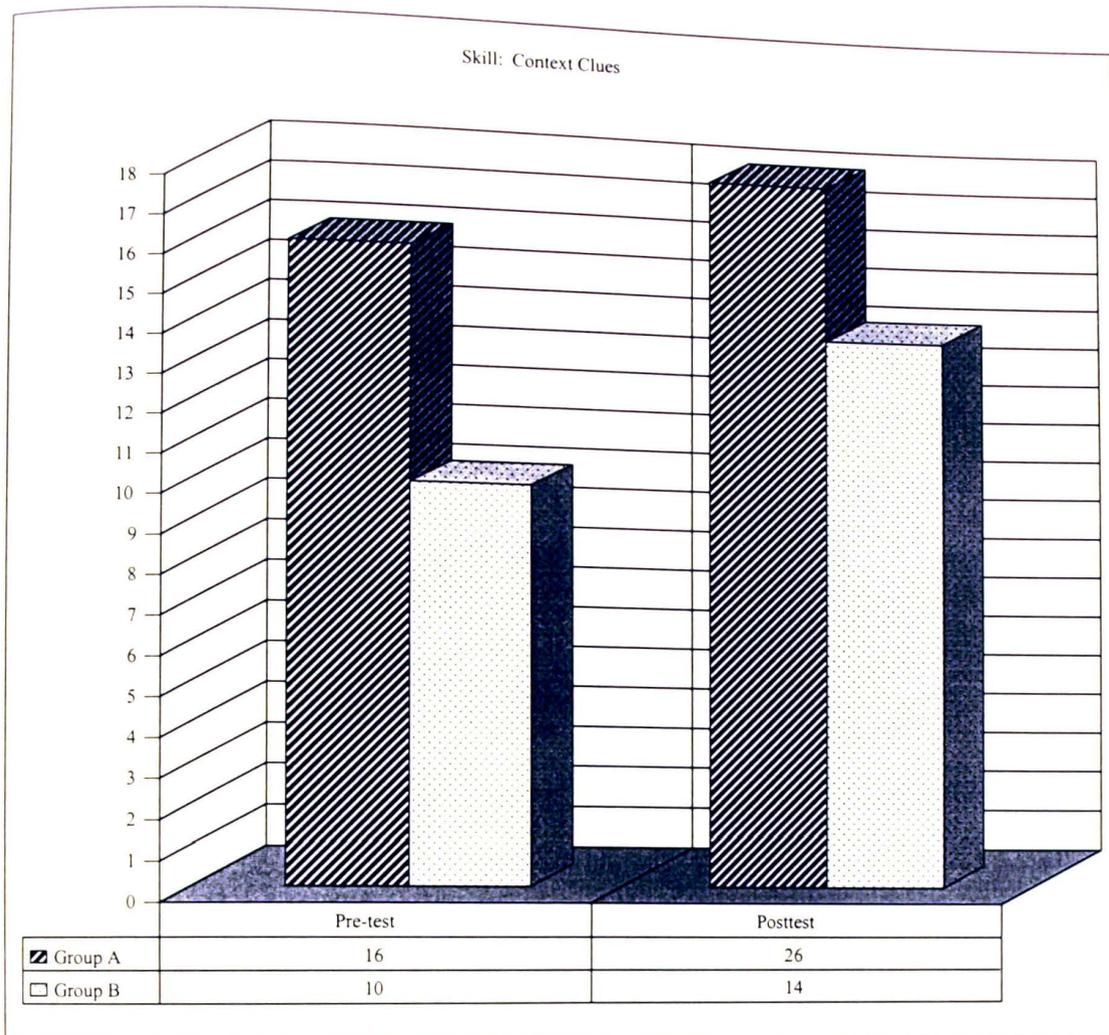


Figure 3-5 Number of students who answered the two questions correctly for the skill, *Context Clues*

There were two questions on the skill Context Clues on both the pretest and posttest. Group A doubled their gains from the pretest to posttest, while Group B showed a moderate gain from the pretest to posttest in the number correctly answering the question for the skill, Context Clues.

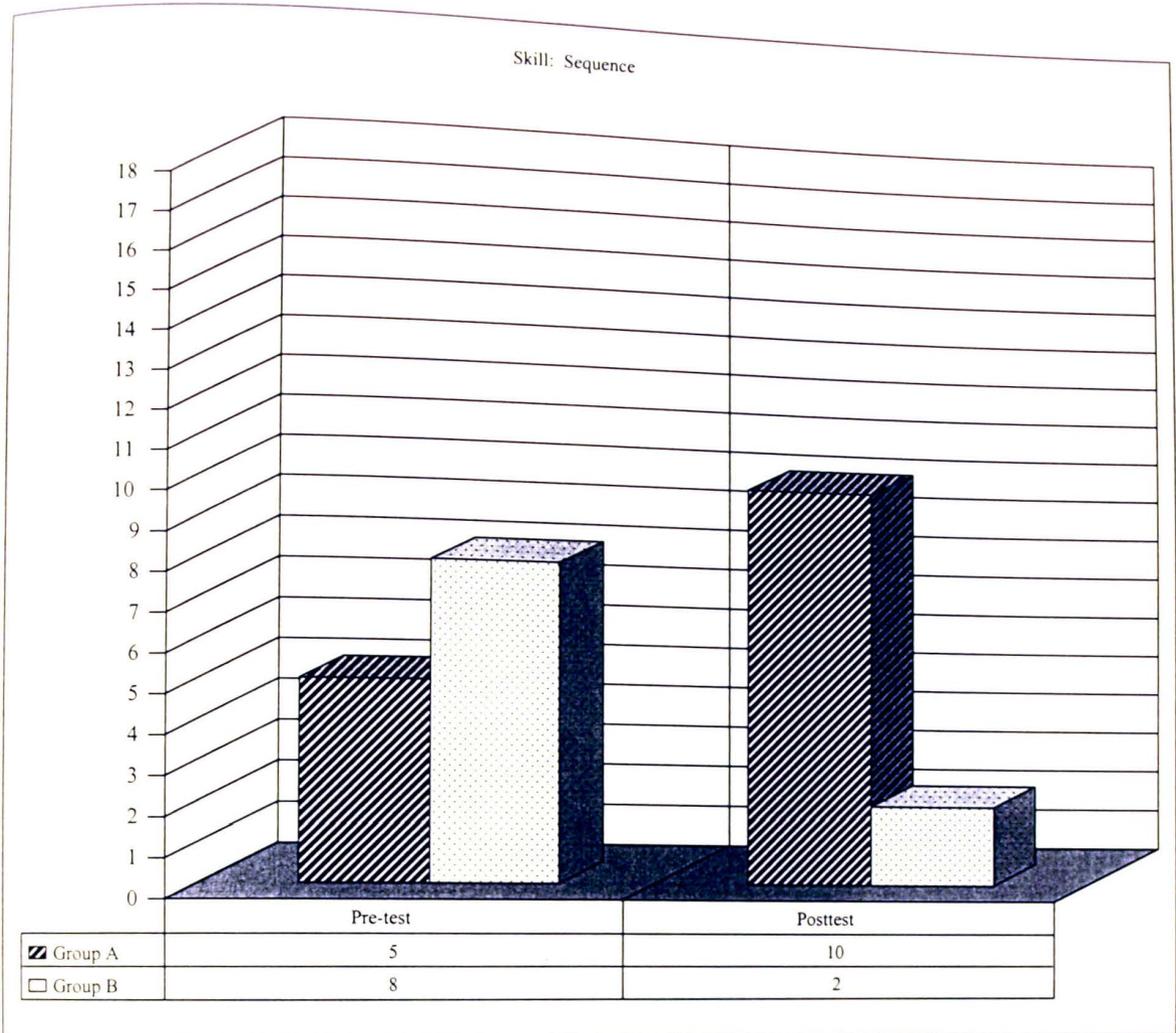


Figure 3-6 Number of students who answered the question correctly for the skill,

Sequence

Group A showed gains from the pretest to the posttest, while Group B showed a decrease in the number correctly answering the question for the skill, Sequence. This was an essay question on both the pretest and posttest. The majority of students attempted to answer the question on the pretest; however, few of the students in Group B attempted to answer the question on the posttest. Only two of those students who attempted to respond, correctly answered the question.

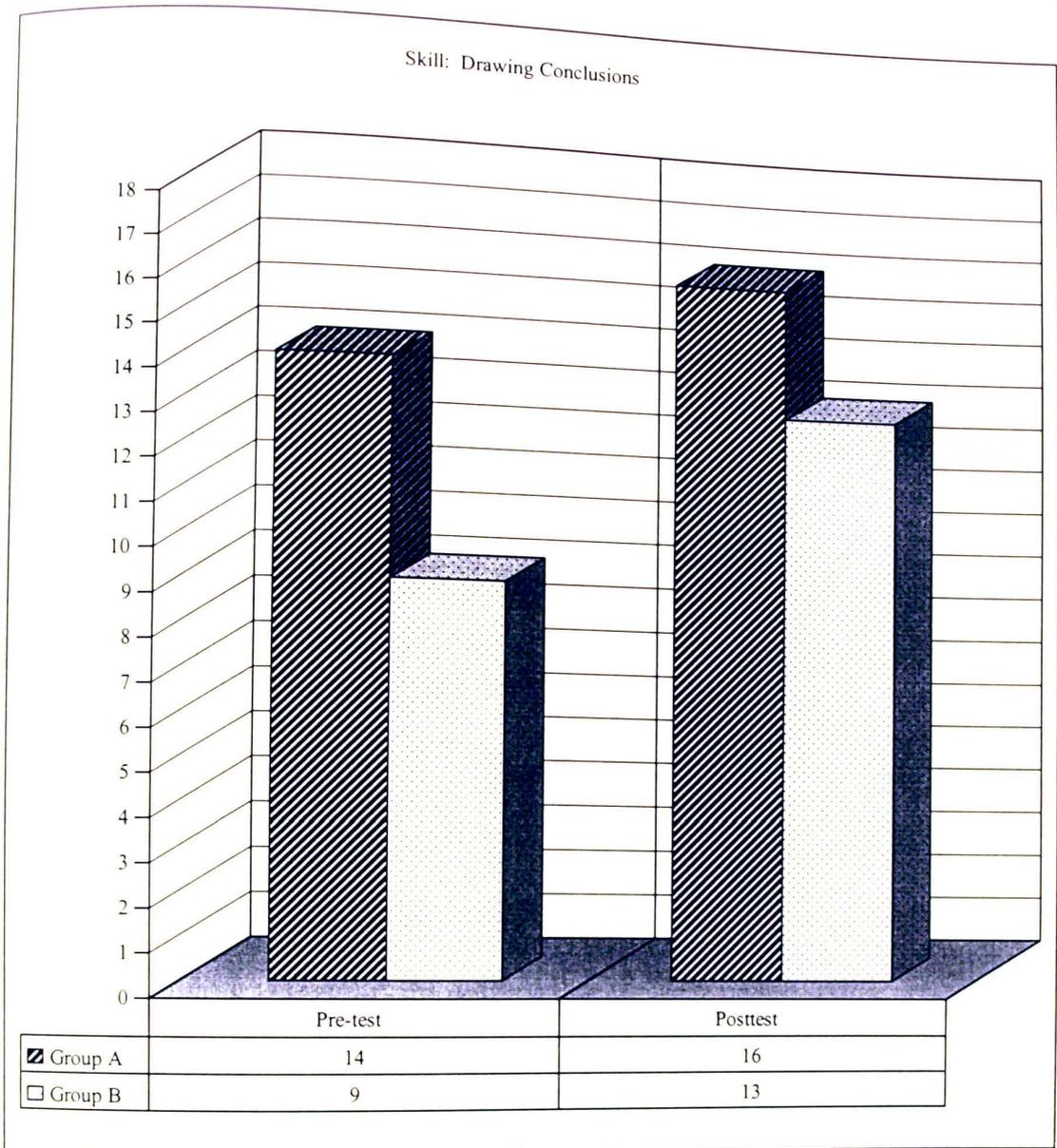


Figure 3-7 Number of students who answered the question correctly for the skill,

Drawing Conclusions

Group A showed gains from pretest to posttest, while Group B showed slightly higher gains from pretest to posttest in the number correctly answering the question for the skill, Drawing Conclusions. Although Group B showed slightly higher gains, Group A still scored higher on both the pretest and the posttest.

Skill: Inferring

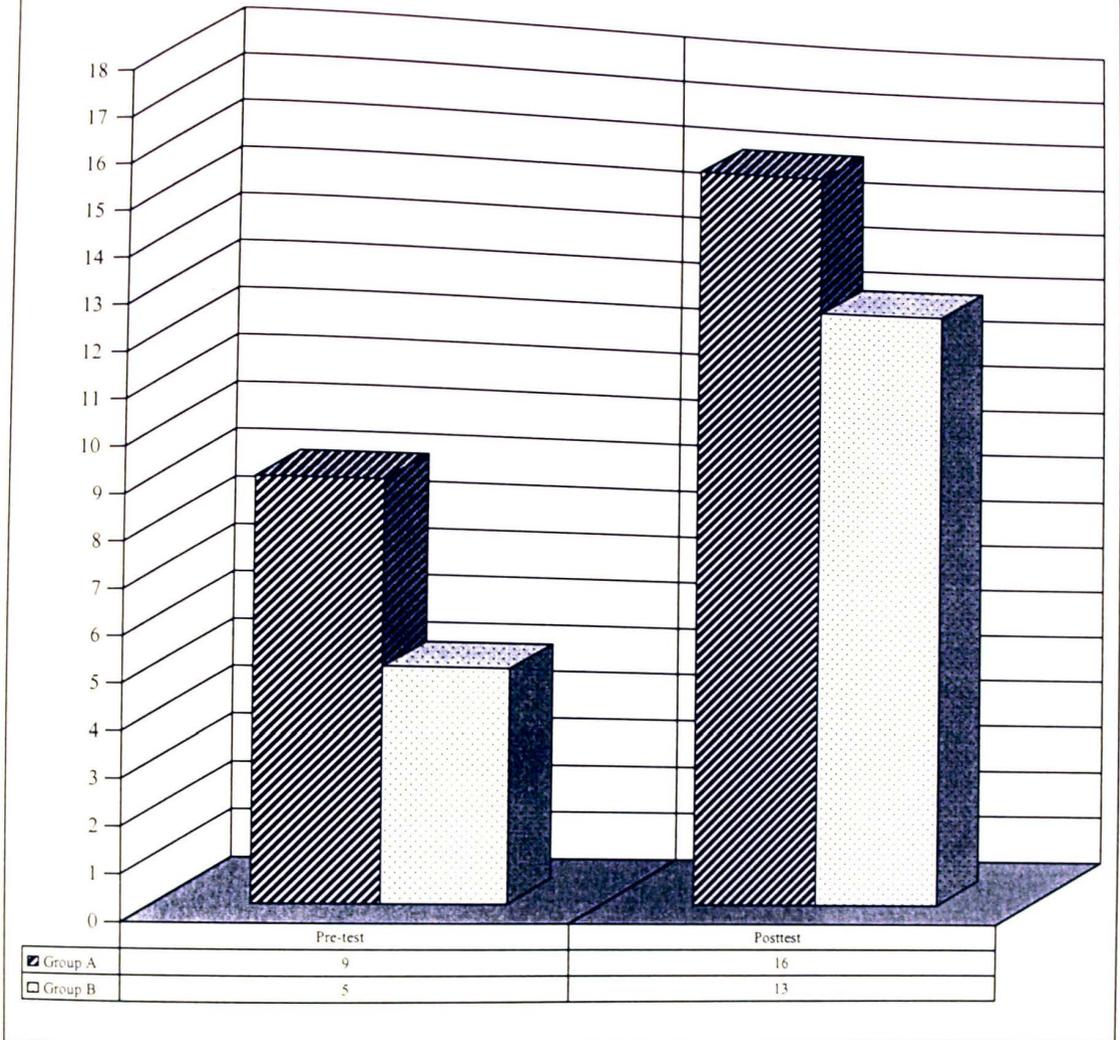


Figure 3-8 Number of students who answered the question correctly for the skill, *Inferring*

Group A showed gains from pretest to posttest, while Group B showed slightly higher gains from pretest to posttest in the number correctly answering the question for the skill, *Inferring*. Albeit Group B's gains were slightly higher on this question, Group A, nonetheless, scored higher on both the pretest and posttest.

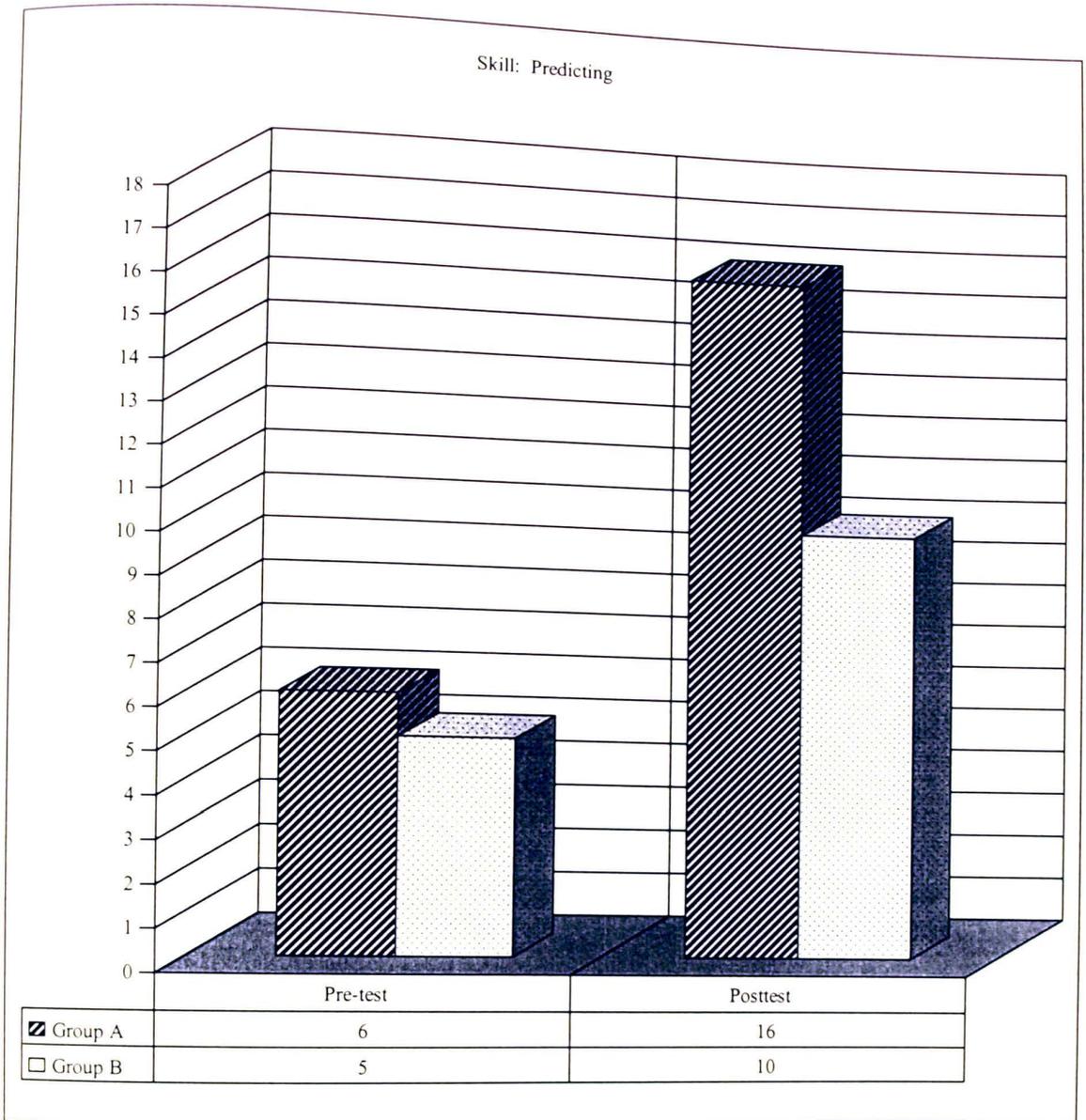


Figure 3-9 Number of students who answered the question correctly for the skill,

Predicting

Both groups were nearly equal in number of students answering this question correctly on the pretest. Group A, however, showed larger gains from the pretest to the posttest, while Group B showed slightly smaller gains from the pretest to the posttest in the number correctly answering the question for the skill, Predicting.

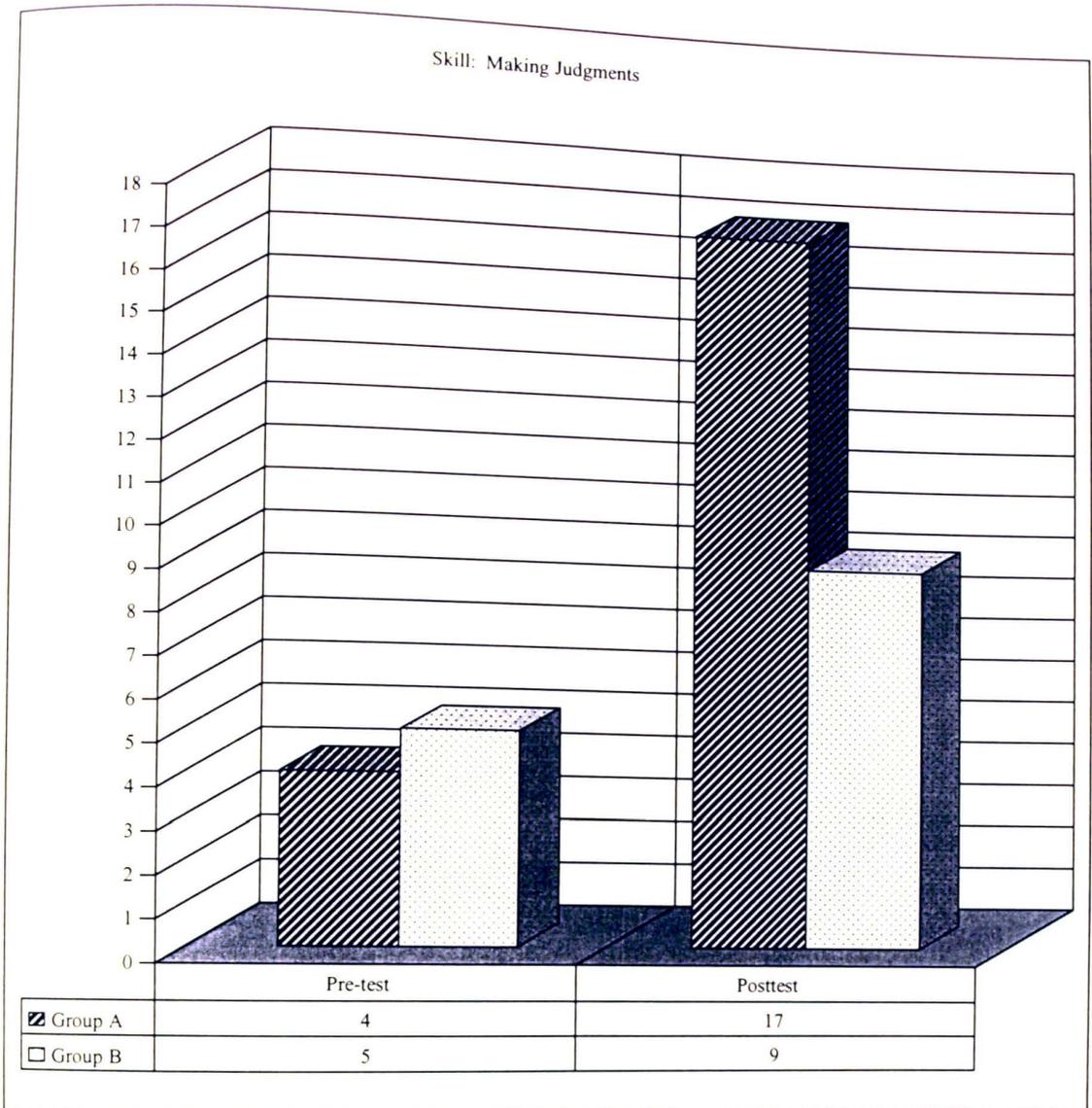


Figure 3-10 Number of students who answered the question correctly for the skill,

Making Judgments

More of the students in Group B correctly answered the question for Making Judgments on the pretest. Group A, in spite of this, showed significantly larger gains from the pretest to the posttest. Conversely, Group B showed smaller gains from the pretest to the posttest in the number correctly answering the question for the skill, Making Judgments.

Skill: Main Idea

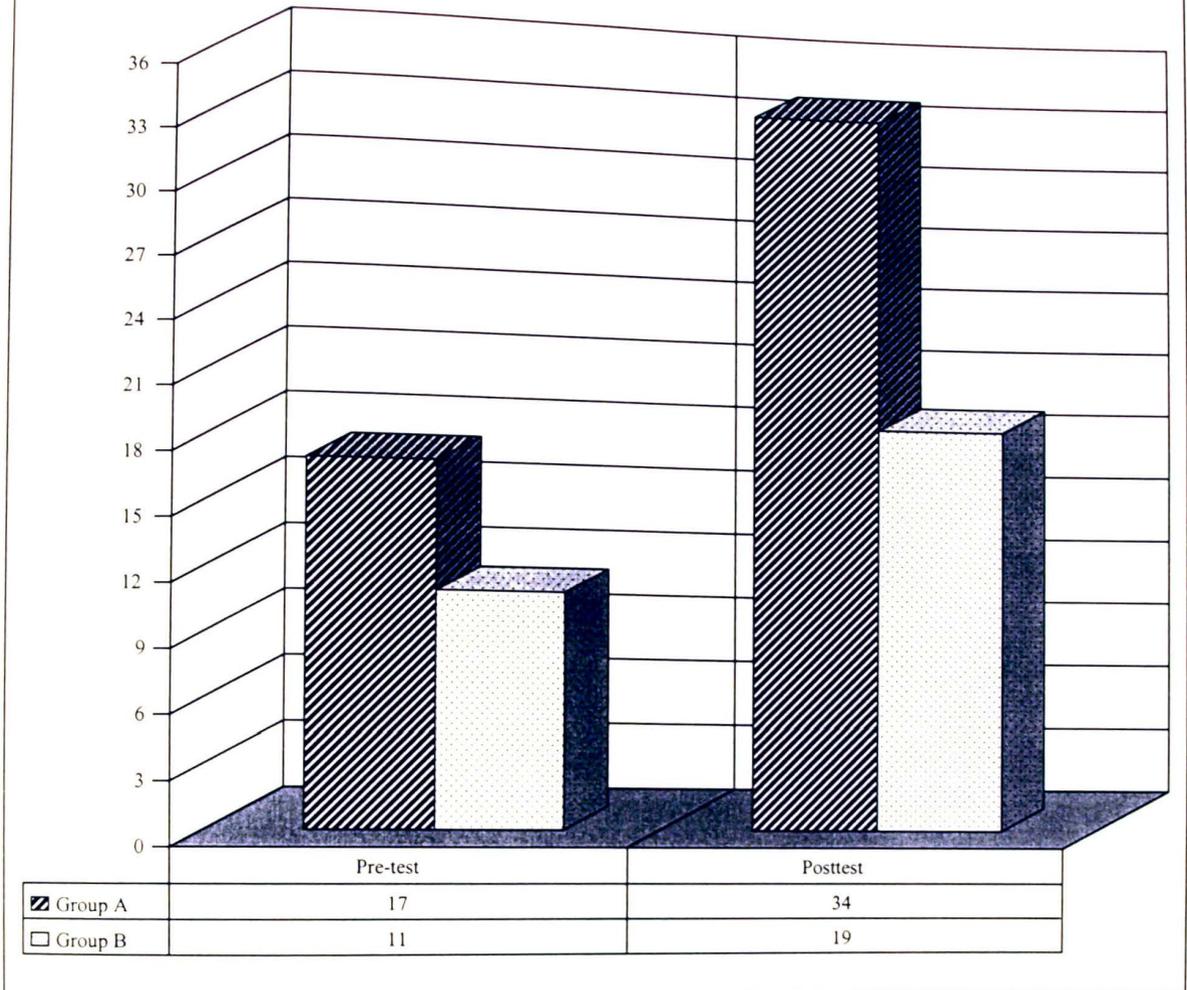


Figure 3-11 Number of students who answered the two questions correctly for the skill,

Main Idea

There were two questions on both the pretest and posttest for the skill, Main Idea. Group A scored higher on the pretest than Group B. Group A doubled in the number of students answering these questions correctly from the pretest to the posttest. Group B showed a smaller gain from the pretest to the posttest in the number correctly answering the questions for the skill, Main Idea.

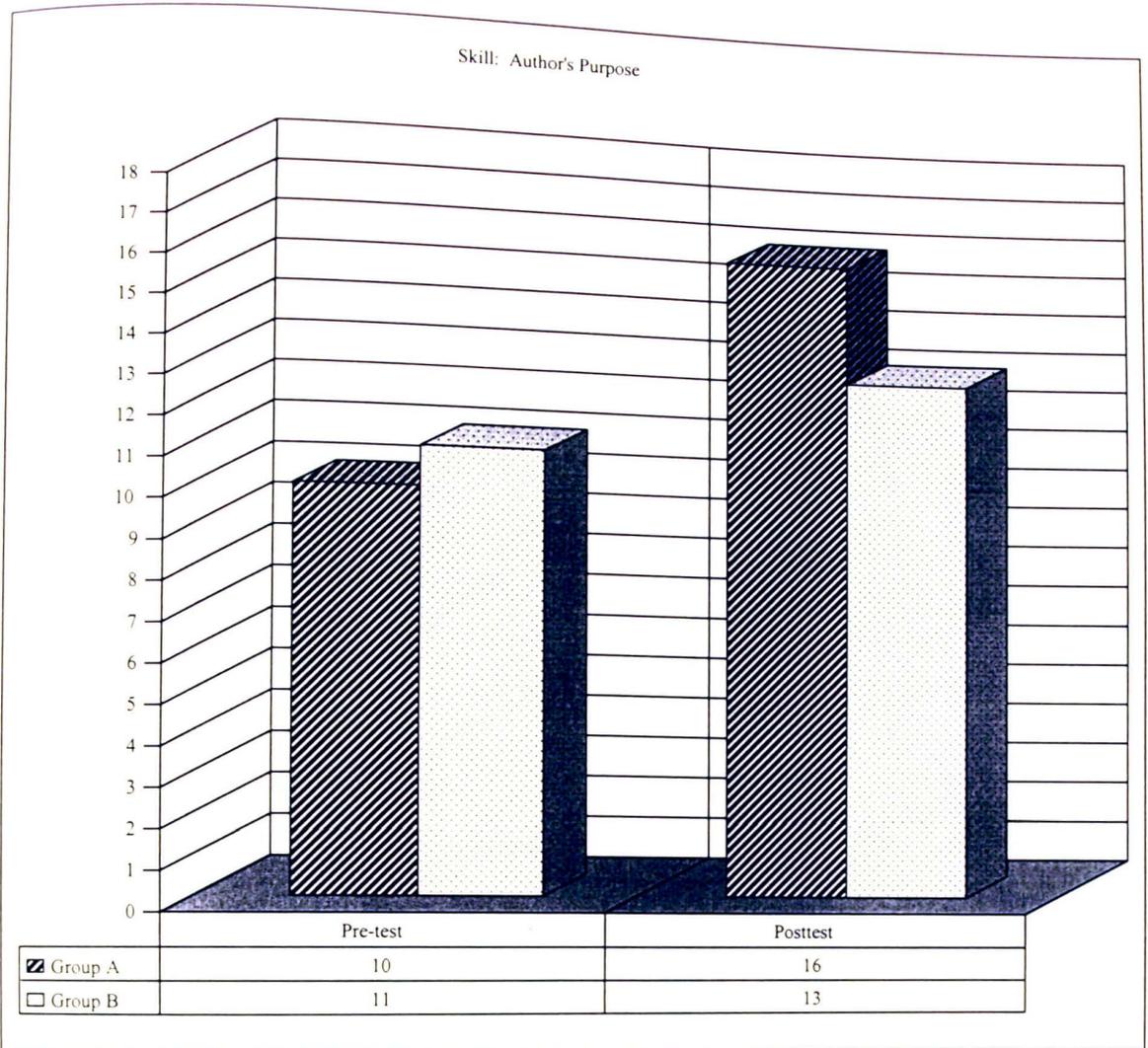


Figure 3-12 Number of students who answered the question correctly for the skill,

Author's Purpose

More of Group B students correctly answered the question for the skill, Author's Purpose on the pretest than students in Group A. Group A, however, showed larger gains from the pretest to the posttest than did Group B. Group B students showed only slightly smaller gains from the pretest to the posttest in the number correctly answering the question for the skill, Author's Purpose.

Skill: Graphic Sources

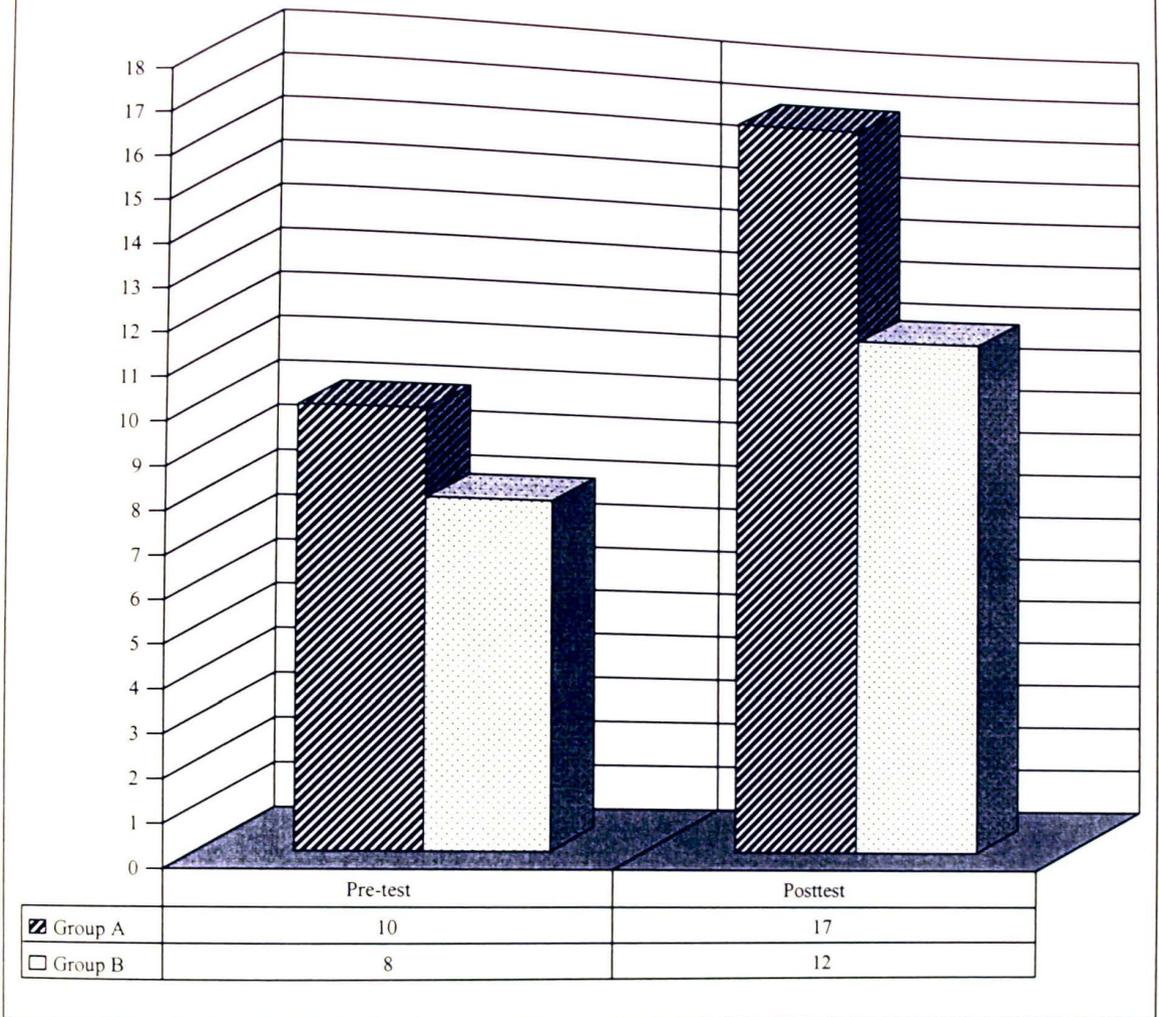


Figure 3-13 Number of students who answered the question correctly for the skill,

Graphic Sources

Group A had more students correctly answer the question for the skill, Graphic Sources, on the pretest than did Group B. Group A showed larger gains from the pretest to the posttest on this question. Group B showed slightly smaller gains from the pretest to the posttest in the number correctly answering the skill Graphic Sources.

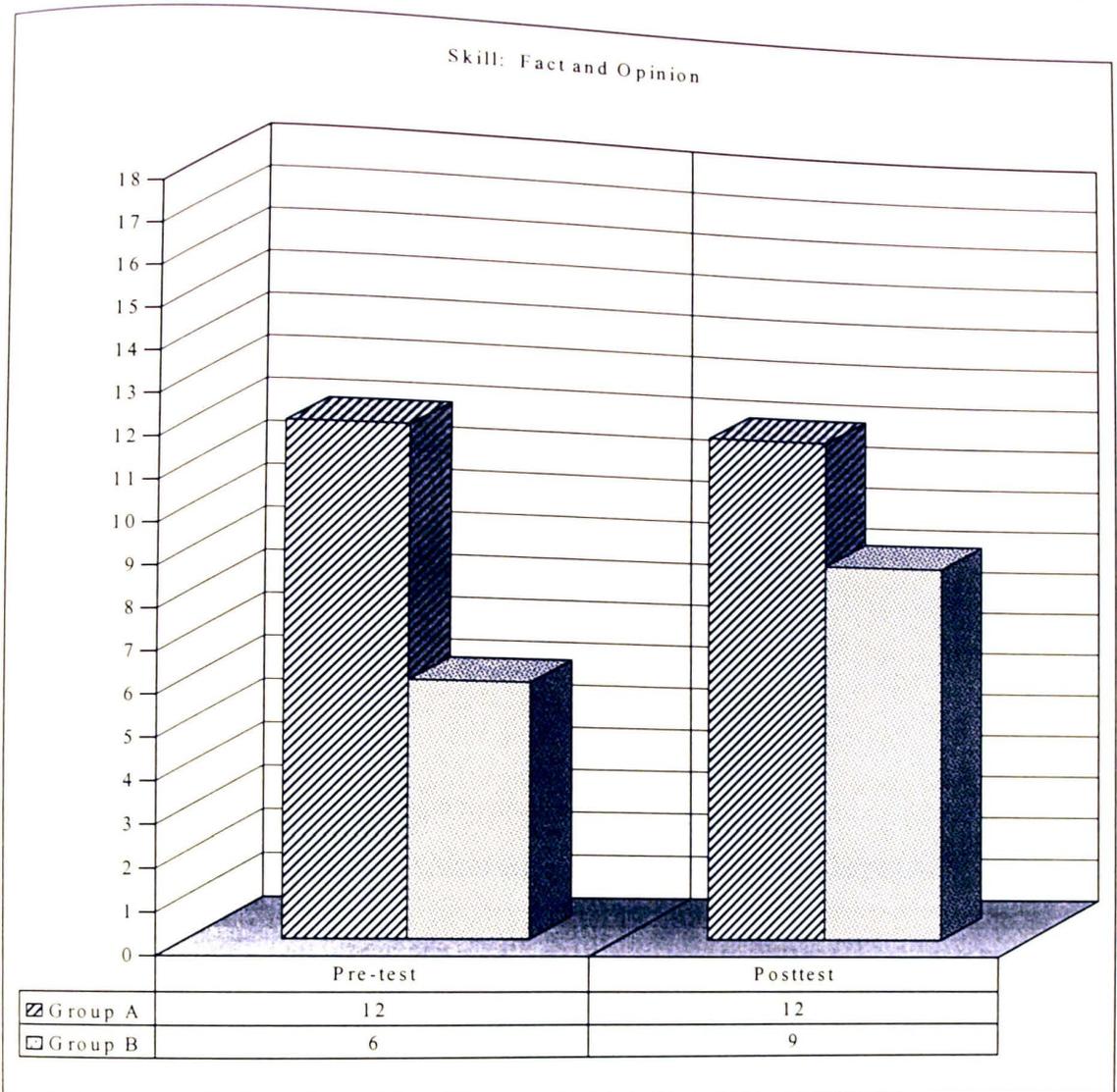


Figure 3-14 Number of students who answered the question correctly for the skill, *Fact and Opinion*

Group A showed no gains from the pretest to the posttest, while Group B showed small gains from the pretest to the posttest in the number correctly answering the question for the skill, Fact and Opinion. Although Group A showed no gains from pretest to posttest, more students in Group A still answered the question correctly on the posttest than did the number of students in Group B.

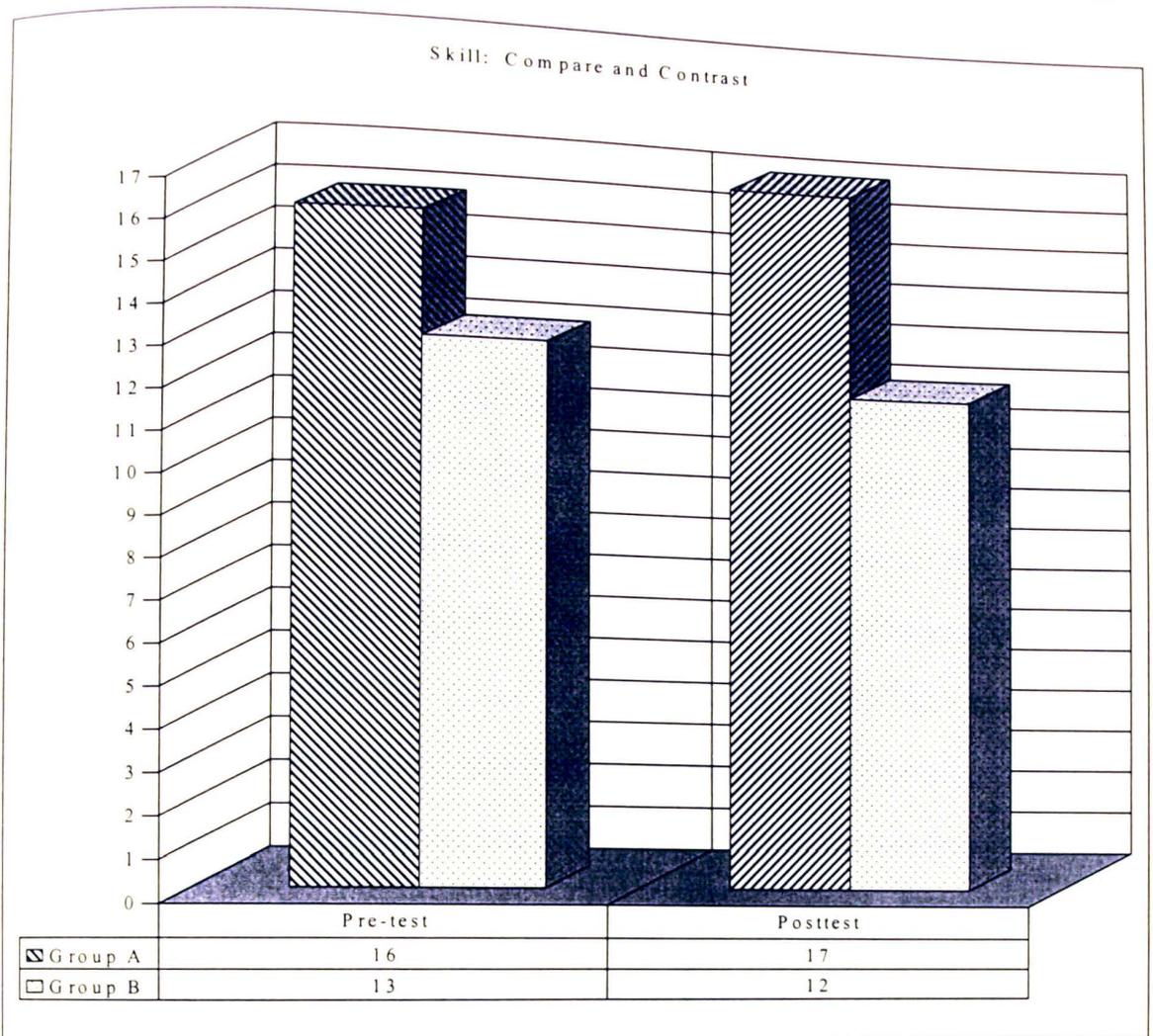


Figure 3-15 Number of students who answered the question correctly for the skill, Compare and Contrast

Group A showed a slight gain from the pretest to the posttest, as did Group B show a slight gain from the pretest to the posttest in the number correctly answering the question for the skill, Compare and Contrast. The gains were small for both groups, but Group A had more students answering correctly on both the pretest and the posttest on the question for the skill, Compare and Contrast.

CHAPTER V

SUMMARY, DISCUSSION, RECOMMENDATIONS

Summary

The central purpose of this pilot study was to evaluate to what extent second grade posttest reading comprehension scores will increase from second grade pretest reading comprehension scores when critical thinking skills are taught across the curriculum. The currently adopted reading series, Scott Foresman Reading (Tennessee Multimedia Edition), was implemented for the pretest and posttest, as well as instruction. The reading comprehension portion of the End-of-Year Benchmark Test was administered to set a baseline for each group. The End-of-Year Skills Test was administered as the posttest. Though the pretest was not given until February 11, 2003, the students began receiving treatment in January 2003 as part of the researchers' Focused Assessment.

The statistical design applied was a *t*-Test for Independent Samples using the statistical program GraphPad Prism Version 3 for Macintosh. The pretest scores for the 18 students in the treatment group and the 14 students in the control group were analyzed. Using a confidence level of 95%, no statistical significant difference was found between the two groups on reading comprehension on the pretest. Utilizing the same program and statistical design, a significant difference was found between the mean scores of the two groups on reading comprehension on the posttest.

Group A students scored significantly higher on the skills: setting, character, sequence, inferring, predicting, making judgments, main idea, author's purpose, and graphic sources after receiving the planned focused instruction. The skills of context

clues, drawing conclusions, and compare and contrast also showed slight gains after treatment. There was no change, however, for the skill: fact and opinion. All students attempted all questions, including the essay questions on both the pretest and posttest.

Group B scored higher on the skills: character, context clues, drawing conclusions, inferring, predicting, making judgments, main idea, predicting, making judgments, main idea, author's purpose, graphic sources, fact and opinion, and compare and contrast. Group B actually scored lower on the skills: setting and sequence after receiving the traditional method of instruction. It is interesting to note that while Group B students attempted most of the essay questions on the pretest, most students did not attempt the essay questions on the posttest.

The question was also poised as to what extent at-risk second grade students taught critical thinking skills across the curriculum through direct instruction would be able to meet the state's standard score on the T-CAP Test. Current world events and the deployment of roughly half the parents in both classes, prompted the pilot study to be concluded prior to the T-CAP Test being administered. The emotional state of the students began to deteriorate along with their attention spans prohibiting the effectiveness of the treatment.

The third question poised was to what extent will at-risk second grade students receiving direct instruction of critical thinking skills across the curriculum improve in other academic areas. No formal testing was administered in this area, however, Figure 4-1 represents three chapters of mathematics that were covered during the period of March 7, 2003 through March 19, 2003 for the treatment group. The mathematics book used was Harcourt Brace, Math Advantage Grade 2, copyright 1999.

Chapter 6 in Math Advantage Grade 2 covers the skill, Counting Money. Specifically, the students used the skill counting-on to identify amounts of money using coins and they also used coins to act out and solve word problems. Chapter 7 in Math Advantage Grade 2 covers the skill, Using Money. The students used coins to show amounts of money to 99 cents. Additionally, the students counted coins and identified objects that could have been bought with that amount of money. Finally, the students used pennies to figured change by counting-on. Chapter 20 covered the skill, Length: Customary Units. The students first used nonstandard units, such as paper clips, to measure length. Next, they estimated, and then measured lengths in inches using rulers. The students also estimated the length of an object as more than, less than, or the same as one foot. As a final point, the students used the problem-solving strategy, guess and check, to estimate the length of a line, which was either curved or jagged.

The students in the treatment group showed gains from the pretest to the posttest for each chapter. It is interesting to note the increased scores on the posttest after the students received planned focused instruction in mathematics. The pretest scores of Chapter 6 ranged from 7 to 86% compared to the posttest scores of 86 to 100%. Three children scored 100% on the posttest and six others scored a 93%, which also equates to a letter grade of A. The pretest scores on the Chapter 7 pretest ranged from 8 to 92% compared to the posttest scores of 58 to 100%. Six students scored 100% on the posttest. Even the children scoring 58% on the posttest made gains from the pretest. The pretest scores on the Chapter 20 pretest ranged from 33 to 92% compared to the posttest scores of 75 to 100%. Seven children scored 100% on the posttest

Students	Pretest and Posttest Scores for Treatment Group A					
	Chapter 6		Chapter 7		Chapter 20	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
A	50	93	58	83	83	90
B	14	93	17	58	42	83
C	21	86	83	92	75	100
D	29	93	33	92	83	100
E	14	93	50	83	83	92
F	71	93	92	100	58	92
G	86	100	33	83	83	100
H	7	86	8	92	75	100
I	14	93	8	78	58	100
J	8	100	8	100	33	80
K	21	86	17	100	50	92
L	50	93	42	92	75	100
M	64	100	93	100	92	83
N	36	100	42	100	67	100
O	21	100	42	83	75	75
P	29	93	42	58	58	92
Q	29	80	50	92	83	92
R	50	80	33	100	33	80

Figure 4-1 Sample of Math pretest and posttest scores for the period of March 7, 2003 through March 19, 2003 for the treatment group

Discussion

The purpose of the treatment was to motivate students to learn, problem solve, and think critically while providing a real-world context for their learning. Employers, educators, and public officials are pushing to the forefront the need to teaching students thinking and reasoning skills. Teachers are reluctant to delve into this area due to lack of training and lack of resources. Additionally, teachers fear that drill and skill is the only way to meet the requirements for improving standardized test scores, which are increasingly emphasized by school administration and public officials.

Unfortunately, many educators hold low expectations for special needs children. Further, there is a preconceived notion that special needs children would not benefit nor be able to successfully participate in critical thinking activities. Traditional methods of ability grouping, grade retention, special education, pullout programs for remedial instruction, are now believed to actually reduce student learning opportunities. According to Kauffman, et al. (2001), higher-order thinking of students with special needs can be improved with effective instruction, especially metacognition and comprehension. In order for this instruction to be effective, the learner must be systematically introduced to content or skills from previous lessons, taught to use advanced organizers, and be given the opportunity for extended practice.

Though special needs learners require extra support for academic achievement, the statistically significant difference between the reading comprehension pretest and posttest means scores for the treatment group in this pilot study belies that notion. The students in the treatment group attempted every activity without hesitation. While the students in Group A were more successful in some activities than in others, they did not hesitate to attempt every activity with which they were presented. Their self-confidence rose. They learned how to problem solve situations when working together in small groups, increasing overall group productivity.

This is further evidenced by the treatment groups' performance in mathematics. During the treatment period, the students' pretest scores ranged from 7 to 86% on the skill of money covered in Chapter 6 in the mathematics book, Math Advantage Grade 2. Typically, this is a difficult skill for most second grade students regardless of academic ability. Conversely, the students' posttest scores ranged from 86 to 100%. Three of the

students scored 100% on the posttest and six others scored 93%, which also equates to a letter grade of A. Chapter 7 in the mathematics book, Math Advantage Grade 2, covers the skill of using money. The pretest scores on this chapter ranged from 8 to 92% compared to the posttest scores of 58 to 100%. Regardless of the posttest score, every student made gains from their pretest scores. Six of the students scored 100% on the posttest. Length: Customary Units is the skill covered in Chapter 20 of the mathematics book. The pretest scores ranged from 44 to 92%. In contrast, the posttest scores ranged from 75 to 100% with seven of the students scoring 100%. The findings of this pilot study indicate, therefore, that incorporating critical thinking skills across the curriculum, may have contributed to the significant gains between pretest and posttest both in reading comprehension and the mathematic scores.

Recommendations

The following recommendations are based on the outcome of this study.

1. It is recommended that a replication of this study be administered to future special needs children, focusing on the potential benefits across the curriculum.
2. It is recommended that a more extensive pilot study be conducted for a longer period of time and with a larger population.
3. It is recommended that more grade level be used for analysis.
4. It is recommended that teachers receive training for implementing higher-level thinking skills in the classroom.

LIST OF REFERENCES

LIST OF REFERENCES

- Applegate, M. D., Quinn, K. B., & Applegate, A. J. (2002). Levels of thinking required by comprehension questions in formal reading inventories: informal reading inventories may not be the best tool for assessing higher level thinking skills. *The Reading Teacher*, 56(2). Retrieved October 26, 2002 from Expanded Academic ASAP database.
- Astleitner, H. (2002). Teaching critical thinking online. *Journal of Instructional Psychology*, 29(2). Retrieved October 26, 2002 from Expanded Academic ASAP database.
- Cotton, K. (2001). Teaching thinking skills. *Northwest Regional Educational Laboratory*. Retrieved September 14, 2002, from <http://www.nwrel.org/scpd/sirs/6/cu11.html>.
- Duplass, J. A. & Ziedler, D. (2002). Critical thinking and logical thinking. *Social Education*, 66(5). Retrieved October 26, 2002 from Expanded Academic ASAP database.
- Dyrud, M. A. & Worley R. B. (1998). Critical thinking. *Business Communication Quarterly*, 61(3). Retrieved October, 2002 from Expanded Academic ASAP database.
- Edmondson, J. (2002). Asking different questions: Critical analyses and reading research. *Reading Research Quarterly*. 37(1), 113-121.
- Gibson, C. (1995). Critical thinking skills through questioning. *RQ*, 35(1), 27-36
- Green, F.E. (1999). Brain and learning research: implications for meeting the needs of diverse learners. *Education*, 119(4), Retrieved from Expanded Academic ASAP database.
- Haas, P. F. & Keeley, S. M. (1998). Coping with faculty resistance to teaching critical thinking. *College Teacher*, 46(2), Retrieved October 26, 2002 from Expanded Academic ASAP database.
- Hopson, M. H., Simms, R. L., & Knezek, G. A. (2001). Using a technology-enriched Environment to improve higher-order thinking skills. *Journal on Research on Technology in Education*, 34(2), 109-120.
- Ivie, S. D. (1998). Ausubel's learning theory: An approach to teaching higher-order thinking skills. *High School Journal*, 82(1), Retrieved September 22, 2002 from InfoTrac OneFile database.

- Jarolimek, J. & Parker, W. C. (1993). *Social Studies in Elementary Education (9th ed.)*. New York: Macmillan Publishing Company.
- Kauffman, J. M., Davis, P. D., Jakubecy, J. J., & Lundgren, K. A. (2001). Self-concept, higher-order thinking, and teaching: commentary on the findings of two meta-analyses. *The Elementary School Journal*, 01(3), Retrieved from InfoTrac OneFile database.
- National Council for Excellency in Critical Thinking (n.d.) *A Draft Statement of Principles* Retrieved September 19, 2002, from <http://www.criticalthinking.org/ncect.html>
- Paul, R. (1993). The logic of creative and critical thinking. *American Behavioral Scientist*, 37(1). Retrieved September 16, 2002 from Expanded Academic ASAP database.
- Rubado, K. (2002). Empowering students through multiple intelligence. *Reclaiming Children and Youth*, 10(4). Retrieved March 8, 2003 from Expanded Academic ASAP database.
- Savage, L. B. (1998). Eliciting critical thinking skills through questioning. *The Clearing House*, 71(5), Retrieved September 15, 2002 from Expanded Academic ASAP database.
- Swanson, H. L. (2001). Searching for the best model for instructing students with learning disabilities. *Focus on Exceptional Children*, 34(2) Retrieved June 6, 2002 from Expanded Academic ASAP database
- Taylor, B. M., Pearson, P. D., Peterson, D., & Rodriguez, M. C. (2002). Center for The Improvement of Early Reading Achievement. Retrieved October 15, 2002, from <http://www.ciera.org/library/reports/inquiry-2/2-016fmh.html>
- Tener, N. (1995). Information is not knowledge. *Childhood Education*, 72(2). Retrieved October 26, 2002 from Expanded Academic ASAP database.

APPENDICES

APPENDIX A

Research Involving Human Subjects

Austin Peay State University Institutional Review Board

January 3, 2003

Barbara Fitch
c/o Margaret Deitrich
Education Dept.
APSU Box 4545

RE: Your application dated December 2, 2002 regarding study number 03-012: Effects of Direct Instruction of Critical Thinking Skills on At-Risk Second Grade Reading Comprehension (Austin Peay State University)

Dear Ms. Fitch:

Thank you for your response to requests from a prior review of your application for the new study listed above.

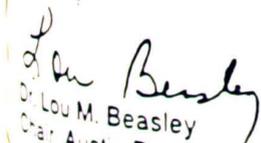
Congratulations! This is to confirm that your application is now fully approved. The protocol is approved through one calendar year. You must obtain signed written consent from all subjects. . . . This approval is subject to APSU Policies and Procedures governing human subjects research. You may want to review this policy which can be viewed on the APSU website at: www2.apsu.edu/www/computer/policy/2002.htm

You are granted permission to conduct your study as most recently described effective immediately. The study is subject to continuing review on or before December 2, 2003, unless closed before that date. Enclosed please find the forms for reporting a closed study and for requesting approval of continuance.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. If you have any questions at all do not hesitate to contact Lou Beasley (221-7414; fax 221-7641; email beasleyl@apsu.edu) or any member of the APIRB.

Again, thank you for your cooperation with the APIRB and the human research review process. Best wishes for a successful study!

Sincerely,



Dr. Lou M. Beasley
Chair, Austin Peay Institutional Review Board

APPENDIX B

Letters of Inquiry

January 27, 2003

Barbara Fitch
Teacher/Glenellen Elementary
1324 Barbara Drive
Clarksville, TN 37043

Sallie Keith
Director of Instructional Support
And Research and Development
Board of Education
61 Gracey Avenue
Clarksville, TN 37043

Dear Ms. Keith:

I am submitting a letter requesting approval of a field study entitled, *Effects of Direct Instruction of Critical Thinking Skills on Second Grade Reading Comprehension*.

With effective instruction, the higher-level thinking of students with disabilities can be improved, especially in metacognition and comprehension. Critical thinking skills are not widespread or taught sufficiently. Most students score lowest in problem solving and critical thinking skills on standardized test. The purpose of this study is to discern the effect of teaching critical thinking skills through direct instruction across the curriculum on second grade pre- and posttest reading comprehension scores.

Two groups of second grade students will be the subjects of this pilot study. Each of the two groups will be composed of 18 children ranging in ages from seven to nine and be of mixed academic abilities. There are 19 females and 17 males. The children are students in two adjacent classrooms. One of the groups of students is the principal investigator (PI). The other group is students of PI's team teacher. There are five identified learning-disabled students in each classroom. The remainders of the students are considered to be at-risk academically. The students will receive a video and popcorn party in compensation for returning the informed consent forms.

Students in both classrooms will be administered the End-of-Year Benchmark Test from the currently adopted reading series, Scott Foresman Reading (Tennessee's Multimedia Edition) in February 2003. This test is not usually administered, but will serve as a pre-test to set a baseline for each group. Over the course of the preceding 3 months, the students in the PI's classroom will receive instruction in the state mandated curriculum and the currently adopted reading series. Additional critical thinking skills will be taught in all subject areas twice a week using activities from such resources as *Critical Thinking Activities*, *Kagan's Brain-Based Learning Skills*, *Grade 2 Powerthink*, *Cooperative Critical Thinking Activities*, *How to Solve Word Problems*, and *Literacy Centers Activities*. The principal investigator will be doing these activities as directed by

the principal as the PI's Focused Assessment Project. The control group teacher will use the traditional method of instruction without the extra activities. In April 2003, both groups will be administered the standard End-of-Book Test from the same reading series. This test would be administered regardless of a field study being conducted. Only the reading comprehension scores on both tests will be collected for data comparison.

The data gathered is intended to investigate the effects of teaching crucial thinking skills on reading comprehension for special needs learners in second grade. In order to minimize the risk of breach of confidentiality, the grade level chair will produce a master list of both classes, coding the data with random numbers. The compiled data will be kept confidential and stored in a locked file cabinet in the administrative office of the school until this study is concluded. At the conclusion of this study, the grade level chair will shred the data. This data will be published and presented in such a way that does not reveal the identities of the participants. It is anticipated that at-risk students receiving direct instruction in critical thinking skills across the curriculum will significantly increase their posttest reading comprehension scores from their pre-test reading comprehension scores.

In order for me to be able to complete this field study, I need to begin in February. Thank you for your time and expedient handling of this matter.

Sincerely,

A handwritten signature in cursive script that reads "Barbara Fitch". The signature is written in black ink and is positioned above the printed name.

Barbara Fitch



Sallie Keith
Curriculum & Instruction Coordinator

Board of Education 621 Gracey Avenue Clarksville, Tennessee 37040
931-920-7819 Fax: 931-920-9819 sallie.keith@cmcss.net

January 29, 2003

Mrs. Barbara Fitch
1324 Barbara Drive
Clarksville, TN 37043

Dear Mrs. Fitch:

Your research project titled "Effects of Direct Instruction of Critical Thinking Skills on Second Grade Reading Comprehension" has been approved by the research committee. The date of approval was January 28, 2003.

Now that you have approval from the research committee, you may contact the principal for approval. According to Board Policy File IFA, the principal has the final authority and responsibility for approving or disapproving research conducted in his/her building.

Please read the Research Policy and Procedures Handbook for all information concerning research in the Clarksville-Montgomery County Schools.

If you have questions, please call my office at (931) 920-7819.

Sincerely,

A handwritten signature in cursive script that reads "Sallie Keith".

Sallie Keith
Curriculum and Instruction Coordinator

January 31, 2003

Barbara Fitch
Teacher/Glenellen Elementary
1324 Barbara Drive
Clarksville, TN 37043

Clara Patterson
Principal
Glenellen Elementary
825 Trenton Road
Clarksville, TN 37040

Dear Ms. Patterson:

I am submitting a letter requesting approval of a field study entitled, *Effects of Direct Instruction of Critical Thinking Skills on Second Grade Reading Comprehension*. This request was approved by the research committee of the Clarksville Montgomery County School System on January 28, 2003.

With effective instruction, the higher-level thinking of students with disabilities can be improved, especially in metacognition and comprehension. Critical thinking skills are not widespread or taught sufficiently. Most students score lowest in problem solving and critical thinking skills on standardized test. The purpose of this study is to discern the effect of teaching critical thinking skills through direct instruction across the curriculum on second grade pre- and posttest reading comprehension scores.

Two groups of second grade students will be the subjects of this pilot study. Each of the two groups will be composed of 18 children ranging in ages from seven to nine and be of mixed academic abilities. There are 19 females and 17 males. The children are students in two adjacent classrooms. One of the groups of students is the principal investigator (PI). The other group is students of PI's team teacher. There are five identified learning-disabled students in each classroom. The remainders of the students are considered to be at-risk academically. The students will receive a video and popcorn party in compensation for returning the informed consent forms.

Students in both classrooms will be administered the End-of-Year Benchmark Test from the currently adopted reading series, Scott Foresman Reading (Tennessee's Multimedia Edition) in February 2003. This test is not usually administered, but will serve as a pre-test to set a baseline for each group. Over the course of the preceding 3 months, the students in the PI's classroom will receive instruction in the state mandated curriculum and the currently adopted reading series. Additional critical thinking skills will be taught in all subject areas twice a week using activities from such resources as *Critical Thinking Activities*, *Kagan's Brain-Based Learning Skills*, *Grade 2 Powerthink*, *Cooperative Critical Thinking Activities*, *How to Solve Word Problems*, and *Literacy*

Centers Activities. The principal investigator will be doing these activities PI's Focused Assessment Project. The control group teacher will use the traditional method of instruction without the extra activities. In April 2003, both groups will be administered the standard End-of-Book Test from the same reading series. This test would be administered regardless of a field study being conducted. Only the reading comprehension scores on both tests will be collected for data comparison.

The data gathered is intended to investigate the effects of teaching crucial thinking skills on reading comprehension for special needs learners in second grade. In order to minimize the risk of breach of confidentiality, the grade level chair will produce a master list of both classes, coding the data with random numbers. The compiled data will be kept confidential and stored in a locked file cabinet in the administrative office of the school until this study is concluded. At the conclusion of this study, the grade level chair will shred the data. This data will be published and presented in such a way that does not reveal the identities of the participants. It is anticipated that at-risk students receiving direct instruction in critical thinking skills across the curriculum will significantly increase their posttest reading comprehension scores from their pre-test reading comprehension scores.

In order for me to be able to complete this field study, I need to begin in February. Thank you for your time and expedient handling of this matter.

Sincerely,


Barbara Fitch

Approved
Cilava Patterson
Jan 31, 2003

APPENDIX C

Informed Consent

**Consent to Participant in a Research Study
Austin Peay State University**

You are being asked to allow your child to participate in a research study. This form is intended to provide you with information about this study. You may ask the researchers listed below about this study or you may call the Office of Grants and Sponsored Research, Box 4517, Austin Peay State University, Clarksville, TN 37044, (931) 221-7881 with questions about the rights of research participants.

1. TITLE OF RESEARCH STUDY Effects of Direct Instruction of Critical Thinking Skills on Second Grade Reading Comprehension

2. PRINCIPAL INVESTIGATOR Barbara Fitch, second grade teacher at Glenellen Elementary School and a graduate student at Austin Peay State University. Her advisor is Dr. Margaret Deitrich, (931) 221-7522.

3. THE PUPOSE OF THE RESEARCH The purpose of the research is to evaluate whether including activities in critical thinking skills will improve reading comprehension in second grade students when compared to students who do not take part in these extra activities.

4. PROCEDURES FOR THIS RESEARCH This study is voluntary, if you agree with your child's participation in this research project; your child will be given a reading test in January. This will set a starting point. The students in Mrs. Fitch's class will be taking part in the critical thinking skills activities (learning how to solve word problems) twice a week. The students in Mrs. Judd's class will not be taking part in these activities. In May, your child will take the End-of-Book test *as usual*. The scores from both tests will be compared to see if the critical thinking activities helped to raise the scores between the two tests. In order to minimize the risk to your child's scores being made public, the grade level chair for second grade will make a master list of the children's name. She will assign each child a random number beside their reading scores. Their names will not appear beside their scores when the scores are compared. Their scores will be kept confidential and stored in a locked filing cabinet in the administrative offices of the school until the study has ended. At the end of the study, all data will be destroyed by the grade level chair. The data that results from the analysis of their scores will be published or presented in a way that does not reveal the identity of your child. A copy of the research results will be made available upon request. Mrs. Fitch's students will be taking part in the critical thinking skills twice a week. Your consent means that you agree that your child can take the pretest in January and that Mrs. Fitch will be able to include your child's reading scores for comparison in her study. Regardless of whether you agree or disagree to take the test in January and allow his/her scores to be used in the comparison, your child will take part in all activities in Mrs. Fitch or Mrs. Judd's classroom. All students who return their consent form, whether you agree or disagree, will participate in the video and popcorn party.

5. POTENTIAL RISKS OR BENEFITS TO YOUR CHILD The risk to your child is minimal. The benefit of this research is that it will let us gain a better understanding of just how well critical thinking skills can improve reading comprehension.

6. INFORMED CONSENT STATEMENT:

INFORMED CONSENT STATEMENT:

I have read the above and understand what the study is about, why it is being done, and any benefits or risk involved.

I understand that I do not have to allow my child to take the pretest, and my refusal to participate will involve no penalty or loss of rights.

I understand that I have the right to withdraw my consent at any time during the study until the results are published, and all data collected from my child will be destroyed.

If I choose to withdraw my child, that choice will be respected and my child will not be penalized or coerced to continue. I understand I will receive a copy of this form.

If I have questions about this study I may call Barbara Fitch (graduate student, Education Department) at 931-920-6158 or Dr. Margaret Deitrich (faculty supervisor, Education Department) at 931-221-7522.

_____ I agree to allow my child, _____, to take the pretest in January and I understand that by agreeing to participate I have not give up any of his/her human rights.

_____ I DO NOT agree to allow my child, _____, to take the pretest in January.

Signature of Research Participant (or legally authorized representative)

Date

Signature of Researcher

APPENDIX D

Example of Critical Thinking Activity

RESEARCH PROJECT

Critical Thinking Activity

OBJECTIVES:

Process: Analysis, Application, Classification, Comparing, Similarities and Differences, Description, Discussion, Generalization, Listing, and Synthesis

Content: The student will recognize that there are differences among animals of the same kind and that they have features to help them survive in different environments.

CONTEXT:

Group Size: Three

Grade Grouping: Second

CLASS MATERIALS:

Critical Thinking Activities Primary Level, Project Wild, Animal Wildlife Cards, library books, the magazine Zoobooks, and a research form

PROCEDURES:

1. The students will be assigned into groups of three. Each group will determine who will read the information for the group, who will write the information for the group, and who will present the information to the class.
2. The animals to be researched are types of bears to include: the polar bear, grizzly bear, panda bear, and the black bear.
3. Each group will be given Animal Wildlife Cards, library books, and the magazine Zoobooks with which to research their assigned bear.
4. Each group will be given a research form, which lists the information their team is to investigate.
5. The students will spend two thirty-minute sessions researching and reporting on their assigned bear. The students have the option to present their findings either by report or illustrations.

RESULTS:

Each group successfully completed the objectives. The students in each group worked cooperatively and came to a consensus as to who would complete each part of the assigned task. Each group elected to read their report to the class while holding up a picture from one of the reference books. The students used the research form to help them look for clues to find the required information in the reference material. The students used their reference materials to collect the information with which to complete their research form. All of the information on the form dealt with factual information, but the students were required to find an interesting fact about their bear and include it on the research form. It is interesting to read the fact each group wrote. It is proof that they actually read the information in the reference material. The facts were information that was within the text, not merely a caption under a picture. The completed forms are included in the following pages.

Team: _____

My bear is a Polar bear.

My bear eats: Fish

My bear lives in a cave and in the country of arctic

My bear does or does not hibernate. no

My bear is white color.

My bear protects itself by bitting

My bear weighs 1100

My bear is 500 tall

Tell me one fact about your bear that you found to be the most interesting.

How they live in the cold

with out the warm weather and they lived for a long time

Team:

My bear is a Grizzly

My bear eats: fish

My bear lives forest and in the country of North America

My bear does or does not hibernate.

My bear is ^{not truly} brown color.

My bear protects itself by making marks

My bear weighs 700

My bear is 5 feet tall

Tell me one fact about your bear that you found to be the most interesting.

We think what's interesting
how the cub waits for his
mom or dad

Team: -----

My bear is a Panda Bear.

My bear eats: bamboo plants.

My bear lives the forests ever- and in the
country of china ^{green-bamboo} trees.

My bear does or does not hibernate.

My bear is black and white color.

My bear protects itself by they defend themselves
by climbing trees.

My bear weighs 300 pounds.

My bear is 6 feet tall

Tell me one fact about your bear that you found to be the most interesting.

Fossils of the giant panda have been found that over four million years old.

Team: -----

My bear is a Black bear.

My bear eats: fish Honey blueberries

My bear lives China and in the country of North American.

My bear does or does not hibernate.

My bear is Black with tan color.

dark brown

My bear protects itself by they can't be disturbed while eating because they will attack

My bear weighs 800 pounds

My bear is 6 feet tall

Tell me one fact about your bear that you found to be the most interesting.

People eat about 1,500 calories each day in the fall a bear may consume 15,000 calories each day!

Vita

Barbara Fitch was born in Kingsport, TN on March 22, 1959. She graduated from Ketron High School in 1977 and attended Berea College in 1978. She moved to San Antonio, TX when her husband joined the Air Force in 1980. There she attended San Antonio Community College. In 1985 she and her family moved to The Netherlands, where she attended The City Colleges of Chicago. Returning to the United States in 1987, she earned her Bachelor of Science degree in Elementary Education from Methodist College, Fayetteville, NC in December 1993. Her family returned to San Antonio where she began teaching for the San Antonio Independent School District in August of 1994. That same year, she entered the University of Texas, San Antonio and began her Master of Arts in Education degree.

After her husband retired from the Air Force in 1995, she and her family moved to Sylva, NC where she taught at the Cherokee Indian Reservation for one year. She began teaching for the Clarksville-Montgomery County School System in August of 1996 and she entered Austin Peay State University the same year. In December of 1997, she received her Master of Arts in Education degree. She completed her Education Specialist degree in Elementary Education from Austin Peay State University in 2003.