To the Graduate council:

I am submitting herewith a dissertation written by Betsye Hunter Robinette entitled "Immediate Feedback vs. Self-Correction: A Comparison of Two Peer Tutoring Error Correction Methods." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

Donald J. Dickinson, Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the council:

Associate Vice Chancellor
and Dean of the Graduate School

IMMEDIATE FEEDBACK VS. SELF-CORRECTION: A COMPARISON OF TWO PEER TUTORING ERROR CORRECTION METHODS

A Dissertation

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Doctor of Philosophy

Degree

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ABSTRACT

The effectiveness of two peer tutoring error correction procedures, "Look, Tell, and Say" (Tell) and "Pause, Prompt, and Praise" (Praise) were investigated. Error correction procedures were also evaluated to determine which was more effective at reducing the number of errors made by the tutees, who were taught to compute the percent of a number. Gains made by all tutees, as well as tutor adherence to training were examined.

Thirty one students participated in the study (eleven tutors and twenty tutees). Tutors were selected by teacher nomination as to rating of mathematic skills, scoring in the highest one-third of the class on the Tennessee Comprehensive Achievement Profile (TCAP) total math score and scoring 85% correct or higher on a pretest measuring skill on computing the percent of a number. Tutees were also selected by teacher nomination, rating of math skills, scoring in the lower one-third of the class on the math TCAP, and scoring 50% or lower on the pretest.

Tutors were trained by a videotaped presentation of both the math concept and their respective tutoring methods. Tutors then role played their tutoring method until successfully meeting the criterion level of five successful error corrections. Tutors tutored tutees individually on the 15 math problems. The tutoring session was videotaped for the evaluation of tutor adherence to the training procedures (Tell or Pause). On the day following the tutoring

session the tutees completed a posttest measuring skills in computing the percent of a number.

The results indicate that neither the Tell or the Pause method yielded consistently higher post-test scores for the tutees ($F(1,18) = .59$, $p = .45$). All tutees had significant increases in their ability to compute the percent of a number irrespective of tutoring condition. Tutees in the Tell group made fewer errors than tutees in the Pause group. Tutors in both groups made errors in following tutoring steps, but tutor errors did not appear to impact tutee's post-test scores. Results of additional analysis revealed interesting implications regarding the gender composition of the tutoring pairs. Tutees who spent the longest time in the tutoring session had the least gains on the posttest. The findings suggest that all tutees benefitted from tutoring as measured by increases in math post-test scores.

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CHAPTER I

INTRODUCTION

Peer tutoring is a viable alternative to some of the traditional methods of modified classroom instruction. Classroom teachers often report that there is never enough time in a school day to ensure every student has gained academic understanding. Many students will comprehend the material upon first presentation and be ready to move on. Others will not understand or have insufficient information and skills in order to gain knowledge of the concept presented. Students who do not grasp the concept upon first presentation would benefit from more instructional time, practice, and corrective feedback in a supportive environment. Since most classroom teachers do not have the time or opportunity to modify instruction for each individual student, methods to increase student instructional time needs investigation. Peer tutoring can fill this need by providing the needed supportive, one-on-one instructional environment.

Peer tutoring methods are not new to the educational instructional repertoire (Allen, 1976). Theoretically, peer tutoring should have very positive benefits since general educational research has shown that by merely reducing the teacher pupil ratio, both instructional time and learning retention rates are increased (Berliner, 1988).

Many studies have effectively demonstrated that properly instituted peer tutoring programs can derive great benefit for all students involved. Studies have shown that tutoring programs can produce positive results in self-concept (Jenkins & Jenkins, 1982), school interest and academic content (Gold & Johnson, 1982; Lazerson, 1980), academic performance (Csapo, 1976), and social behavior (Lane, Pollock, & Sher, 1972). Peer tutoring techniques also reinforce teacher instruction, better utilization of "idle" classroom time and produce both academic and social benefits for all those involved (Greenwood, Carta, & Hall, 1988). Peer tutoring also generally occurs in a "one-to-one" teaching style, and this method is generally superior to conventional classroom and mastery learning methods of group instruction (Bloom, 1984). In fact, "some peer tutoring procedures have been demonstrated to be even more effective than conventional teacher mediated procedures because of increased opportunities to respond [and] immediate feedback . . . " (Greenwood et al., 1988, p. 271).

Statement of the Problem

Often tutors are instructed in the material they are to present to the tutee, but seldom are they taught varying and useful error correction procedures. There are two viable models of error correction methods: "Pause, Prompt, and Praise" and "Look, Tell, and Say". Advocates of the "Look, Tell, and Say" method emphasize that immediate feedback to correct mistakes

increases learning, while advocates of the "Pause, Prompt, and Praise" method insist that increased opportunities to respond and time for self-correction is the most beneficial. These error correction models differ on their basic theoretical constructs. Advocates of the model providing immediate feedback to errors believe learning is enhanced when the learner is provided with immediate knowledge on the correctness of their response. Advocates of the other method embrace the idea that learning is increased when a student is allowed time to self-correct mistakes. This enhances self-esteem and decreases teacher dependence. However, very little controlled research has been done to examine the results of these different methods of error correction. This study will compare which of two tutoring methods based on these models is the most effective peer tutoring method.

Merits of Peer Tutoring

The primary goal in education is to instruct all students in achieving adequate mastery of all subjects taught. Since this is not consistently done and individual instructional time cannot be given to every student by the classroom teacher, other methods need to be developed. Peer tutoring is a method to help children learn more effectively.

Peer tutoring programs have been found to be effective because the tutees do not have to wait for the teacher to grade a paper to receive corrective information or to have their questions answered (Guaranaccia, 1970). Such

tutoring also implements effective learning principles, knowledge of results while learning is occurring and the lack of negative feedback from an authority figure (Guaranaccia, 1970). The peer tutor is also often a relief from the formality of the classroom and is indigenous to the tutee population and speaks their "language" (Gredler, 1985). Peer tutoring programs increase on-task learning time and academic achievement as well as increasing both tutor and tutee self-esteem (Scruggs, Mastropieri, & Richter, 1985; Yogev & Rachel, 1982).

This study can extend the current research on peer tutoring. More importantly, it will not only demonstrate which error correction procedure is most effective in a peer tutoring situation, but may also indicate how well tutors actually follow their training procedures in a one-to-one tutoring situation.

Purpose of the Study

The primary purpose of this study is to determine which error correction procedure ("Look, Tell, and Say" vs. "Pause, Prompt, and Praise") is the most beneficial to students in a peer tutoring program. The two error correction procedures to be studied are immediate feedback (designed to model the correct answer and to provide knowledge of their efforts -- known as "Look, Tell, and Say") and delayed feedback (designed to increase opportunity to respond and self-correction time -- known as "Pause, Prompt, and Praise"). There is currently some controversy over which is the most effective. Peer tutoring's overall effectiveness will also be examined based on all tutees'

increase in learning based on math post-test scores. The second purpose will be to determine to what extent tutor training actually influences the tutoring process. Tutor adherence to the training procedures will be studied and videotaped. The presence of essential features of tutoring will be evaluated.

Overview of Methodology

Students will be pre-tested on the math concept of computing the percent of a number. Math was chosen because it is easily identifiable and scoreable as either correct or incorrect. Other subjects, such as reading, science or social studies, would require much more subjectivity on the part of the tutor in identifying incorrect or partially incorrect responses. Peer tutoring has been successfully used in a number of math tutoring programs due to the high percentage of low achievers in math and the ease of scoring responses as correct or incorrect for the tutor (Bourke, 1985; Harris & Sherman, 1973; Piggott, Fantuzzo, & Clement, 1986; Sharpley, Irvine, & Sharpley, 1983). On the basis of the pre-test scores, Tennessee Comprehensive Achievement Profile (TCAP) scores in math achievement, and teacher nomination, students will be divided into two groups of tutors and tutees. Tutors will be trained in both the math concept to be presented and one of the two tutoring techniques ("Look, Tell, and Say" vs. "Pause, Prompt, and Praise" error correction procedure). Tutoring sessions will then ensue and videotapes will be made of some of the sessions. A posttest will be given, analyzed, and compared with

pre-test scores. Videotapes will also be analyzed to determine the extent to which tutors adhered to their method of tutoring and error correction procedure.

Research Questions

The following research questions will be explored by the present study:

1. Which peer tutoring method ("Look, Tell, and Say" vs. "Pause, Prompt, and Praise") is more effective in increasing pupil learning as measured by a math posttest on computing the percent of a number?

2. Which peer tutoring method is more effective in reducing tutee errors made during tutoring?

3. To what extent does tutor training influence the tutoring process (i.e., do the tutors actually adhere to their respective training procedures)? Adherence will be determined by the number of errors made by tutors in each group.

Definitions of Operational Terms

These definitions function as operational definitions for the present study.

Corrective feedback. Feedback given by the tutor to correct or improve the tutees response. Tutor provides tutee with the knowledge of the results of the tutee's response. Requires the tutee to respond actively to correct mistakes. Used interchangeably with error correction.

Delayed feedback. Feedback (usually in the form of a prompt) given by

the tutor when the tutee makes a mistake. Time delay is at least five seconds in length or until the end of a problem. (Wheldall & Mettem, 1985).

Feedback. Involves the tutor giving the tutee the knowledge of the results of their performance on a problem.

Immediate feedback. Feedback on an error given by the tutor that occurs immediately (less than five seconds) upon an incorrect response by the tutee (Wheldall & Mettem, 1985).

Pause. A delay of response from the tutor when the tutee errors in responding. The pause duration is at least five seconds.

Praise. A specific descriptive comment of approval that tells the learner exactly what behavior is being commended (Merrett, 1988).

Prompt. "Any instance of responding to an error with a clue or hint about the meaning of the word" (McNaughton, 1981a).

Self-correction. An error that is corrected spontaneously by the tutee or after a prompt by the tutor.

Supportive feedback. Feedback given by the tutor to encourage, support or give approval to the tutee for work, effort and correct responses.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter contains relevant literature pertaining to the study. An overview of research on immediate feedback and corrections will be presented first. Two specific methods of peer tutoring techniques will be examined. The theoretical underpinnings for each method will also be reviewed. Each tutoring method is soundly theoretically based, although they differ in their basic concept and in the timing of delivery of feedback and corrections. The major difference between the methods is in using prompts to cue a self correction, or by telling the student how to complete the problem, and having them practice the correct response. The first to be examined will be the "Look, Tell, and Say" method of tutoring which is based on the research foundation of immediate feedback and corrections. Next, a discussion of the literature on delayed feedback in corrections will be presented. This will be followed by a presentation of the "Pause, Prompt, and Praise" method of tutoring which is founded on the delayed feedback literature. A review of the value of tutor training programs will ensue. The review will conclude with a discussion of pertinent developmental aspects of using school-age children in tutoring programs.

Immediate Feedback

The value of immediate feedback and corrections in learning new responses has long been established. In psychological literature, it has become the standard since the writings of Watson, Thorndike and Skinner (as cited in Schwartz, 1978). These theorists demonstrated that the major influence on learning (and thus behavior) is the occurrence of feedback. "Acts which have favorable consequences will continue to occur, while acts which do not have favorable consequences will stop" (Schwartz, 1978, p. 28). Immediate feedback is considered one of the basic principles of learning (Redd, Porterfield, & Anderson, 1979). Learning is generally defined as the "development of new responses, or the development of an ability to do new things" (Schwartz, 1978, p. 138). Immediate feedback has repeatedly been shown to increase learning in a variety of settings (Greenwood et al., 1988; Kalfus, 1984; Skinner, Beatty, Turco, & Rasavage, 1989).

A great deal of research has been done that indicates when a student is provided feedback on the accuracy of his or her answer, learning is increased (Anderson & Faust, 1973). "The term 'knowledge of results' refers to providing the student with information (knowledge) about the adequacy (results) of his response" (Anderson & Faust, 1973, p. 271). This "knowledge" increases learning because it provides reinforcement if the answer is correct and it gives corrective feedback when an error occurs. This type of corrective feedback is what is meant by providing immediate feedback contingent on a student's

response. In fact, learning seems to be facilitated more by having the correct answer provided as opposed to telling the student he or she is incorrect (Travis, VanWagenen, Haygood, & McCormick, 1964). If a student is incapable of making a correct response, provision of the correct response will allow the modeling and acquisition of the correct answer (Anderson & Faust, 1973). Reinforcement in the form of supportive feedback can then be given for a student's efforts. Comments such as "correct", "right" or "you are doing very well" serve as examples of supportive feedback.

Instructional techniques such as programmed instruction and computer-aided instruction (CAI), are also based on the value of immediate corrective feedback in learning (Anderson & Faust, 1973; Skinner et al., 1989). In fact, research with computer-aided instruction suggests that immediate feedback inhibits the students from practicing incorrect responses and thus decreases the probability of learning incorrect answers to academic material (Pellegrino & Goldman, 1987; Siegler & Shrager, 1984).

Studies have shown that the age and ability of the child actually seems to be the major consideration in teaching modes. Young, beginning readers and those who are slower in the initial acquisition of these skills, may in fact benefit more from immediate attention and correction (Singh, Winton, & Singh, 1985; Wheldall, Merrett, & Colmar, 1987).

Due to the volumes of literature repeatedly demonstrating the value of immediate feedback, correction and positive practice on learning, the "Look,

Tell, and Say" method of peer tutoring was developed.

"Look, Tell, and Say"

"Look, Tell, and Say" is based on the concept of immediate corrective feedback as well as positive practice. Immediate corrective feedback has been used by teachers, instructional curriculums and computer aided instruction, and has also been demonstrated to be a useful technique in peer tutoring programs (Ehly, 1987; Greenwood et al., 1988; Kalfus, 1984; Young, Hecimovic, & Salzberg, 1983). In fact, this method of corrective feedback in peer tutoring programs has shown that tutees use it to model the tutors behavior and thus learn and practice correct responses (Ehly, 1987; Heward, Heron, Ellis, & Cooke, 1986). In this method, the tutor basically has a dual role of "teacher" and "corrector". This is much like the role most traditional classroom teachers assume. The "Look, Tell, and Say" method is based upon the premise that, in order for students to learn, the tutor must first focus the students attention on the problem and then tell or show how to get the correct answer. After this is done, the tutor asks the tutee to answer a question on what has just been presented. When the tutee answers, the tutor then provides immediate (and corrective if necessary) feedback on the response. "Feedback tells the student if the answer is right or wrong. It can be a single word such as 'correct', 'that's right', or a nod of the head. Students work harder when they know they are succeeding" (Dickinson, 1990, p. 84). In the case of a correct response, this

type of supportive feedback would be given. If the response was incorrect, corrective feedback, followed by student practice, is given. The tutor's role then, is to provide feedback anytime the tutee responds (written or oral responses).

"Look". The actual "Look, Tell, and Say" technique comes in to play when the tutee responds incorrectly. When an error occurs, the tutor will ask the tutee to look, read or listen to the problem again. It is certain a student cannot answer correctly if they have misunderstood the question. The "Look" cue serves as an attention signal. This corresponds to the information processing model whereby stimuli are processed through the brain's sensory register. This cue serves to focus the student's attention on the problem and the incorrect response.

"Tell". After they re-read the problem, the tutor will tell them the correct answer and show the correct procedure for obtaining the answer. The "Look, Tell, and Say" style believes clues and hints are confusing, frustrating and encourage mere guessing. Guessing leads to incorrect answers, lack of confidence and a reduction in motivation.

Research has been done examining the differences in giving immediate corrections to mistakes, analyzing the mistake (with teacher instruction) and drill (practice) of the correct response. In one study of learning disabled children, the research found that simply supplying the correct answer was more effective than some of the more elaborate correction techniques (Rose, McEntire, &

Dowdy, 1982).

Other studies replicated these results and found that the groups using error analysis procedures were no more effective than simply supplying the correct answer (Meyer, 1982). These findings are in keeping with the theoretical basis of the "Look, Tell, and Say" method.

A later study focused on correction procedures in teaching mentally retarded children oral reading skills. This study used an alternating treatments design to compare the effects of the two types of error-correction strategies. As in the previous work, cited above, the correction procedures examined were word supply and word analysis. Unlike the results of the previous research, this study found that the analysis correction method was superior over the supply method. However, both methods did increase the amount of self-corrections the children used. The discussion points out that the analysis allows the children to learn new techniques to work out the problem (Singh & Singh, 1985). This too can be seen in the "Look, Tell, and Say" tutoring method as during the tell portion, the tutor actually demonstrates how to arrive at the correct answer. The "Tell" component has it's roots in modeling which has been shown to be and effective learning technique on numerous occasions (Bandura, 1965).

"Say". Once the correct answer has been given or demonstrated, the tutee is then asked to repeat, or say, the correct answer. By repeating how to get the answer, the tutee is practicing making the correct responses. This is a

form of response learning which has often proved beneficial.

Other studies have further validated the usefulness of practice on increasing retention and comprehension of the task (Jenkins & Larson, 1979; Jenkins, Larson, & Fleisher, 1983). In fact, Jenkins et al. (1983) suggests that drill (or practice) can substantially improve accuracy. Again, this is a component of the "Look, Tell, and Say" method in that in the say portion, they practice making the correct answer.

This type of error correction procedure has been used successfully in other peer tutoring programs (Hall & Broden, 1977; Thurston, 1989). Thurston (1989) used such an error correction procedure in a parent-child tutor training program. In this procedure, when the child responds incorrectly the tutor is to stop the child immediately and provide the correct answer. Then the tutor asks the child for the response again. This can be done by having the child re-read the problem and attempt to respond correctly. If they are correct, they are praised. If the error continues, the correction procedure is repeated until a correct response is obtained.

Theoretically, practice of the correct answer should increase the probability of giving the correct answer the next time the question or problem occurs. It should also increase the accuracy of the math facts being studied and a correct response made later without the tutor's presence.

Delayed Feedback

The concept of delaying feedback to students is not a new one. In their treatise on the value of immediate corrective feedback, Anderson and Faust (1973), note that if a student realizes she/he will be shown the correct answer, she/he won't bother to prepare or work as diligently during the lesson. Although immediate knowledge of results may "short circuit" the learning process, "providing the correct answer has undeniable value as corrective feedback when the student is wrong" (Anderson & Faust, 1973, p. 274). If the student is required to make a response or try and solve the problem before he receives feedback, then the learning cycle is not short circuited. This brief delay between the time a child makes a response (and in particular, a mistake) is thought to increase accuracy and more actively engage the student in the learning process. In fact many recent studies are investigating the merits of instituting the delay in responding into teaching and peer tutoring programs. It is important to keep in mind the distinction in feedback and reinforcement when considering this concept. "It is true that delayed reinforcement is less effective than immediate reinforcement, but that does not mean that delayed feedback will necessarily be less effective than immediate feedback . . ." (Krumhus & Malott, 1980, p. 280). Given this distinction, Krumhus and Malott (1980) went on to conclude that immediate feedback was no more effective than delayed feedback and that feedback functions more as a discriminative stimulus than a reinforcer. It helps the child distinguish correct from incorrect responding.

Studies with severely handicapped autistic children have demonstrated that delay in corrections, and the use of prompts, reduced rates of behavioral problems in these children. When severely autistic children felt they could correctly solve problems without the teacher always supplying the answer, and continually correcting them, they were less likely to act out inappropriately and behavior problems dropped dramatically (Berkowitz, 1990). Berkowitz found that this teaching technique resulted in "fewer trials overall, produced fewer errors overall, and resulted in more correct, independent responses per session than a fading of prompts technique" (Berkowitz, 1990, p. 260). This "errorless learning" is what increased the motivation and decreased behavioral and attentional problems.

A study by McNaughton and Glynn (1981) also investigated the difference in delayed vs. immediate attention to errors. This study investigated the effects of these two methods on six second graders. The results of the study again demonstrated that the delayed attention was superior and resulted in higher reading accuracy (McNaughton & Glynn, 1981). The delay of feedback was found to be vital because the immediate attention appeared to interfere with the child's reading accuracy. The immediate teacher correction seemed to reduce the child's opportunities to attend to syntactic and semantic cues following the mistake. The information from these cues that the child would gain has been interrupted by the error and the attention immediately received by the teacher. Secondly, it does not allow the child the opportunity to self-

correct. This would result in a reduction in the student's problem solving skills, attention and active involvement in the learning task (McNaughton & Glynn, 1981).

McNaughton and Glynn (1981) have suggested that immediate error correction may actually hinder both accuracy and fluency. McNaughton (1981b) has done further studies on immediate vs. delayed correction techniques on learning and concluded that immediate error correction interferes with learning. Immediate attention to errors reduces the learners active involvement in the lesson and problem solving activities. Less attention has to be payed if the correct answer is expected to be supplied. McNaughton and Glynn (1981) further point out that immediate correction may also interfere with accuracy in work as well as restricting opportunities to self-correct. In contrast to the use of immediate feedback with younger children, older children, who already have an established vocabulary and decoding strategies in their repertoire, the delay of corrective feedback and the use of prompts may prove much more beneficial than immediate correction models (Singh et al., 1985; Wheldall et al., 1987). This research has led to the development of the "Pause, Prompt, and Praise" method of peer tutoring which will now be reviewed.

"Pause, Prompt, and Praise"

"Pause, Prompt, and Praise" was developed by Stuart McNaughton in Auckland, New Zealand (McNaughton, Glynn, & Robinson, 1981). The initial

research study evaluating the program's effectiveness was known as the Mangere Home and School Project. Children with very poor reading skills (ages 8 though 12) were intensively involved in this study.

The Mangere Home and School Project involved the children's parents as tutors. The study found that before training, the parents rarely commented on the children's correct reading or on their attempts to solve unfamiliar words. They also tended to immediately correct the child and model the "right" word rather than pausing long enough to allow the child time to self-correct. Data collected during the baseline period showed that the parents tutoring had very little effect on the child's reading skills. After training, however, the parents delayed their attention to errors, prompted instead of modeling and increased their use of specific praise significantly. As expected, the tutored children showed significant gains in reading as compared to their baseline rates after the "Pause, Prompt, and Praise" method was instituted (Merrett, 1988; Wheldall et al., 1987; Wheldall & Mettem, 1985).

This project was based on the reading research work of Professor Marie Clay (Clay, 1979). The procedure is based on the theory that children learn to read by reading, making mistakes and correcting their own errors.

In this program, mistakes are expected and viewed as a normal part of the reading (and learning) process. Mistakes in reading are deemed valuable, for by monitoring these mistakes, the tutor (teacher) can easily determine the child's progress.

Through this process the learners gradually develop more efficient strategies for predicting words, word meanings and contextual cues. This practice aids in allowing them to cope with more difficult material and become more independent learners. The tutoring method itself has three components each of which are solidly based on research. Each of these components will now be discussed.

Basic Components of "Pause, Prompt, and Praise"

The first requirement of the "Pause, Prompt, and Praise" method is that instructional material must be "at an appropriate level such that the child is encountering some unfamiliar words but knows enough words to be able to make good predictions, even if these are miscues" (Wheldall et al., 1987). When tutoring reading, the instructional level is determined by checking the child's reading accuracy rate. It is essential that the child encounters some unknown words, but equally important that enough are recognized to be able to make good predictions. McNaughton (1981b) used a criteria of 80-90% accuracy rate to determine the appropriate text for the child. If the material is too easy (i.e. 95% accuracy) then the child faces no problems to solve and reading skill is not developed. If, on the other hand, the material is too difficult, the student will make so many mistakes that the meaning is lost and discouragement, confusion or refusal will result (Merrett, 1988).

Pause. The "Pause" portion of this tutoring method is essentially what

sets it apart from others. When a child is actively involved in reading (or in any learning task) self-corrections are a sign that the child is engaged in learning and problem solving. The "Pause" part of the process on the part of the tutor is to allow the child to self-correct before continuing. McNaughton and Glynn (1981) found that tutor attention to mistakes that is delayed five seconds or until the end of a sentence, not only encouraged more self-corrections, but also improved reading accuracy. Most tutoring programs seem to stress the importance of immediate corrections, but the "pause" of this method is seen as the key to more helpful teaching. Thus when a child makes a mistake, the tutor waits at least five seconds before acknowledging the mistake. The "pause" gives the child "reasonable opportunity to either correct his own error or to work out the word independently" (Wheldall et al., 1987).

A body of research is accumulating suggesting children need to be allowed time to self-correct because self-corrections show they are more involved in the lesson and not just dependent on the teacher to provide the correct answer (Glynn, 1985; McNaughton, 1981a; McNaughton & Glynn, 1981; Merrett, 1988; Taylor & Nosbush, 1983).

The opportunity to self-correct has been shown to be a very potent predictor of reading development (Allington, 1983). Others have suggested that self-correcting mistakes is a very important reading behavior because it demonstrates that meaning is being sought in the material and this contextual meaning simultaneously allows the reader to detect incorrectly decoded words

(D'Angelo, 1972; Taylor & Nosbush, 1983). McNaughton (1981a) also demonstrated that when immediate correction is given, children tend to self-correct less and are less accurate in identifying words.

In reading, for example, if children are deprived of self-correcting they will be less proficient readers (McNaughton, 1981b). Studies have shown positive correlations between the opportunity to self-correct and academic progress (Clay, 1979).

Other studies have further demonstrated that immediate feedback reduced the number of self-corrections and thus interfered with the learning process (Mudre & McCormick, 1989; O'Connor, Glynn, & Tuck, 1987).

The opportunity to self correct is important because it allows the student to have more control over the learning experience. If every mistake is immediately corrected, the student is dependent on the teacher to supply the answer. This concept and research should have an impact on the way classrooms function, but historically it has not.

Prompt. The second feature of this program is the "prompt". A "prompt" is defined as "any instance of responding to an error with a clue or hint about the meaning of the word or with a direction to look at the content of the story or at the graphophonemic features of a word" (McNaughton, 1981a, p. 169). Prompts are extra cues to guide a response but are not the correct response. If the child makes a mistake and no attempt at self-correction occurs, the tutor prompts the student on the word, depending on the type of miscue. If the

misread word does not make sense in the context of the story, the tutor will prompt with a clue about the meaning of the sentence. Should the word itself be meaningless, the tutor prompts about the look, sound and basic phonetics of the word. If the student makes no attempt, the tutor instructs the student to go back and read the entire sentence again. If the child has not figured out the word after two such prompts, the tutor will tell the child the word, and reading continues. "In many cases a prompt is sufficient for readers to determine the correct word but in instances where they are not successful, it is suggested that they be told what the word is, after two such prompts" (Merrett, 1988, p. 19). This technique allows the reader increased opportunities to respond and to be able to use all possible sources of available information to improve reading accuracy and self-confidence (O'Connor et al., 1987).

The use of prompts in teaching and peer tutoring programs are in direct contrast to the immediate feedback and corrections model. As noted earlier, the use of prompts have long been believed to interrupt and confuse a student and to encourage guessing (Anderson & Faust, 1973). However more recent research and tutoring programs have disavowed this notion and have given the use of prompts a very definite place in teaching.

Prompts have received a wide variety of definitions depending on the nature of the particular research study. They can be categorized into a variety of groups such as verbal, gestural, modeling and physical guidance (Hourcade, 1988; Mosk & Bucher, 1984). Despite the form a prompt takes, it is viewed as

an extra cue to guide a student's response. The "prompt is an artificial and additional stimulus which makes the target behavior more likely to occur, at which point it can be reinforced and thus acquired by the learner" (Hourcade, 1988, p. 38). The type of prompt given will depend on the nature of the mistake, but overall, the goal of prompting, no matter what form it takes, is to increase the probability of correct responding from the student.

The use of such prompts can indicate to the teacher how many of the errors can be spontaneously solved by the student following prompting and modeling and what area may need to be re-taught. Prompts also provide the student increased opportunities to respond. Increased response opportunities are deemed to be vital in learning (Delquadri, Greenwood, & Hall, 1979; Heron, Heward, Cooke, & Hill, 1983). When correct responses are prompted following an incorrect response, the amount of actual student academic learning time is increased (Berliner, 1987). This is a time when students are actively academically engaged and experience high rates of success (Skinner et al., 1989). Studies have shown that learning is facilitated when students are given more opportunities to respond to instructional material (Greenwood et al., 1988; Heward et al., 1986).

Current research on the use of prompts have shown the value of prompting in actual tutor training programs as well as training the tutors to use prompts with their tutees (Young et al., 1983). Similarly, successful use of prompting techniques have also been used with the mentally retarded not only

to teach appropriate behaviors, but to teach them to prompt peers in tutoring situations (Cole, Vandercook, & Rynders, 1988; Lancioni, Smeets, & Oliva, 1987; Wacker, Berg, Choisser, & Smith, 1989).

Most studies however, have focused on the use of prompts in training children in certain areas. Kalfus (1984) reviews a number of peer tutoring programs for both academic and non-academic behavior. In both of these instances, tutors trained in the use of prompting behaviors were found to effectively improve performance and increase the percentage of correct responses by the tutees.

Other research on the use of prompts has focused on the differences in the fading of prompts vs. a delay in prompts. Prompts are often used to aid a child in acquiring a skill and are then gradually faded out so that the child won't be dependent on them and generalization can occur. Prompts are valuable in the initial acquisition of skills because of the aforementioned opportunities to respond and because it results in fewer errors during this period (McDowell, 1982). After the skill is acquired, prompts are usually faded down through a hierarchy until they can be discontinued. This fading of prompts technique hopefully results in the transfer of control for learning from the prompt to the printed problem (Berkowitz, 1990; McDowell, 1982). However, the systematic fading of prompts has not always been effective due to prompt dependency and increased incorrect responding upon withdrawal (Berkowitz, 1990; Touchette & Howard, 1984).

Due to this problem, a method of delaying prompts has been instituted. The delay allows the student "a chance to anticipate the correct response without assistance" (Berkowitz, 1990, p. 256). The argument for the delay in prompts is similar to the rationale for the delay of feedback. Increased opportunities to respond, less instructor dependence, increased academic engagement and lower error rates are all seen as positive outcomes for this approach.

Two recent studies have compared the differences in the delay of prompts procedure vs. the fading of prompts. Berkowitz (1990) studied the outcomes of the two methods with autistic students. These students were to discriminate line drawings in picture communication books. The results suggested that the children made significantly more errors with the fading of prompts technique. The delayed prompting technique, on the other hand, required fewer attempts, yielded fewer errors and "resulted in more correct independent responses per session than a fading of prompts technique" (Berkowitz, 1990, p. 260). Berkowitz (1990) goes on to suggest that the delay technique also decreased misbehavior because it increased correct responding and reinforced the children for correct answers more often than giving feedback and prompts on incorrect responses.

Another group of researchers did a similar study and not only compared fading of prompts vs. delay of prompts, but also normal vs. handicapped children (Smeets, Striefel, & Hoogeveen, 1990). This study also focused on a

visual discrimination task and had four separate experiments contained in the study. The results of the study concurs with the Berkowitz (1990) study that the delayed prompting technique was the most effective of the two techniques in establishing the difficult discriminations in both normal and intellectually handicapped children. However, they do stress that the prompts must be appropriate in order to be effective.

Praise. The final aspect of "Pause, Prompt, and Praise" is the "praise" component. This seems similar to many basic behavioral programs, in that the tutor verbally reinforces positive behaviors and correct responding by the tutee. The praise in this program is also to encourage the development of independence and self-regulatory skills (Wheldall & Mettem, 1985). This is done by dividing the verbal reinforcement into general and specific praise. General praise was given for participating in the activities such as reading a whole page. Specific praise is a descriptive comment that allows the tutee to know exactly what has been done correctly. Praise is more than just a "good job" type of comment. "For example, 'Good work, David. You corrected "rabbit" all by yourself,' tells David exactly what he is being praised for and so the praise is contingent upon good reading behavior" (Wheldall et al., 1987, p. 6). Studies have shown that tutors trained in this procedure have much higher rates of specific praise so that reinforcement was a result of using specific problem-solving strategies (O'Connor et al., 1987). In order for either method to be effective, prospective tutors must be trained to tutor and provide appropriate

feedback.

Theoretical Foundations

Both the "Pause, Prompt, and Praise" and "Look, Tell, and Say" peer tutoring methods are soundly theoretically based. The theory and technique of the "Pause, Prompt, and Praise" tutoring method is based upon the principles of Discovery Learning (Anderson & Faust, 1973; Bruner, 1966; Davis, 1983). The "Look, Tell, and Say" method is founded upon the principles of Concept teaching and Reception Learning (Ausubel, 1978; Kagan, 1966; Merrill & Tennyson, 1977).

"Pause, Prompt, and Praise". Discovery Learning is an appropriate title for this type of learning since the learner is not directly told the concept or principle, but is expected to deduce the principle from a series of examples (Anderson & Faust, 1973).

"The essential feature of Discovery Learning . . .is that the principle content of what is to be learned is not given but must be discovered by the learner before he can internalize it; the distinctive and prior learning task, in other words, is to discover something" (Ausubel, 1977, p.289).

This type of learning purports to make the student a better problem solver and thus a more efficient learner. The experience gained in discovering concepts develops general discovery skills. Therefore, theoretically, when a student faces a problem without a teacher, text or adult to guide, she or he will

be better equipped to induce the needed principle to solve the problem.

The advocates for Discovery Learning suggest that meaningful learning requires more than a rote memorization of facts. "The facts and relationships children discover through their own explorations are more useable and tend to be better retained than material they have merely committed to memory" (Sprinthall & Sprinthall, 1981, p. 289).

The discovery approach to learning is not a new one. It is in fact over a century old and grew out of the progressive education movement of the late nineteenth and early twentieth century. In fact, John Dewey, the renowned educator supported this method by his trademark motto "learning by doing" (Dewey, 1933).

More recent claims for the benefits of Discovery Learning include the following:

1. Discovery Learning is challenging, motivating and enjoyable, more democratic and less authoritarian than more traditional methods.

2. Discovery Learning produces organized knowledge that is more likely to transfer into other areas.

3. Discovery Learning produces good problem solving skills, creative and critical thinking (Davis, 1983).

One of the major supporters of Discovery Learning is Jerome Bruner. Bruner believes that leaning by discovery is a "unique and unexcelled generator of self-confidence, of intellectual excitement and of motivation for sustained

problem-solving and creative thinking" (Ausubel, 1968, p. 493). Bruner believes that the objective of instruction is to make the learner more self-sufficient and not so dependent on the teacher for reinforcement (Sprinthall & Sprinthall, 1981). This is one of the same goals as the "Pause, Prompt, and Praise" tutoring method. Less teacher dependence and more self-sufficient, better equipped problem solvers are the goal of both Discovery Learning and "Pause, Prompt, and Praise".

Bruner labels his opinions on Discovery Learning a "theory of instruction" and not a learning theory. Theories are merely descriptive whereas an instructional theory is prescriptive. It prescribes in advance the best method for teaching instead of merely describing it after the fact. There are four main principles to Bruner's instructional theory and each one will be discussed briefly.

The first principle is motivation. Bruner believes that most children have a will to learn and it is only through intrinsic motivation that the desire to learn is sustained. Learning by discovery can free the child from extrinsic motivations such as grades and parent/teacher approval. Intrinsic motivations include curiosity and the desire to achieve competence. Such intrinsic motivators are also self-reinforcing and motivated students care about classroom activities, pay attention and try to succeed (Davis, 1983; Sprinthall & Sprinthall, 1981).

The second principle of Bruner's theory is structure. The principle of structure suggests that any subject can be optimally organized so that it can be understood by any student. "Any idea or problem or body of knowledge can be

presented in a form simple enough so that any particular learner can understand it in a recognizable form" (Bruner, 1966, p. 44). The way in which a subject or idea is structured and presented depends on the age and ability of the learner. Very young children use enactive representation. They understand best in terms of action and movement.

Older children think at the iconic level. At this stage objects are conceivable without action. Visual imagery and sensory representations allows the child to reproduce things that are not present.

As the child develops language skills the third mode of symbolic representation emerges. Ideas and objects can be explained without actions, symbols or pictures (Davis, 1983; Sprinthall & Sprinthall, 1981).

The third learning principle in Bruner's Discovery Learning method is sequence. Bruner believes that cognitive development is sequential moving from the enactive stage to the iconic and finally to symbolic. Thus this sequence is also the most optimal for any subjects' presentation to take. The teachers should begin a new subject with wordless messages geared toward muscular responses. Then diagrams and pictures are employed. Finally, the lesson is communicated symbolically through words. Although this may seem a tedious process, children who initially appeared to handle the subject at the symbolic level may never comprehend if they don't have the basic imagery to fall back on (Sprinthall & Sprinthall, 1981).

Bruner's fourth and final principle for his instructional theory of Discovery

Learning is reinforcement. Reinforcement is a basic principle in any facet of learning. In order for anyone to learn and become proficient at a new task, feedback on performance is a necessity. Bruner believes that the timing of reinforcement is the crucial component to adequate learning. The student must receive feedback and reinforcement at a time when she is self-evaluating her performance. If results are known too soon, confusion and a stifling of exploration may result. Should feedback and reinforcement occur too late, then the student may learn false information which will then have to be unlearned and replaced with correct responses.

Bruner suggest that the pure form of Discovery Learning as outlined above can result in optimal learning conditions. The goal is to make the learner self-sufficient and not teacher dependent for perpetual guidance and reinforcement. Self-correction and less teacher dependence are also goals of the "Pause, Prompt, and Praise" method of peer tutoring. The Pause allows the student to self-evaluate and self-correct and the prompts guides the student to the correct response so that incorrect information will not be learned.

However, it has been suggested by other theorists, (Anderson & Faust, 1973; Ausubel, 1968) that Bruner's "pure" discovery techniques could only lead to chaos in the classroom if it were the sole means of instruction. In order for Discovery Learning to be the most effective in the classroom, a modified version, known as guided discovery has been proposed. This technique offers assistance and more guidance to the student than the pure discovery method.

Guided discovery often consists of rhetorical questioning, the provision of the general rules before the student begins, hierarchical arrangement of problems and verbal direction (Ausubel, 1968). Prompting can prevent guesswork and incorrect response learning. It is most effective in the early stages of learning a new subject. It has also been shown to be more effective than just feedback for short periods of practice (Ausubel, 1968; Briggs, 1961; Cook & Spitzer, 1960). Even Ausubel, a vehement opponent of Discovery Learning notes that guided discovery "is more efficacious for learning, retention and transfer than is either completely autonomous discovery or the provision of complete guidance" (Ausubel, 1968, p. 303).

The "Pause, Prompt, and Praise" method is very similar to the method of guided discovery and the model of Discovery Learning. The use of prompts to guide the student toward the correct answer and the time to allow for self-correction are components of both the theory of Discovery Learning and the method of "Pause, Prompt, and Praise". Less teacher dependence and more self-correcting and self-reliant students are the goal of each. The experience gained in making mistakes and self-correcting is believed to create better problem-solvers and analytical thinkers both in and out of school.

"Look, Tell, and Say". The "Look, Tell, and Say" peer tutoring method has roots in the theories of Concept Teaching and Reception Learning. Although David Ausubel suggests that guided discovery techniques have a place in education, he is much more an advocate of Concept/Reception

Learning through the channel of expository teaching (Ausubel, Novak, & Hanesian, 1978).

There are a number of differences in Reception and Discovery Learning as there are in the "Pause, Prompt, and Praise" and "Look, Tell, and Say" tutoring techniques. "In Reception Learning the entire content of what is to be learned is presented to the learner in final form" (Ausubel, 1968, p. 22). Learning requires no independent discovery. Material is understood through the process of internalization. The major difference between Reception and discovery learning lies in "whether the principle content of what is to be learned is discovered by the learner himself or is presented to him" (Ausubel, 1968, p. 54).

Similar in principle to Reception Learning is the idea of Concept Teaching. The "Look, Tell, and Say" method also has foundations in Concept learning. Although both Reception and Concept learning are fundamental components of "Look, Tell, and Say", they are slightly different since the tutoring method focuses more on correction that presentation. However, the fundamentals of Concept Teaching and Reception Learning remain the basis for tutoring in the "Look, Tell, and Say" method.

Concepts have been variously defined as: "an abstraction or a generic idea that does not actually exist" (Ausubel, 1968, p.50); "a well-defined set of critical features; a bundle of more or less distinctive features" (Anderson & Faust, 1973, p. 369); and "the building blocks not only for learning principles,

problem-solving skills, and taxonomic and hierarchical relationships but also of thinking itself" (Kagan, 1966, p. 97).

It is evident from these definitions that concepts and the teaching of concepts are viewed as being fundamental to learning. Concepts are presented to the learner through the means of expository teaching. In expository teaching, the student is told the concept or principle and the concept is applied to several examples (Anderson & Faust, 1973). This is similar to the "Look, Tell, and Say" tutoring method. In both, the student is instructed in the concept and then allowed to practice. In pure Discovery Learning on the other hand, the student theoretically is to "discover" the concept by inducing it from the examples.

Anderson and Faust (1973) suggest that all components of the teaching model: presentation, student response, reinforcement and corrective feedback, are present in the teaching of concepts and principles. This is almost identical to the "Look, Tell, and Say" method. A learner is said to "know" a concept when she or he has the capacity to make a common response(s) to a class of objects or events. "In other words, understanding of a concept entails the ability to classify things as examples of the concept (called 'positive instances') and non-examples (called 'negative instances')" (Anderson & Faust, 1973, p. 339). Critical features are attributes which all positive examples of a concept share. Objects (ideas, concepts, etc.) which do not have each critical feature are negative instances (Anderson & Faust, 1973).

Procedures for teaching concepts through this expository method have been outlined by a number of educational theorists (Anderson & Faust, 1973; Klausmeier, 1976; Levin & Allen, 1976; Merrill & Tennyson, 1977).

The most concise outline of the procedures to teach concepts is offered by Merrill and Tennyson (1977) in the preface of their text. The first step in Concept Teaching is to present a definition. "A 'definition' is a statement identifying each of the critical attributes and indicating how these attributes are combined" (Merrill & Tennyson, 1977, p. ix). Step two involves providing an expository presentation of matched example/non-example pairs. Later examples diverge from the initial ones and range in difficulty from easy to hard. Merrill and Tennyson point out that failure to meet one or more of these criteria may result in errors. For example, by eliminating non-examples, over generalization may occur. Using only convergent examples may yield a misconception.

The next step involves providing attribute isolation for each example and non-example. This is achieved through attention focusing devices that enable the student to more easily isolate critical attributes.

The fourth step provides inquisitory practice of examples and non-examples accompanied by feedback. Gagne asserts that "the learner must practice the actual task that needs learning" (Gagne, Mayor, Garstens, & Paradise, 1962, p. 92).

It is important during this stage to have the student verbalize responses

(Anderson & Faust, 1973; Ausubel, 1968; Gagne & Smith, 1962; Pressley, Reynolds, Stark, & Gettinger, 1983). Verbalization of responses encourages active participation on the part of the student and can increase performance. Early studies (Bandura, Grusec, & Menlove, 1966) found that "children generating verbal equivalents of modeled responses during a presentation later reproduced more matching responses than children who observed the modeled displays attentively without verbalization" (Gerst, 1971, p. 90).

Later studies (Anderson, Faust, Roderick, Cunningham, & Andre, 1969) confirmed the necessity of verbalization on learning. "Research indicates that the students should be required to make a response as soon as he is capable of making it" (Anderson & Faust, 1973). Thus students should verbalize responses as soon after they are instructed as possible. Not only does it increase attention but retention as well. As Ausubel notes, "the more active this process is, the more meaningful and useful assimilated concepts are" (Ausubel, 1968, p. 22). Also, in this way students learn to make correct responses and do not retain incorrect information.

Feedback is provided immediately after each response to focus attention on the critical attributes and provide the correct answer. "A closely related immediate consequence of feedback in this context is that as a result of discovering which parts of the learning task have not been sufficiently mastered, the subject is better able to focus his attention and effort selectively on these later aspects" (Ausubel, 1968, p. 296). Feedback also increases the

chance that the student will use the correct cues from short-term memory when retrieving processing operations from long term memory (Brainerd, 1983). This would be vital to most classroom instruction, especially in the area of mathematics.

The "Look, Tell, and Say" method closely follows this model in theory and practice. The explicit, expository instruction, attention focusing, positive practice, corrective feedback and reinforcement are the basis of the "Look, Tell, and Say" method. These techniques are founded in the theories of Concept Teaching and Reception Learning and provide a research rich background for its basis and use in the instruction of children.

Tutor Training

Effective peer tutoring programs have demonstrated that tutors must be adequately trained before tutoring commences to assure a successful program. For example, in some programs, the tutors are not only instructed in the concept to be taught, but are trained in confirming correct responses and providing corrective feedback (Kalfus, 1984; Young et al., 1983). The training of tutors appears to be a vitally important component to the success of any peer tutoring program. Several studies have assessed the value of simply pairing students for tutoring, without giving the tutor any specific training. Results of these studies indicate that effective tutoring/teaching skills are not natural. Children must be taught methods of tutoring in order for tutoring

sessions to be useful and for classroom time not wasted. Peer tutoring programs have often been demonstrated to be successful, but tutor training must initially be carefully accomplished in order to maximize tutee benefits (Ludeke & Hartup, 1983).

Investigations into untrained tutor programs suggest that they rarely used supportive feedback or praise (Ludeke & Hartup, 1983). In fact, untrained tutors do not always use reinforcing remarks even when trained to do so (Johnson & Bailey, 1974). Most untrained tutors do not seem to use appropriate feedback skills (Wheldall et al., 1987), and thus some type of tutor training program will be necessary.

A number of tutor training programs covering a wide variety of teaching techniques and student skill have been reported in the literature (Greenfield & McNeil, 1987; Greenwood et al., 1988; Heward et al., 1986; Kalfus, 1984; Merrett, 1988; Parsons & Heward, 1979). Basically, these studies suggest that untrained tutors do not naturally emit appropriate teaching strategies and that the success of the peer tutoring program hinges on the importance and detail placed on tutor training. "Tutors who are given specific training have been found to emit more requisite tutoring behaviors than untrained tutors" (Greenwood et al., 1988, p. 267). Tutors who were trained in specific teaching strategies such as basic rapport skills, praise and corrective feedback have been shown to have much more successful peer tutoring programs than did similar programs with untrained tutors (Niedermeyer, 1970). Thus there clearly

seem to be a fundamental relationship between tutor skills and success (increase in learning) for the tutees (Heward et al., 1986).

Tutor training programs range from simply giving verbal instructions to the tutor to elaborate predesigned sequences of tutoring steps, responses and tasks (Osguthorpe & Scruggs, 1986). Basically, tutor training strategies are based on a task analysis of the tutoring role plus the theoretical basis on which the tutoring technique rests. Systematic steps are then laid out to be followed to achieve these goals. Some of the varieties of methods in tutor training techniques include the following: tutor training based on modeling, role play, shaping and reinforcement (Dineen, Clark, & Risley, 1977), prompting and praising techniques (Parsons & Heward, 1979; Willis, Morris, & Crowder, 1972) and tutor feedback techniques (Davis, 1972; Jenkins, Mayhall, Peschka, & Jenkins, 1974).

Several books have been written as a guide to developing tutoring programs that include necessary tutor characteristics for successful programs (Koskinen & Wilson, 1982a; Koskinen & Wilson, 1982b; Topping, 1988). It is suggested that the tutors need to be reliable, flexible, respect the rights of others and are able to maintain confidentiality with their tutee (Koskinen & Wilson, 1982b). The ability to build and establish rapport is also vital to a successful program. In order to establish adequate rapport, it is suggested that tutors be friendly, smile, help the tutee feel at ease by talking about their interests and discuss with them their reactions to the tutoring activities. It is

also important to praise the student on their efforts and not just overall success (Koskinen & Wilson, 1982b).

Koskinen and Wilson's (1982a) research also suggest that it is not vital for the tutor to be intimately familiar with every aspect of the subject they are tutoring. It is more important to start with clearly defined tasks that can be successfully completed. Initial tutor training may include practice of the task (and tutoring method) to be employed during the actual sessions.

Developmental Aspects

According to the vast quantities of research done on peer tutoring, it is evident that students of any age and/or ability, can be taught to successfully use peer tutoring programs. In fact peer tutoring programs have been shown to be successful with preschoolers (Kalfus & Stokes, 1987), elementary age students (Ehly, 1987; Heward et al., 1986; McNaughton, 1981b; Mudre & McCormick, 1989), middle and high school children (Kohler, Richardson, Mina, Dinwiddie, & Greenwood, 1985; Ludeke & Hartup, 1983; Wheldall & Mettem, 1985), the developmentally delayed (Guralnick & Paul-Brown, 1984), sibling pairs (Koester & Johnson, 1984), mixed age pairs (Limbrick, McNaughton, & Glynn, 1985; Ludeke & Hartup, 1983), residential and mentally retarded children (Brown, Fenrick, & Klemme, 1971; Ehly, 1987; O'Connor et al., 1987; Wagner & Sternlicht, 1975), low progress and "slow learners" (Johnston, 1984; O'Connor et al., 1987; Wheldall & Mettem, 1985), the autistic (Berkowitz, 1990), the

speech impaired (Evans & Potter, 1974), and the behaviorally disordered (Gartner, Kohler, & Riessman, 1971).

The aforementioned researchers have demonstrated that peer tutoring programs benefit the academics, social skills and peer relationships whenever a program is effectively implemented (Kohler et al., 1985). Thus the success of a peer tutoring program is not dependent on the age, ability or developmental level of the children involved.

Koester and Johnson (1984) examined the difference in the behavior of tutors when they were paired either with an unrelated peer, or their own sibling. This study paired older tutors with younger tutees (cross-age tutoring dyads). The results showed that the tutors almost always used demonstration and assistance, but when tutoring their own sibling, they were more actively involved, and more often corrected and provided feedback than when working with a peer. Implications of the study suggest that "a child tutor may have a natural advantage when paired with a sibling in that there is an increased awareness of the younger child's developmental level and capabilities" (Koester & Johnson, 1984, p. 30).

Other studies suggest that school children "possess an implicit 'theory of teaching' which assumes (a) that younger children require more cognitive structuring than same-age children, and (b) that younger children require more supportive and corrective feedback than same-age children" (Ludeke & Hartup, 1983, p. 913). This study found that children's interaction with each other vary

dramatically depending upon same or mixed age situations. When tutors work with younger children, they are more likely to give help and sympathy than with same age peers. When dyads are of equal age and status, more social acts, competitiveness and aggression may occur. Younger children are more likely to show dependent behaviors when working with older students.

Ludeke and Hartup's (1983) study involved with 11 year old sixth graders and paired the tutors with same age or younger children. Again, they found that the tutors modified their instruction depending on the age of the tutee. In relation to the "Pause, Prompt, and Praise" tutoring method then, it would seem less likely that tutors would use the "pause and prompt" portions with younger children because of their tendency to provide immediate feedback, corrections and to feel compassion on their learning struggles. Children not only seem to have well developed sensitivity to their companions abilities and skills, but they also generally seem to provide developmentally appropriate teaching methods.

As mentioned previously, some studies have suggested that teaching style is somewhat dependent on the developmental level and age of the child. Young children need more direct instruction and corrective feedback than do older children. By middle school, children have acquired basic skills and learning strategies. Thus middle school children will theoretically benefit from a less direct instructional method of teaching (Singh et al., 1985; Wheldall et al., 1987).

Piaget suggested a theory of gradually developing intellectual ability that

progressed as the child developed and aged. He stressed that maturation was the key for acquiring higher forms of reasoning and thought, although he did indicate that experience, society and genetics play a role as well.

According to Piaget, middle school children are emerging from the concrete operations stage and unfolding into the formal operations stage. The usual cut off point between the two stages is age 11; the age at which most children begin middle school. The concrete operation stage child can understand the concepts of time, space, logic and numbers. During the formal stage of thought, children develop causal thinking and grasp abstract thought.

The theory and research seems to suggest then, that developmentally older students (e.g. middle school children) may benefit more from being allowed time to self-correct and therefore decrease dependence on the teacher. Younger children however, may continue to benefit from immediate feedback and correction until they have acquired basic skills (McNaughton, 1981b; Wheldall et al., 1987).

CHAPTER III

METHOD

Subjects

Participants for this study consisted of public middle school students from the Knox County schools. All students were sixth graders in the 11 to 13 year old age range. The students were Caucasian, and no special education students were included in the subject pool. Only students who were willing to participate and had signed parental permission were included in the program. The study was conducted in one middle school. Table 1 was established to show the student characteristics. The participants were divided into two groups: tutors and tutees.

Tutors. Tutors consisted of male and female sixth grade students in the age range of 11-13 years. These were selected on the basis of scoring in the top one third of the class on the Tennessee Comprehensive Achievement Profile (TCAP) in mathematic achievement and rated as being average or above average by the teacher. They must have made a score of 85% or higher on a pretest consisting of exercises in computing the percent of a number after receiving videotaped instruction. Students must have met all requirements in order to be included in this group. Eleven students served as tutors in this study. Table 2 reports frequencies for tutors by group on age, sex, TCAP, pre-

Table 1. Means and Standard Deviations of Student Characteristics

	Group			
	Tutees N = 19		Tutors N = 11	
Variable	Mean	SD	Mean	SD
Age	11.95	.62	11.36	.50
TCAP	44.74	12.46	83.45	13.43
Teacher Rating	3.89	.46	2.36	.67
Pre-Test	3.63	1.21	23.27	1.19

Notes:
Teacher Rating: 1 = High, 2 = Above Average, 3 = Average, 4 = Low Average, 5 = Below Average
State Mean TCAP(Tennessee Comprehensive Achievement Profile) score = 56
Pretest and Posttest maximum correct = 25

Table 2. Tutor Characteristics by Tutoring Condition

	Tell Method		Pause Method	
	Frequency	Percent	Frequency	Percent
Age (Years)				
11	3	50.0	4	80.0
12	3	50.0	1	20.0
Sex				
Male	5	83.3	4	80.0
Female	1	16.7	1	20.0
Teacher Rating				
High	1	16.7		
Above average	2	33.3	3	60.0
Average	3	50.0	2	40.0
TCAP (NCE)				
59	1	16.7		
68			1	20.0
71	1	16.7		
78			1	20.0
79	1	16.7		
84	1	16.7		
95			1	20.0
96	2	33.3	2	40.0
Pretest*				
21	1	16.7		
22			1	20.0
23	3	50.0	2	40.0
24	1	16.7	1	20.0
25	1	16.7	1	20.0

*Number Correct out of 25

test scores and teachers' ratings of rank in class.

Tutees. Tutees consisted of ten male and ten female, sixth grade students in the age range of 11-13 years. These were selected on the basis of scoring in the bottom one third of the class on the TCAP in mathematic achievement and were rated in the lower one third of the class by the teacher. They must have also made a score of 50% or lower on a pretest consisting of exercises in computing the percent of a number after receiving videotaped instruction. Tutees must have met all requirements in order to be included in this group. Nineteen students served as tutees in this study. Table 3 reports frequencies for tutees by group on age, sex, TCAP, pre-test scores and teacher ratings of class rank.

Mathematics Concept

The mathematic concept studied by the tutees and taught by the tutors involved finding the percent of a number. This was a novel concept to all the students as it will was not presented in the curriculum until near the end of the school year.

For example: To find 15% of 20, first use a decimal to name the percent, then multiply.

Step 1:

$$15\% = .15$$

First, we rename the percent as a decimal by simply moving the decimal two places to the

Table 3. Tutee Characteristics by Tutoring Condition

	Tell Method		Pause Method	
	Frequency	Percent	Frequency	Percent
Age (Years)				
11	2	22.20	2	20.00
12	5	55.60	7	70.00
13	2	22.20	1	10.00
Sex				
Male	5	55.60	5	50.00
Female	4	44.40	5	50.00
Teacher Rating				
Average			3	30.00
Below average	8	88.90	7	70.00
Low	1	11.10		
TCAP (NCE)				
14	1	11.10		
24			1	10.00
32			1	10.00
36	1	11.10		
37			1	10.00
40	1	11.10		
43	1	11.10		
45	1	11.10	1	10.00
47	1	11.10	1	10.00
48			1	10.00
51			1	10.00
53	1	11.10	2	20.00
54	1	11.10		
63	1	11.10		
65			1	10.00

Table 3 (continued).

	Tell Method		Pause Method	
	Frequency	Percent	Frequency	Percent
Pretest*				
1	1	11.10		
2			2	20.00
3	3	33.30	1	10.00
4	3	33.30	7	70.00
6	2	22.20		

*Number correct out of 25

left from it's implied position behind the number and dropping the percent sign.

Step 2:

$$\begin{array}{r} 20 \\ \times .15 \\ \hline 100 \\ 20 \\ \hline 3.00 \end{array}$$

Next, multiply the numbers and bring down the decimal.

Step 3:

The answer: 3.00

The answer is the result of the multiplication.

Other examples may include problems such as:

(a) What is 25% of 36?

(b) What is 30% of 180?

(c) A vase from Italy is listed in a catalog for $245.60. All catalog prices have been reduced 20%. How much is the price of the vase is reduced.

(d) The percent for the decimal 0.13 is _____%.

These will be solved in the same manner as demonstrated by the math teacher on the tutor training videotape.

Development of Pretests and Posttests

Some of the pre-test and post-test materials were taken from the supplementary teacher guide to Mathematics Today - Level 6, (2nd ed.) (Abbott

& Wells, 1987). Problems were randomly selected from this manual to represent problems dealing with finding the percent of a number. Other problems were created using the same concept and similar problems as the teaching tape. The pretest (Appendix A) and posttest (Appendix E) contain 25 items each. Both the pretest and posttest involve problems involving computing the percent of a number. In order to determine the internal consistency of the pretest, a split-half reliability coefficient was obtained using odd and even problems. The resulting Spearman-Brown reliability coefficient was .96.

Procedure

All tutors and tutees were shown an 8 minute videotape on how to compute the percent of a number. After the presentation, all students were given a pretest to determine their current knowledge of the math concept. Students must have scored at least 85% correct to be included in the tutor group and 50% or below for the tutee group. The tutors then role played a tutoring session with other tutors until they were correct on the procedure at least five times. Total tutor training time was approximately 45 minutes. The experimental groups ("Look, Tell, and Say" vs. "Pause, Prompt, and Praise") were equated on the basis of pre-test scores, TCAP scores and gender. This was accomplished for both tutors and tutees. Tutors then tutored tutees using either the "Look, Tell, and Say" or "Pause, Prompt, and Praise" methods of tutoring.

Pause condition. In the "Pause, Prompt, and Praise" method, a standard correction procedure was used that corresponds to the method outlined in the "Pause, Prompt, and Praise" technique by McNaughton & Glynn (1981) and Wheldall, Merrett, & Colmar (1987). This error correction technique involved a hierarchy of verbal prompts. First, a general instruction was given to the student to continue working in order to solve the problem. If no solution occurred, after the tutor paused at least five seconds, prompts were given to attend to mathematical signs, or procedural reminders were given to the tutee by the tutor.

The type of prompt given depended on the type of error made. If the error did not make sense, the prompt was directed by giving clues or asking a question about the problem. For example, the tutor may ask "Five percent of ten couldn't be 120, could it"?

If the error did make sense (it was close to the right answer, but still incorrect) the tutor prompted by asking about the one part that is wrong. The tutor may have said "Does five times five equal 30?", and allow the tutee to self-correct that portion of the problem. If the child said nothing and did not respond, the tutor asked the student what procedure to follow step-by-step to solve that particular problem.

If the problem was still not correct after two prompts, the tutor told the tutee the answer and proceed to the next problem. Short descriptive statements of approval were then given for the tutee's efforts and the pair

moved on to the next problem.

To summarize, in the Pause condition, tutors were trained by the following procedure:

1. Tutors were shown a video tape showing a math teacher explaining how to compute the percent of a number;
2. Tutors corrected errors by:
   a. pausing after an error at least five seconds;
   b. prompting the tutees to correct their responses. Tutees were given two prompts to enable them to correct their errors before being told the answer to the problem. Prompts consisted of:
      (1). asking questions about the problem if the mistake did not make sense;
      (2). prompting with a clue or question about the incorrect part of the problem if the mistake did make sense; and
      (3). asking the student to re-read the problem or review steps to solve the problem if no attempt was made (see Figure 1).
3. Tutors told the tutee the correct answer if the correct answer was not received after two attempts. Tutors then paused at least five seconds to allow the tutee time to comprehend his/her error.
4. Tutees were praised if they initially solved a problem correctly and if they self-corrected a mistake. Tutees were also praised when they got the problem right after a prompt. Praise statements include

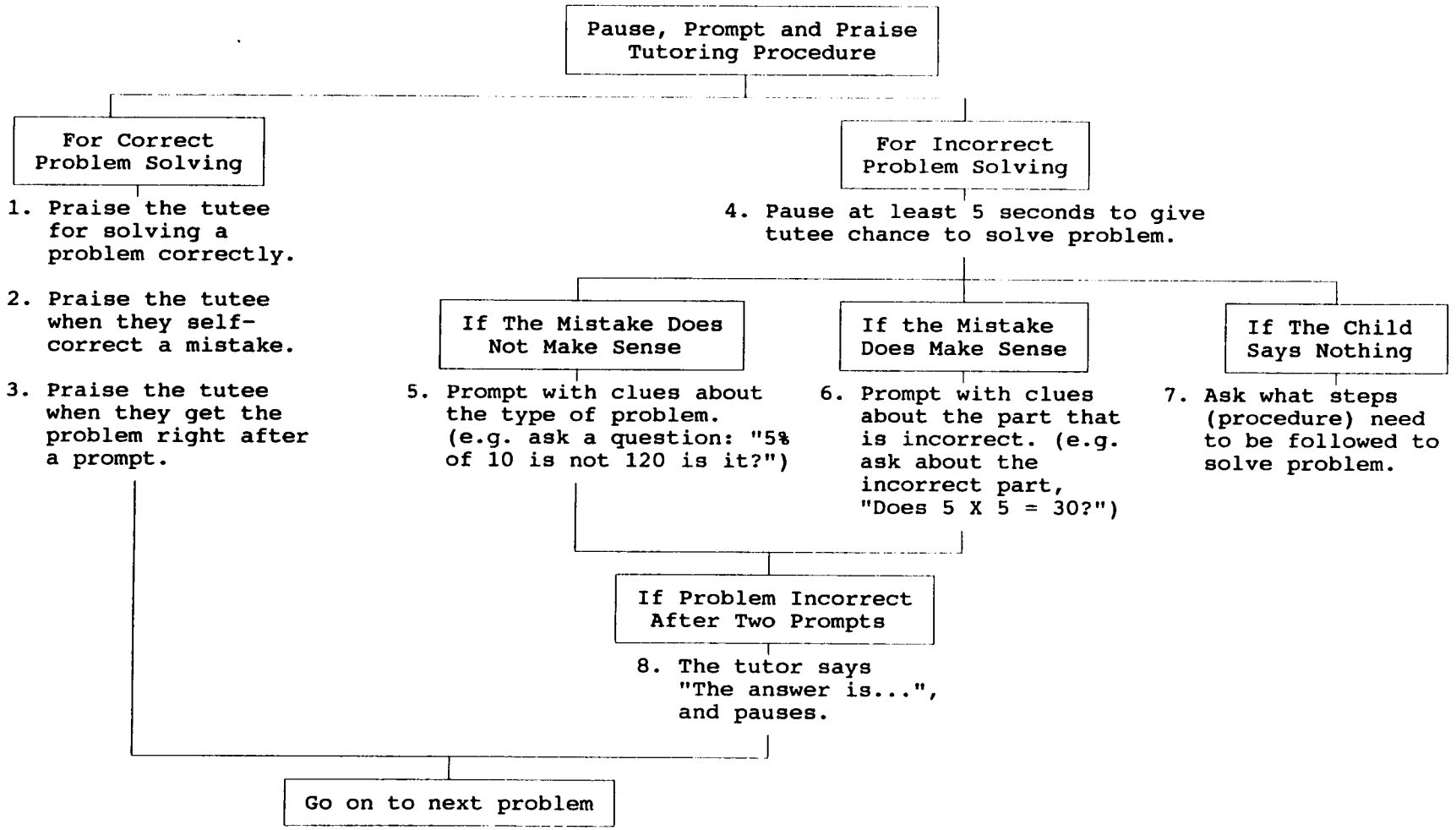

Figure 1. Pause, Prompt and Praise Tutoring Procedure

comments such as: "Excellent, you corrected that all by yourself"; "Good job, you moved the decimal to the right place"; and "Nice work, you did the multiplication well".

Tell condition. In the "Look, Tell, and Say" condition, a standard correction procedure was used that paralleled the procedure used in the "Pause, Prompt, and Praise" method. This error correction procedure provided a three step method for correcting a tutee's errors (Thurston, 1989).

When an error occurred, the tutor immediately drew the tutee's attention to it by asking the student to "look" at the problem again. This was to re-focus the tutee's attention and increase accuracy of responding. Then, the tutor showed and verbally told the tutee how to arrive at the correct answer. Next, the tutor asked the tutee to re-work the same problem, verbally repeating the steps as the tutee solved it on paper.

After this problem was corrected, or if it was initially correct, the tutor provided feedback. This feedback may have included such comments as: "right", "go on", "next" or "correct". The tutor then proceeded to the next problem.

To summarize, the Tell condition consisted of these steps:

1. Tutors were shown a video tape of a math teacher explaining how to compute the percent of a number;
2. Tutors demonstrated and told the tutees how to do the mathematic concepts;

3. Tutors demonstrated how to correct errors by:
    a. obtaining the attention of the tutee (Look);
    b. showing and telling the tutee how to do the mathematics (Tell);
    c. having the tutee show and tell how to do the problems (Say) (see Figure 2);
4. Providing feedback. Comments such as "that's correct", "right", and "next one", are examples of feedback

Tutor Training

A eight minute videotape was developed showing a math teacher teaching the concept of finding the percent of a number. This tape was shown to each group of tutors.

Five of the tutors were trained to use the "Pause, Prompt, and Praise" Method (Prompt) and six were trained to use the "Look, Tell, and Say" Method (Tell). After the videotape of the math concept was shown to the tutors, they were asked to complete the pretest (see Appendix A). A five minute review of the videotape was then made to further demonstrate how to work the problems. Particular attention was given to the differences in straight percentage problems versus problems requiring substraction after the percentage is computed. When the tutors made an error they were corrected by the appropriate Tell or Prompt method, according to their group assignment. When the tutors correctly completed five successive problems they were shown a videotape on Tell or

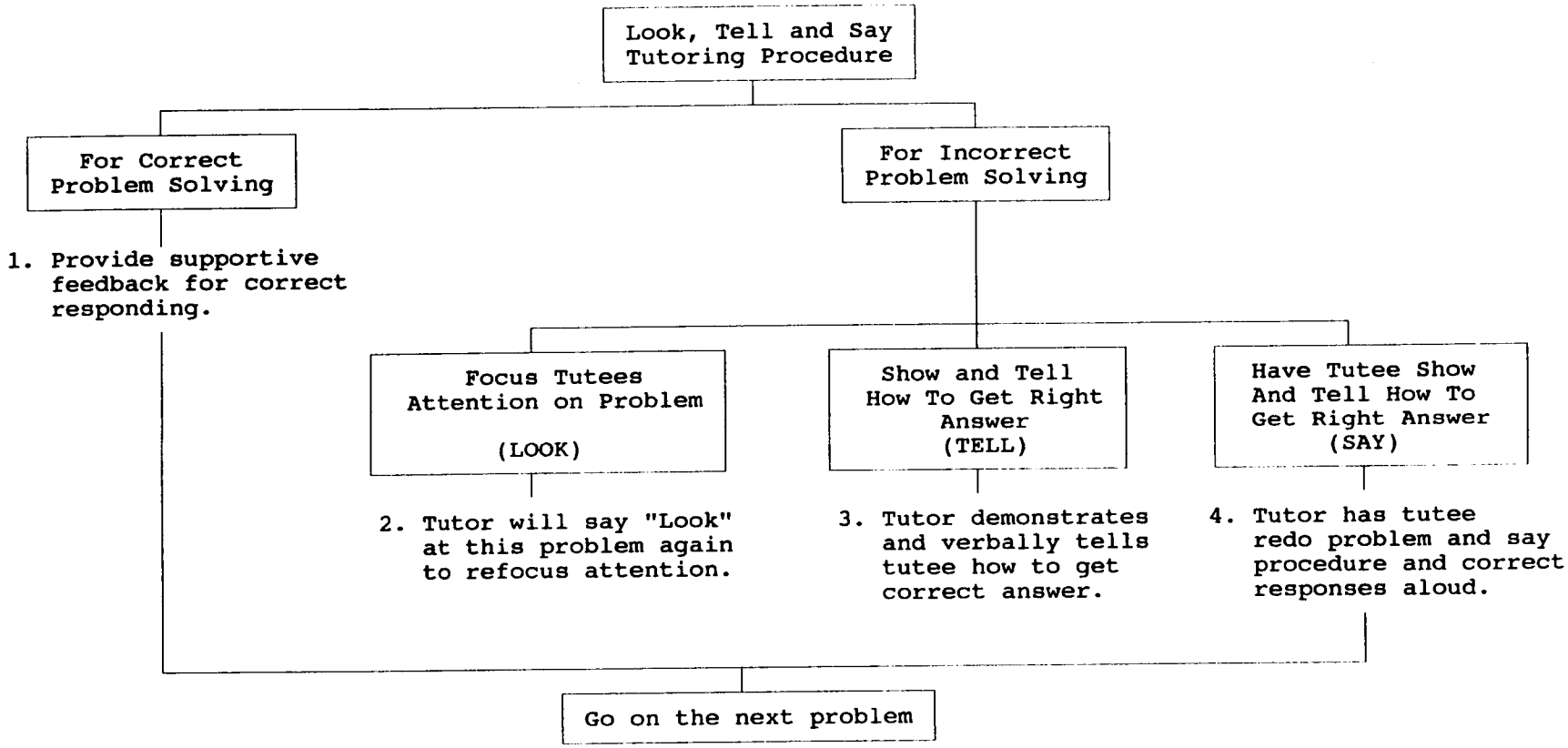

Figure 2. Look, Tell and Say Tutoring Procedure

Prompt tutoring. The tutors were then asked to tutor each other (role play) within their appropriate groups using the appropriate correction method. A checklist (Appendices B and C) was used to monitor their performance. When they made five successive appropriate corrections training was ended.

Tutors then tutored one tutee at a time on 15 problems listed in Appendix D, using the appropriate correction procedure. A record was made of the number of errors and corrections. Data were included in the study only when the tutees made at least four errors during the tutoring session.

Tutoring

Tutoring was one-on-one in a room free from distractions. All tutoring sessions were videotaped. Tutoring sessions were scheduled for 20 minutes. Tutors asked tutees to work 15 problems that were similar to the problems on the pretests and posttests. The session problems are shown in Appendix D.

Analysis of Tutor Behavior

In order to insure that the appropriate procedures were implemented in each condition, students' tutoring behavior was analyzed. A checklist of essential features (see Appendices B and C) was completed on each tutor during each tutoring session to insure that tutors followed the correction procedures. Since each session was videotaped, a reliability check could be completed after the tutoring session by another rater. Thirteen videotapes of

the tutoring sessions were randomly selected. Two raters rated the videotapes according to the checklists. The reliability coefficient was .99.

In order to obtain a percentage of exact agreement between the raters, five of the tutoring checklists were randomly selected for both the Tell and Pause methods. An exact count of inter-rater agreement was established for each. The exact agreement percentage for the Tell group was 96%. The exact agreement percentage for the Pause group was 94%. Total exact agreement between raters for both the Tell and Pause groups was 95%.

Data Analysis

Before the experiment, tutor and tutee groups were equated on the basis of math pre-test scores, the TCAP and gender. Tutee groups were matched initially on the basis of scores on the pretest. Then a t-test was used to determine differences. As can be seen from Table 4, all were non-significant, suggesting equated groups. The independent variable for this study was the correction procedure of either "Look, Tell, and Say" or "Pause, Prompt, and Praise". The dependent variables were (a) the number of problems correctly solved on the posttest, and (b) the number of errors made during the tutoring sessions.

The data analysis conducted for each research question was as follows:

Research Question 1: Which peer tutoring method ("Look, Tell, and Say" vs. "Pause, Prompt, and Praise") is more effective in teaching the computation

Table 4. Means, Standard Deviations, and t-tests of Tutor Groups by TCAP, Teacher Rating, and Pretest

Variable		Mean	SD	t	p
TCAP	Tell	80.83	14.47	-.69	.85
	Pause	86.60	12.91		
Teacher Rating	Tell	2.33	.81	-.16	.45
	Pause	2.40	.54		
Pretest	Tell	23.16	1.32	-.31	.78
	Pause	23.40	1.14		

df = 9

of the percent of a number as measured by a posttest?

The data on problems solved correctly were collected by both groups on the posttest and were analyzed by the use of an ANCOVA. The pretest served as the covariate. The number of errors made by the tutees during the tutoring session in each of the two tutoring methods were analyzed by a t-test. This information from the tutoring sessions

was obtained from the posttest and the videotape of the tutoring session.

Research Question 2: Which peer tutoring method is more effective in reducing tutee errors made during tutoring? A t-test was used to determine the number of tutee errors made by the tutees during the tutoring session.

Research Question 3: To what extent does tutoring training influence the tutor's adherence to the tutoring process as determined by the number of errors in each of the tutoring steps? Descriptive statistics were used to describe errors. A t-test was used to determine which group of tutors made the most errors in following the procedure listed in Appendices B and C.

CHAPTER IV

DATA ANALYSIS AND RESULTS

To evaluate the research questions posed by this study, the Statistical Package for the Social Sciences (SPSS) system was used. Table 5 presents the means and standard deviations for each (Tell vs. Pause) of the tutoring groups on all variables considered.

Results

Research question 1. An analysis of covariance was used to answer research question one. The null hypothesis for research question one states that there would be no mean significant difference between the "Look, Tell, and Say" (Tell) and the "Pause, Prompt, and Praise" (Pause) methods of peer tutoring as measured by the posttest on computing the percent of a number. The ANCOVA evaluated the math post-test scores and controlled for differences in the pre-test scores. The adjusted post-test mean for the Tell group was 16.44 and the adjusted post-test mean for the Pause group was 13.70. The ANCOVA shown in Table 6 revealed no significant difference in adjusted mean post-test scores in the two types of tutoring ($F(1, 18) = .59$, $p = .45$). The results of the ANCOVA suggest both the Tell and the Pause method appear to be equally effective in producing higher math post-test

Table 5. Means and Standard Deviations on Math Pre-test and Post-test Scores, Errors, and Time Per Tutoring Session by Tutee Group

	Tutees							
	Tell $n = 9$				Pause $n = 10$			
	Mean	SD	MIN	MAX	Mean	SD	MIN	MAX
Pre-Test	3.78	1.56	1.00	6.00	3.50	.85	2.00	4.00
Post-Test	16.44	6.77	3.00	24.00	13.70	7.97	2.00	21.00
Tutee Errors	5.78	1.20	4.00	7.00	9.10	3.18	4.00	14.00
Time (in minutes)	16.92	5.42	10.43	26.83	15.27	2.61	9.92	18.25

Note: Pretest and Posttest maximum correct = 25

Table 6. Analysis of Covariance

Sources of Variation	Sum of Squares	df	Mean Square	F	p
Covariates Pretest	.61	1	.61	.010	.920
Main Effects Group	35.08	1	35.08	.598	.451
Explained	35.68	2	17.84	.304	.742
Residual	938.32	16	58.65		
Total	974.00	18	54.11		

scores.

Research question 2. The null hypothesis for research question two states there would be no significant mean difference in the number of errors made during tutoring between the Look method vs. the Pause method of peer tutoring by the tutees. A t-test for independent samples was conducted to determine if the number of tutee errors made by tutees during the tutoring session was significant. The results of this t-test were significant ($t(17) = -2.95$, $p = .009$). The mean of the Tell group's (group one) number of errors was 5.77 and the Pause group's (group two) mean number of errors was 9.10. The tutees in the Tell group made significantly fewer mean number of errors than the tutees in the Pause group.

Research question 3. The null hypothesis for research question three states there will be no difference between the two tutoring groups in the mean number of errors made by the tutors when tutoring.

A frequency count was made to determine the mean number of errors made by each tutor. Data were used to compare tutor groups by steps missed during the tutoring session (see Table 7). In the Tell group, most mistakes were made on Steps 3 (Say), 1 (Look), and 4 (Feedback). Many tutors found it difficult to tell the tutee to "look at the problem again" and instead leaped to Step 2 (Showing and Telling). Many also had difficulty getting the tutee to repeat the problem aloud even if they were rewriting it silently (see Table 8). Total mistakes on these steps were 33 with a mean of 6.17.

Table 7. Number of Tutor Errors per Step

Tell (Group 1) $n = 6$		Pause (Group 2) $n = 5$	
Steps	# Missed	Steps	# Missed
T1 (Look)	10	P1 (Pause)	5
T2 (Show & Tell)	0	P2 (Prompt)	0
T3 (Say)	15	P3 (If no response, redo procedure)	0
T4 (Feedback)	8	P4 (If 2 incorrect responses, go on)	0
		P5 (Praise)	11
Total missed:	33		16

Table 8. Frequencies of Tell Tutor Errors

Tell Method			
Step	Number of Errors	Frequency	Percent
1 (Look)	0	2	33.3
	1	1	16.7
	2	1	16.7
	3	1	16.7
	4	1	16.7
2 (Show and Tell)	0	6	100.0
3 (Say)	0	2	33.3
	2	1	16.7
	3	1	16.7
	4	1	16.7
	6	1	16.7
4 (Feedback)	0	4	66.7
	3	1	16.7
	5	1	16.7

The tutors in the Pause group made most mistakes on Steps 1 and 5 (Pause and Praise). Some tutors tended to immediately attend to a tutee's mistake, leaving out the "Pause" component of their training. The "Praise" Step was also frequently omitted, as was the "Feedback" portion in the Tell group (see Table 9).

The Pause tutors made a total of 16 mistakes on Steps 1 (Pause) and 5 (Praise). This yielded a mean of 4.60. A t-test was then conducted to compare the mean number of errors between the Tell and Pause tutors. On this t-test, the groups did not differ significantly in mean number of errors (t (9) = .69, p = .510). See Table 10 for means and standard deviations.

Additional Finding

Overall gains were found for all tutees on the posttest. This was determined by a t-test between pre-test and post-test scores. On this analysis t (18) = -6.67, p < .001. The average pre-test score was 3.63 and the average post-test score = 15.0 (maximum score = 25). Considerable improvement was made by the tutees regardless of whether they were in the Tell or Pause group. See Table 11 for descriptive statistics.

Descriptive Analysis

There were several factors that were felt to be related to tutoring success (as measured by tutees mean gain math scores) that were not statistically

Table 9. Frequencies of Pause Tutor Errors

Pause Method			
Step	Number of Errors	Frequency	Percent
1 (Pause)	0	2	40.0
	1	2	40.0
	3	1	20.0
2 (Prompt)	0	5	100.0
3 (If no response, redo procedure)	0	5	100.0
4 (If two incorrect responses, give answer)	0	5	100.0
5 (Praise)	0	1	20.0
	1	1	20.0
	3	2	40.0
	4	1	20.0

Table 10. Tell and Pause Tutor Group Means, Standard Deviations, and t-tests for Tutor Errors per Session

Variable	Mean	Standard Deviation	t	p
ERROR				
Tell	6.17	3.55	.69	.510
Pause	4.60	4.04		

df =9

Table 11. Means, Standard Deviations and t-tests for all Tutees Between the Math Pretest and Math Posttest

Variable	N	Mean	Standard Deviation	Standard Error
Pretest	19	3.63	1.21	.27
Posttest	19	15.00	7.35	1.68

(Difference) Mean	Standard Deviation	Standard Error	t Value	Degrees of Freedom	p
-11.3684	7.425	1.703	-6.67	18	.000**

** $p < .001$

computed due to the small number of subjects. The following areas were examined descriptively: (a) gender differences in tutoring success, (b) the skill of the tutor (as measured by teacher rating) in tutoring success, (c) the skill level of the tutees (as measured by teacher rating) with their overall success (as measured by overall mean gain on the posttest), and (d) the number of errors made by the tutor during the tutoring session and the success of the tutees based on tutees mean gains on the posttest. In addition, the following correlational relationships were examined: (a) the correlation between the tutees' error rate and the math post-test and gain scores, (b) correlation between the tutees' pre-test and post-test scores, and (c) the relationship among the amount of time required by the tutee in the tutoring session and overall post-test and gain scores.

Gender. Tutor-tutee pairs were randomly assigned. The total mean gains made by the tutees (both female) who had the two female tutors was 12.50. The total mean gain on the posttest for all tutees who had male tutors was 11.30. The tutor-tutee pairs were then further divided to examine the gains achieved by tutees who had a tutor of the same gender or of the opposite gender. Male tutees who had male tutors had a mean gain on the posttest of 13. Female tutees who had male tutors had a gain of 8.60 (see Figure 3). From this data, it appears that the same gender dyads (female-female or male-male) possibly may have had greater gains than mixed gender dyads. Means and standard deviations were also obtained by gender for the pretest, the

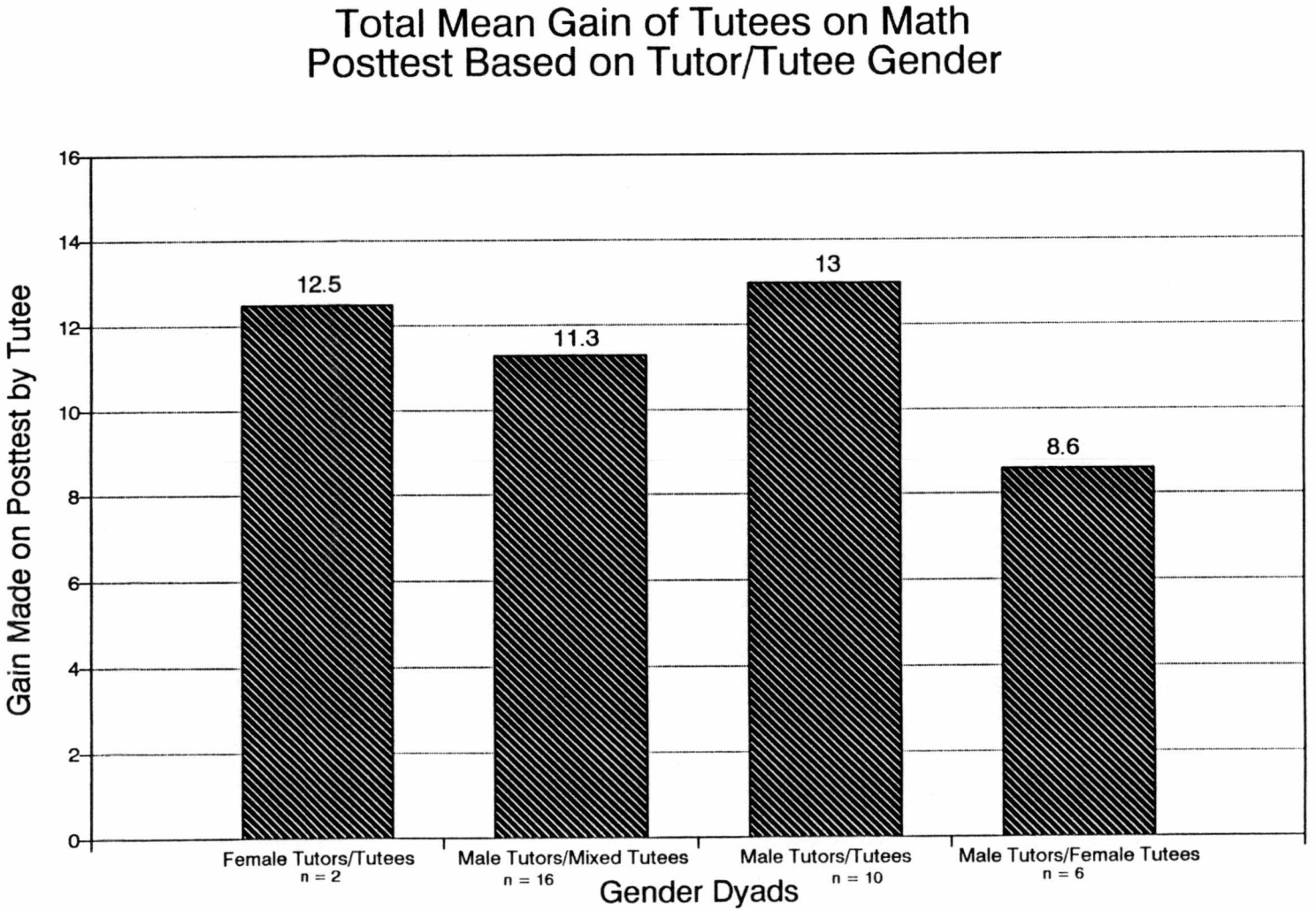

Figure 3. Total Mean Gain of Tutees on Math Posttest Based on Tutor/Tutee Gender

posttest, and mean number of errors made during tutoring by the tutees. The mean number correct for both the pretest and posttest was slightly higher for males than females. Males also had a slightly lower mean number of errors during the session (see Table 12).

Tutor Skill. The total mean gains made by the tutees who had a tutor ranked as "high" in math skills by the teacher (n=1) was 9. Five tutors were ranked as "above average" in math skills by the teacher. The tutees who had tutors that were "above average" had a mean gain of 13.10. The five remaining tutors were ranked as "average" in math skills by the teacher. Tutees in the "average" tutor group had a gain of 10.40 (see Figure 4). This data suggests that tutees who had tutors ranked as above average by the teacher may have had greater gains than those rated as high or average, however, the differences may be due to chance alone.

Tutee Skill. The tutee (n=1) who was ranked as "below average" in math skills by the teacher actually made a lower score on the posttest than the pretest (-1). Sixteen tutees were rated as "low average" in math skills by the teacher. The "low average" groups had a mean gain of 11.90. Three of the tutees were rated as "average" in math skills by the teacher. The tutees in the average group had a mean gain of 14.30 on the posttest (see Figure 5). This data suggests that perhaps the higher the math skills of the tutees, the greater the gains made from tutoring, or possibly that these tutees were brighter than some of the other tutees.

Table 12. Means and Standard Deviations of Sex of Tutee Groups by Pretest, Posttest, and Error

Variable		Mean	Standard Deviation
PRETEST	Male	4.00	1.12
	Female	3.00	1.15
POSTTEST	Male	15.91	7.03
	Female	13.42	8.18
ERROR	Male	7.16	2.72
	Female	8.14	3.38

df = 17

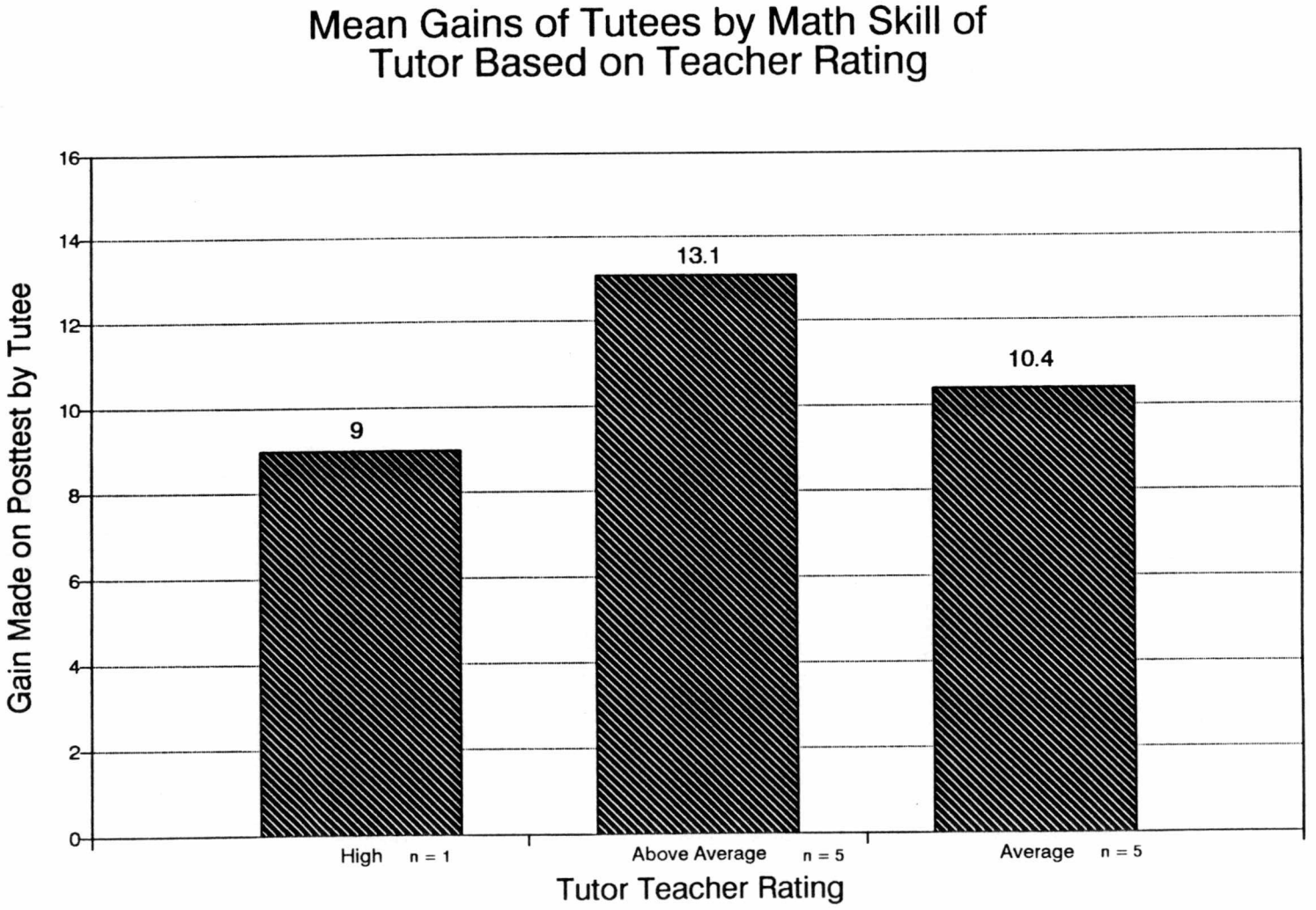

Figure 4. Mean Gains of Tutees by Math Skill of Tutor Based on Teacher Rating

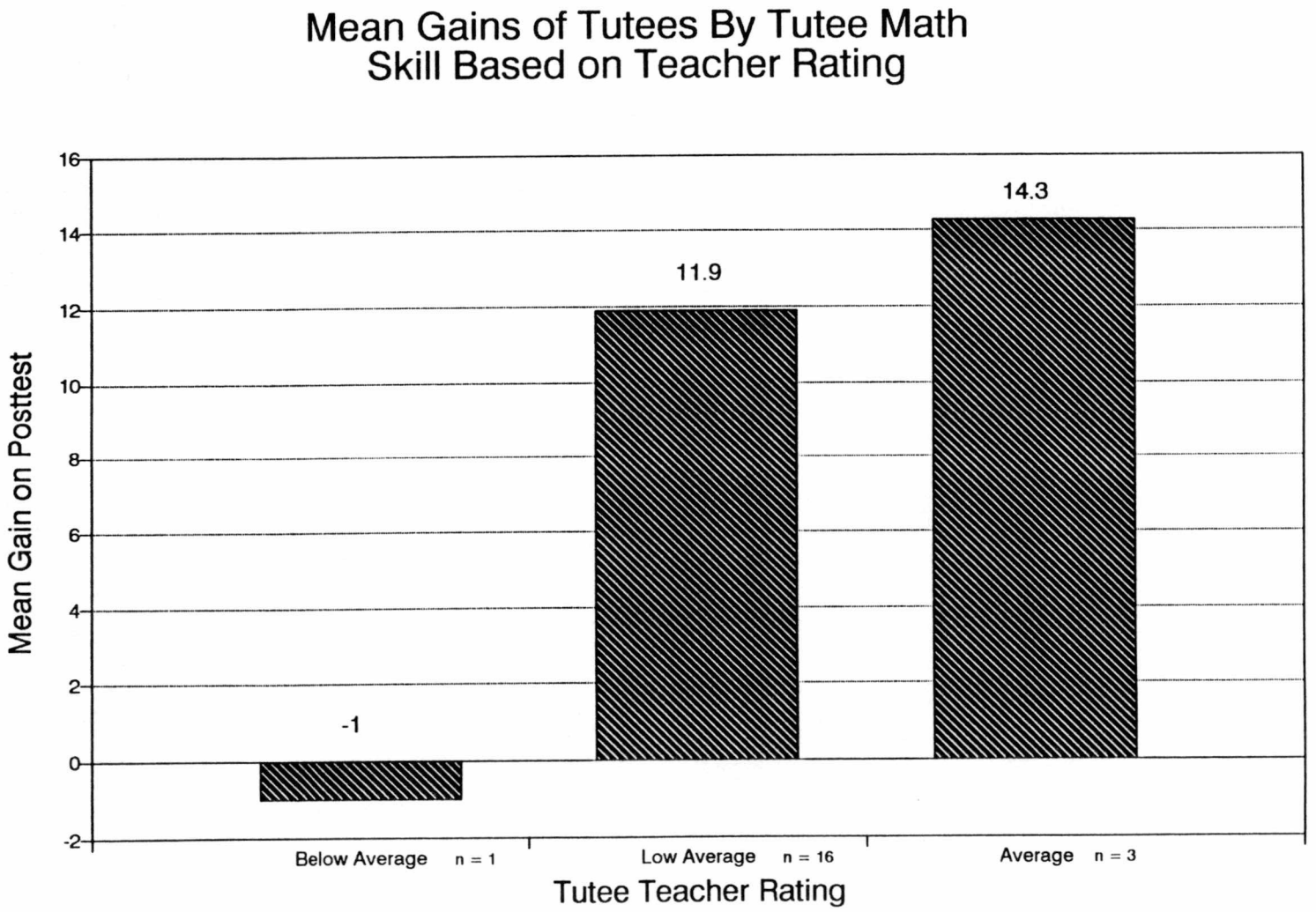

Figure 5. Mean Gains of Tutees by Tutee Math Skill Based on Teacher Rating

Tutor Errors. The mean number of errors made by each tutor per session was calculated. These were then compared to the mean gain made by the tutees. There was no distinguishable consistency in the patterns of tutor errors and mean gain of tutees. For example, the greatest gain made by a tutee was 20.50. This tutee was tutored by a tutor who made 8 errors during the tutoring session. Another tutor who also made 8 errors during the tutoring session had the tutee with the least gain (-1) on the posttest. Overall, the number of errors made by the tutor did not seem to influence gains made by the tutee.

Correlations

The correlation of the tutees' error rate with the number correct on the math posttest was a significant negative correlation (-.61), $p < .01$. In other words, tutees who made the most errors during the tutoring session, also made more errors on the posttest. The same was true for the correlation of the tutee's error rate with gain scores. The correlation between gain scores and error rate was also negative (-.58), and significant at .01 ($p < .01$). This data suggests the greater the tutee error rate, the less the overall gain on the posttest.

The correlation between the pretest and the posttest was .03 which was not significant. No significant relationship was found where a strong relationship would be expected. Logically, tutees that had the lowest pre-test

scores would not be expected to do as well on the posttest as those tutees who had higher pre-test scores. However, some of the tutees with the lowest initial pre-test scores made much more improvement that did those tutees who had the highest pre-test scores. Conversely, some of the tutees made no gain on the posttest at all and some did worse on the posttest than on the pretest. The tutoring effects were apparently not consistent, since this correlation would imply that performance on the posttest was not related to performance on the pretest.

Each tutoring session was timed with a stopwatch to determine if time spent tutoring had any effect on posttest outcome. Also, each group could be compared on overall tutoring time and overall gain scores of the tutees (gain equals post-test score minus pre-test score). An interesting phenomenon occurred in each group in regard to time spent in the tutoring session and post-test or gain scores. In both the Tell and Pause groups, the students who spent the longest time in the tutoring session had negative gain scores [r = -.32 and r = -.42, respectively] and post-test scores that actually declined from their pre-test scores (see Table 13). Similarly, students who spent the shortest times had significant gains in their post-test score. In the Tell group, the tutee with the longest tutoring session

time had a gain of -1, and the student with the shortest tutoring time had a gain of +16. In the Pause group, the longest time in tutoring yielded a gain of -2, while the shortest session time student gained +17 on the posttest.

Table 13. Tutees' Pre-test and Post-test Scores with Time and Overall Gain Scores

Method	Tutor Number	Tutee Number	Time	Gain
Tell	1	6	14.39	7
		7		16
	2	4	22.17	20
		10		21
	3	3	26.83[b]	-1
	4	5	10.43[a]	16
	5	2	15.87	14
		9	17.50	19
	6	1	16.75	7
		8	11.42	11
Pause	7	18	13.50	13
		19	16.83	14
	8	12	18.25[b]	-2
		20	13.92	17
	9	14	13.83	16
		15	17.60	9
	10	13	16.51	0
		11	9.92[a]	17
		17	14.51	1
	11	6	17.87	17

[a] = shortest time
[b] = longest time

CHAPTER V

DISCUSSION AND CONCLUSIONS

Summary

The primary purpose of this study was to determine which error correction procedure ("Look, Tell, and Say" [Tell] or "Pause, Prompt, and Praise" [Pause]) was most beneficial in increasing tutee's ability to compute the percent of a number. The second goal was to determine tutor adherence to training. Other areas examined were: (a) which peer tutoring method (Tell or Pause) was more effective at reducing tutee errors and (b) determining whether tutees increased their scores on computing the percent of a number by following tutoring (both conditions combined).

The general findings were as follows:

(1) Neither the Tell nor the Pause method yielded consistently higher post-test scores by the tutees. Although both methods appeared to increase post-test scores for all tutees, the Tell method appeared to produce slightly higher mean post-test scores than the Pause method.

(2) Tutees in the Tell group made significantly fewer errors in the tutoring session than did the tutees who were corrected by the Pause method.

(3) Tutors in both groups made errors, but the number of errors were not consistent between or within groups. Most tutors who tutored more than

one tutee also varied widely in the number of mistakes made from one tutoring session to the next.

Additional findings suggested that:

(1) Dyads (tutor-tutee) composed of same gender pairs seemed to have greater gains on the posttest that cross-gender pairs.

(2) Tutors who were ranked as "above average" in math skills by the teacher had tutees who made the greatest gains on the posttest. There was no significant relationship between the number of errors made by a tutor and the corresponding tutee gain on the posttest.

(3) The higher the tutees were rated in math skill by the teacher, the greater the gains made on the posttest.

(4) The more errors the tutee made during the session, the less overall gain by the tutee on the posttest.

(5) The tutees in both groups who had the longest tutoring sessions made lower scores on the posttest than on the pretest. Tutees with the shortest tutoring sessions made the greatest post-test gains. As the length of the session increased, gains on the posttest decreased.

(6) Considerable improvement in computing the percent of a number was made by all tutees as measured by the overall mean increase in the post-test scores as compared to the pre-test scores.

Discussion

The primary goal was to determine which peer tutoring method was most effective in teaching tutees how to compute the percent of a number. Both tutoring methods appeared to be effective in increasing learning on the math concept, but neither was more effective than the other. However, the Tell method appeared to have slight advantages in mean post-test scores and reduced errors made by the tutees. It appeared that for this math subject, the increase of learning did not depend on the tutoring method or type of feedback presented.

Tutor and tutee skill levels also were important variants in tutees' post-test outcome. The higher tutees were ranked by the teacher, the better their total gain. Tutors who were "above average" may have been more effective than "average" tutors. Since there was only one tutor in the "high" group, fair comparisons could not be made in this study between the "high" and "above average" tutors in regard to skill level and tutee outcome.

Both groups of tutors found it difficult to give praise and feedback to their tutees. The Tell tutors made 33 tutoring errors on Steps 3 (Say), 1 (Look), and 4 (Feedback). The Pause tutors made 16 tutoring errors on the Praise and Pause Steps. Most mistakes for both groups were on Praise and Feedback. Apparently this is not a natural type of communication sixth grade students normally have with each other and many tutors may have felt uncomfortable giving praise and feedback to a peer. Some tutors gave praise fairly

consistently while others seldom did. Tutors in the Tell group had difficulty being directive in refocusing tutees attention to an error and asking for verbal repetition of the problem as the tutee re-worked the missed problem. Future studies may wish to consider self-concept variables possessed by the tutor that would enable being more directive and positive with tutees.

The relationship of gender differences on tutoring success appears to be a consideration of some merit in the future. From the brief analysis of the gender pairings of each dyad, same-sex pairs may have worked more effectively with each other. The male pairs did slightly better than the female pairs. The male tutors with female tutees made the lowest mean gains. There were not any female tutors paired with male tutees so that comparison was impossible. Same sex pairs may have felt more comfortable working and communicating with each other than mixed sex pairs. This might be related to the subject's age and grade. The same finding may not hold true at either elementary or high school levels.

Perhaps one of the most interesting findings was the inverse relationship between length of time in the tutoring session, tutee errors, and gains in tutoring on the posttest. Tutees who had the longest tutoring sessions, and thus increased opportunities for error correction, had lower post-test scores than pre-test scores. This appears to be related to tutee skill. Tutees who needed the greater instructional time to complete the 15 session problems were also the tutees rated lowest in math skill by the teacher. These tutees ranked as

"below average" or "low average" by the teacher took longer in the session and yet failed to grasp the presented mathematics concept. The tutees who took the least time benefitted from instruction and made greater and quicker gains in concept comprehension. Neither tutor errors nor errors made by the tutee during tutoring were consistently related to either time spent in the tutoring session nor to overall score gain.

Integration With Prior Literature

A review of the existing literature demonstrates that both the "Look, Tell, and Say" and "Pause, Prompt, and Praise" methods were soundly based in both theory and practice. Neither method has been proven to be more effective than the other but "Look, Tell, and Say" and "Pause, Prompt, and Praise" had not been compared directly by any prior research.

Theoretically, the Tell method is based on the principles of Concept Teaching and Reception Learning, which suggest that the essential components of teaching include: presentation, response, feedback, and reinforcement (Anderson & Faust, 1973). Immediate feedback, practicing missed skills, and verbalization of responses are all essential features of concept teaching and the "Look, Tell, and Say" method (Anderson & Faust, 1983; Ausubel, 1968; Gagne et al., 1962; Jenkins et al., 1983).

In contrast, the "Pause, Prompt, and Praise" method is based on the foundations of delayed feedback in learning and guided discovery (Ausubel,

1968). Both theory and practice has demonstrated that delayed feedback increases problem solving skills, decreases teacher dependence and provides increased opportunities to respond (Gagne et al., 1962; Greenwood et al., 1988; McNaughton & Glynn, 1981; Taylor & Nosbush, 1983). Delayed attention to errors has been demonstrated to be superior to immediate feedback in increasing reading accuracy because immediate responding interferes with reading accuracy and learning (McNaughton & Glynn, 1981).

Both of these theoretically based methods have been used successfully in peer tutoring programs in the past (Berliner, 1987; Kalfus, 1984; Merrett, 1988; Young, Hecimovic, & Salzberg, 1983). The finding that neither of these methods produced increased learning over the other in this study may be due to several factors, including: tutor training, age, and development level of participants.

One of the primary reasons that a tutor training component was a part of the methodology of this study is the prior research done on tutor training programs. Studies done on peer tutoring with untrained tutors suggested untrained tutors rarely used feedback and praise and lacked appropriate rapport skills (Johnson & Bailey, 1978; Ludeke & Hartup, 1983; Niedermeyer, 1970). Basic rapport skills are a major asset in increasing the success of peer tutoring programs (Koskinen & Wilson, 1982b). Most tutoring training programs consist of systematic steps that include modeling, role play, shaping and reinforcement (Dineen, Clark, & Risley, 1977).

Although this study had a tutor training component that lasted about 45 minutes, most of the training focused on teaching the tutors their assigned method of tutoring ("Look, Tell, and Say" or "Pause, Prompt, and Praise"). The training did include role play, modeling and reinforcement, but these techniques were to train the tutors a criterion level of proficiency in the respective tutoring methods. Rapport skills were discussed with the tutors, but most tutors tended to dismiss the subject as "something they already knew". A limitation of the study based on the literature may perhaps be that the method of tutor training needed to include more time devoted to increasing tutors' rapport skills, praise and ability to use reinforcing remarks.

The age, ability, and development level of the child are also important considerations in the success of a peer tutoring program according to the literature (Singh, Winton, & Singh, 1985). Prior studies have suggested that young students and those who are slower at acquiring skills would benefit most from immediate correction and feedback. In this study, however, the tutee who was ranked the lowest by the teacher and obtained negative gains on the posttest, participated in the Tell method. According to the literature, the tutee should have made optimal progress with the Tell method. It is not known, however, how the tutee would have gained by the Pause method since this opportunity was not available. Perhaps such method comparisons could be done in the future.

Average middle school children were predicted by the literature to make

more gains by being allowed time to self-correct and from a less direct instructional tutoring method (Singh et al., 1985; Wheldall et al., 1987; McNaughton, 1981b). However, the Pause method did not prove to be more effective than the Tell method in the current study.

Previous studies involving peer tutoring programs with sixth grade middle school children found that the program may have worked better with cross-age tutoring dyads (older tutors than tutees) than with equal age partners (Ludeke & Hartup, 1983; Wheldall et al., 1987). Tutoring dyads that are of equal age and status tend to have more competiveness, aggression, and socialization (Ludeke & Hartup, 1983). The present study was a peer tutoring program in the true sense of the word "peer" in that participants were all sixth grade students with the same math teacher. Future researchers may also wish to experiment with cross-age and same age tutoring dyads to determine age effects.

The Pause method claims to be more directed toward intrinsic qualities and long term effects. Only short term immediate recall effects were measured by the math posttest. When used consistently, the "Pause, Prompt, and Praise" method has been demonstrated to increase motivation and problem-solving skills, provide increased opportunities to respond, and decrease dependence on the teacher (Anderson & Faust, 1973; Heron et al., 1983; McNaughton & Glynn, 1981; Taylor & Nosbush, 1983). Thus, a study that involves several tutoring sessions and measures the aforementioned skills and qualities may provide insight into short term vs. long term tutoring effects.

In general, this study and prior literature demonstrate that peer tutoring programs are advantageous for all involved regardless of the method used or the number of procedural errors made by the tutor. Children can be taught to be effective teachers for each other resulting in improved academic performance by both tutors and tutees.

Limitations

One of the major limitations of this study was the pretest-posttest design and lack of a control group. Factors, other than tutoring, may have been present during the time between the pretest and posttest that may have increased tutee's skills in computing the percent of a number. Two such possibilities are that students may have conferred with one another or the teacher may have begun discussing the topic in the classroom. Since there was no control group, and such threats to the present study's validity are unknown and cannot be totally ruled out, the tutees' increases on the posttest may be due to chance alone. Future researchers may wish to change the research design (e.g., use a multiple baseline) to rule out such threats and have more certainty in their findings.

Future studies may need to include more participants and may wish to involve more than one school. One of the difficulties in obtaining a larger number of tutees, was the lack of consent to participate by the parents. Several students met all the criteria for inclusion as a tutee and were willing to

participate but could not obtain parental consent. Other participating tutees' data had to be dropped from analysis since they had too few errors during tutoring for the correction method to be applied to criterion.

Increased tutor training as well as more than one tutoring session may be needed to determine significant effects. Tutor training needs to have more focus on rapport building and feedback. More than one session could continue to increase tutee gains.

Conclusion

The results of the present study suggests that most tutees learned the skills necessary to compute the percent of a number. One method of tutoring did not appear to be more effective than the other, but both appeared to increase a general gain in knowledge of this particular math concept.

Due to the experimental design and the limited number of participants, it is difficult to draw conclusions other than tutees did benefit from tutoring. Although one method did not prove to be more effective than the other, each method proved to have distinct advantages.

One of the advantages for the tutees in the Tell group was their mean post-test score on computing the percent of a number was higher than tutees' post-test scores in the Pause group. This information suggests that the Tell method was easier for the Tell tutees to follow, respond to, and make corrections than was the Pause method for tutees. The Tell tutees also made

significantly fewer errors while being tutored.

An advantage for the Pause method was the tutors made fewer errors during the tutoring sessions than did tutors in the Tell method. The Pause procedure appeared to be easier for the tutors to use; the Tell method easier for tutees. However, the major mistake the Tell tutors made was in requiring tutees to repeat the corrected problem aloud as the tutee re-worked the problem. Sixth grade peers may have difficulty with such social demands and may have felt uncomfortable requiring their tutees to repeat the tutor's corrections aloud. The Pause tutors did not have such a requirement, and thus made significantly fewer mistakes.

The amount of time the tutee spent in the tutoring session and subsequent gain on the post-test score also seemed to be a finding of some merit. The tutees who had the longest tutoring sessions also had the least (negative) gain on the posttest. This was true for both tutoring conditions. However, neither the amount of procedural tutoring errors made by the tutor nor the number of errors made by the tutee during the session appear to be related with either the length of the session or overall gain in math scores on the posttest. Students who needed increased time to complete the problems with tutor help, apparently lacked the skills necessary to benefit from tutoring regardless of their own errors or the tutors'.

The brief descriptive data obtained from the study may suggest that tutees gained more on the posttest from tutoring when paired with same-sex

tutors. The least gains were made by female tutees who had male tutors. A review of the videotapes shows several male tutors physically and verbally responding differently depending on the gender of the tutee.

Tutor's skill level as rated by the teacher also seems to be an important consideration for tutoring success. Tutors regarded as "above average" by the teacher had tutees who gained more on the posttest than those tutors rated as "average". Only one student was ranked as having "high" ability but the teacher also noted that this tutor had a "bad attitude" about school which may have partially influenced his performance despite his exceedingly high ability. In fact, this tutor had to be released from in-school suspension on one of the days he was to tutor due to an altercation with another student. Future studies will need to include more tutors of "high" ability and control for such attitudinal considerations.

According to the literature, tutor training is vital in the success of a peer tutoring program. The present study included a 45 minute tutor training component using demonstration, modeling, and role play. However, tutor adherence to training could have been increased by larger training sessions. Additionally, more emphasis on rapport and feedback skills for both methods appear to be necessary in increasing adherence to all of the tutoring steps, especially Praise and Feedback.

Although many of the results of this study were inconclusive due to the experimental design and small data set, it is appears that a peer tutoring

program can be beneficial in increasing tutees learning on a particular skill. Peer tutoring programs need to be considered as viable options in the classroom. This study suggests that peer tutoring programs may be beneficial to the tutees in terms of increased academic success. Prior studies have demonstrated that peer tutoring programs are also beneficial to the tutor as well as to the tutee in terms of not only increased academic skill, but self-concept, motivation, and social relationships as well (Csapo, 1976; Jenkins & Jenkins, 1982; Lane, Pollock, & Sher, 1972). Peer tutoring programs used in the classroom may aid struggling students and increase the overall amount of instructional time the teacher has in the classroom. Teachers generally do not have time to work one-on-one with the students who do not understand a particular concept. This study suggests that by setting up a peer tutoring program, the tutees may receive the increased individual instruction time from a peer tutor and benefit by academic gain.

Implications for Future Research

Future investigations into peer tutoring may wish to add more tutor training components. More attention in training to rapport building and presentation of feedback as well as additional instruction on procedural methods, may aid in increasing tutor adherence to training. Live instruction instead of a videotape may also improve training since the tutor would have an opportunity to respond and receive feedback.

Further studies need to be made with a larger population and perhaps at more than one school. Statistically, this will help determine significant effects that may be unrecognizable with a small number of subjects.

Gender differences, dyad composition, and same age vs. mixed age dyads also need further investigation. Small effects of gender pairings were present in this study, but these characteristics need to be studied and controlled.

Allowing each tutee to participate in both methods may also demonstrate effectiveness of each method within the individual. However, the recency effect and the increased instructional time the tutee will have had when the second method is presented will have to be accounted for and controlled.

In order to determine long term vs. short term effects of the Tell and Pause methods, it may be useful to give two posttests. One immediately after tutoring and another a week later. The posttest would also need to be coupled with valid measures of school motivation and self-esteem to take into account the long term effect claims of "Pause, Prompt, and Praise".

Finally, subject matters other than math should be included. "Pause, Prompt, and Praise" was founded on and used extensively in reading programs. The immediate feedback method has been used in most academic areas. The Pause method had not been applied to math tutoring until this study according to the available literature. Another comparison study in reading would be beneficial to fully investigate the Pause method's claims since reading has been

the Pause method's primary area of focus.

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APPENDICES

APPENDIX A

PRETEST -

COMPUTING THE PERCENT OF A NUMBER

PRETEST

Your name: _____

Read each question carefully. Write your answer in the blanks.

1. What is the percent for the decimal 0.13 _____

2. John buys grain for his pony in 60 lb. containers. If he feeds his pony 10% of the grain each day, how many pounds would he feed each day? _____

3. What is the decimal for 16% _____

4. A basketball warm-up suit is priced at $100. If the sales tax is 7% of the price, how many dollars is the sales tax? _____

5. In a 24 hour day, Jimmy is sleeping 30% of the entire time. How many hours per day does Jimmy sleep? _____

6. What is 20% of 55 _____

7. The gas tank on Granddad's van holds 20 gallons of gasoline. When he returned from filling it, he said "David, it was 95% empty!" How many gallons did he buy to fill the tank? _____

8. A ladies clothing store advertised ladies winter coats on sale for one day only at 20% off the normal price. Louise bought one marked $195. How much did it cost her? _____

9. Mary has a 1 year old pony. Her pony is allowed to eat only 6% of a 60 lb. container of grain each day. How many lbs. of grain is her pony fed each day?_____

10. A school has 100 students in the 6th grade. 56% are girls. How many students are girls?_____

11. A salesperson took 15% off the price of a pair of $25 jeans. How much did he take off the original price? _____

12. What is 94% of 46 _____

13. Donnie has a large apple tree in his back yard. He picked 30 red apples that had fallen on the ground. He decided to give his sister 10% of the 30. How many apples did his sister get? _____

14. What is 40% of 30 _____

15. There are 25 national flags which are white and one other color. Of these 8% are green and white. How many nations have a green and white flag? _____

16. What is 20% of 90 _____

17. What is 25% of 36 _____

18. There are 50 cards in a deck of Flinch cards. Of these 4% are blue and one other color. How many cards are blue and one other color? _____

19. What is 15% of 12 _____

20. What is 30% of 40 _____

21. Pump tennis shoes are advertised at 30% off the regular price of $90. Jason bought one pair. How much did he get off the regular price? _____

22. Nolan Ryan's fast ball has been clocked at 96 miles per hour when it crosses the plate. Phil Neikro throws a knuckle ball that crosses the plate only 51% as fast as Ryan's. Both have great records as strike out pitchers. How many miles per hour is Neikro's ball travelling when it crosses the plate? _____

23. What is 30% of 180 _____

24. What is 75% of 12 _____

25. What is 100% of 900 _____

KEY - PRETEST

1. 13%
2. 6 lbs.
3. .16
4. $7
5. 7.2 hr.
6. 11
7. 19 gals.
8. $156
9. 3.6 lbs.
10. 56
11. $3.75
12. 43.24
13. 3
14. 12
15. 2
16. 18
17. 9
18. 2
19. 1.8
20. 12
21. $27
22. 48.96 mph
23. 54
24. 9
25. 900

APPENDIX B

CHECKLIST FOR ANALYSIS OF TUTOR BEHAVIOR

PAUSE, PROMPT, AND PRAISE

CHECKLIST FOR ANALYSIS OF TUTOR BEHAVIOR

PAUSE, PROMPT, AND PRAISE

Problem Number:

Essential Features:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. "Pause" (tutor pauses at least 5 seconds before attending to error).															
2. "Prompt" (tutor prompts with clue about type of problem or part of problem that is incorrect).															
3. If tutee does not respond, tutor goes over procedure to be followed and prompts again.															
4. If problem still incorrect after 2 prompts, tutor gives answer.															
5. "Praise" (tutor praises for correct problem solving, self-correction, and correcting after a prompt).															

(✓ indicates presence of feature for specified observed problem.)

APPENDIX C

CHECKLIST FOR ANALYSIS OF TUTOR BEHAVIOR

LOOK, TELL, AND SAY

CHECKLIST FOR ANALYSIS OF TUTOR BEHAVIOR

LOOK, TELL, AND SAY

Problem Number:

Essential Features:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. "Look" (focus tutees attention on problem.)															
2. "Show and Tell" (tutor demonstrates and verbally tells how to get correct answer).															
3. "Say" (tutor has tutee show and tell how to get the right answer--redo problem).															
4. Feedback provided.															

(✓ indicates presence of feature for specified observed problem.)

APPENDIX D

TUTOR PROBLEMS -

COMPUTING THE PERCENT OF A NUMBER

TUTOR PROBLEMS

Your name: _____

Read each question carefully. Write your answer in the blanks.

1. What is the decimal for 77% _____

2. The step to Mrs. Dunn's porch needs to be replaced. It is 40 inches long. She told the carpenter to make one 20% longer. How many inches longer should the carpenter make the step? _____

3. What is 100% of 999 _____

4. What is the decimal for 45% _____

5. A local clothing store advertised a sale on wintercoats. All girl's coats were 20% off the marked price. Jenny selected one priced at $78. How much did she save on the coat? _____

6. What is 16% of 50 _____

7. What is 50% of 42 _____

8. Greg left the fair with 64 peanuts in a bag. Riding home, he ate 75% of them. How many did he eat? _____

9. What is 25% of 24 _____

10. A local fast food restaurant gives a 15% discount to 6th grade students. Amy ate there last week. Without the 15% discount, her food would have cost $4.70. How much money did she save with the discount? _____

11. What is 10% of 75 _____

12. What is 48% of 65 _____

13. Jeremy's dad's new car cost $15,000. The car dealer added 5% sales tax onto the price. How much more did the sales tax add to the cost of the car? _____

14. There are 20 national flags which are white and one other color. Of these, 25% are red and white. How many flags are red and white? _____

15. What is 25% of 56 _____

KEY - TUTOR PROBLEMS

1. .77
2. 8 in.
3. 999
4. .45
5. $15.60
6. 8
7. 21
8. 48
9. 6
10. .47
11. 7.5
12. 31.2
13. $750
14. 5
15 14

APPENDIX E

POSTTEST -

COMPUTING THE PERCENT OF A NUMBER

POSTTEST

Your name: _____

Read each question carefully. Write your answer in the blanks.

1. What is the percent for the decimal 0.25 _____

2. Jane buys grain for her pony in 40 lb. containers. If she feeds her pony 15% of the grain each day, how many pounds would she feed each day? _____

3. What is the decimal for 8% _____

4. A pair of running shoes is priced at $80. If the sales tax is 5% of the price, how many dollars is the sales tax? _____

5. In a 24 hour day, Bryan is sleeping 25% of the entire time. How many hours per day does Bryan sleep? _____

6. What is 80% of 16 _____

7. The gas tank on Eric's dad's car holds 16 gallons of gasoline. When he returned from filling it, he said "Eric, it was 50% empty!" How many gallons did he buy to fill the tank? _____

8. A girls clothing store advertised girls winter coats on sale for 30% off the normal price. Shelley bought one marked $95. How much did it cost her? _____

9. Bobby has a 2 year old pony. His pony is allowed to eat only 7% of a 70 lb. container of grain each day. How many lbs. of grain is his pony fed each day? _____

10. A school has 60 students in the 4th grade. 25% are boys. How many students are boys? _____

11. A salesperson took 10% off the price of a $25 shirt. How much did she take off the original price? _____

12. What is 40% of 94 _____

13. David has a large pear tree in his back yard. He picked 20 pears that had fallen on the ground. He decided to give his sister 25% of the 20. How many pears did his sister get? _____

14. What is 80% of 60 _____

15. There are 30 national flags which are yellow and two other colors. Of these 10% are green, blue and yellow. How many nations have a green, blue and yellow flag? _____

16. What is 55% of 80 _____

17. What is 40% of 80 _____

18. There are 50 cards in a deck of Uno cards. Of these 6% are red and one other color. How many cards are red and one other color? _____

19. What is 27% of 24 _____

20. What is 60% of 80 _____

21. Girls ski jackets are advertised at 20% off the regular price of $40. Ashley bought one. How much did she get off the regular price? _____

22. Nolan Ryan's fast ball has been clocked at 97 miles per hour when it crosses the plate. Phil Neikro throws a knuckle ball that crosses the plate only 55% as fast as Ryan's. Both have great records as strike out pitchers. How many miles per hour is Neikro's ball travelling when it crosses the plate? _____

23. What is 60% of 240 _____

24. What is 25% of 8 _____

25. What is 100% of 400 _____

KEY - POSTTEST

1. 25%
2. 6 lbs.
3. .08
4. $4
5. 6 hr.
6. 12.8
7. 8 gals.
8. $66.5
9. 4.9 lbs.
10. 15%
11. $2.5
12. 37.6
13. 5
14. 48
15. 3
16. 44
17. 32
18. 3
19. 6.48
20. 48
21. $8
22. 53.35 mph
23. 144
24. 2
25. 400

APPENDIX F

INFORMED CONSENT FORMS

The University of Tennessee
Committed on Research Participation

EXAMINEE INFORMED CONSENT FORM

The reason for this project is to learn which of two tutoring methods works best with sixth grade students. You will be in one of two groups: tutors and tutees. If you are selected to be a tutor, you will be taught how to tutor in one of two different methods. Then you will work on a math skill with other students (tutees) to see which method works best. If you are selected to be a tutee, you will be taught these math skills by a tutor.

You will be assigned a partner to work with. You will also be given a short quiz before you begin the tutoring sessions and one after they are all over. This will show how much you knew before tutoring and how much you learned through the tutoring.

You and your partner may be videotaped to make sure you are using the tutoring methods you were taught. Your names will not be on the tape and the only one that will see it will be one of the people in charge of the project. The tapes will be erased after the project is completed. Your names will not be used and no one will know your scores.

There shouldn't be any reason to feel uncomfortable in the tutoring sessions. Everyone is to try their best to see which method works best to help students learn. You won't receive anything from participating, but it will help others when we find out which tutoring method is the best for students to use when teaching each other.

You don't have to do this if you don't want to. If you start tutoring and then decide you don't want to finish, you can stop at any time. If you stop, no one will get upset with you. Do you understand?

I understand what this project is about and what I will be asked to do. If I have any questions after I finish the tutoring, I understand that I can call or ask my parents to call one of the people in charge of the project. They are Betsye Robinette or Don Dickinson at (615) 974-5131. I understand that I will get a copy of this paper to read and keep whenever I like.

_____ _____

Signature of Participant Date

_____ _____

Signature of Principal Investigator Date

The University of Tennessee
Committee on Research Participation
PARENTAL INFORMED CONSENT FORM

Principal Investigator: Betsye H. Robinette
Co-Principal Investigator: Dr. Donald Dickinson, Ph.D.
Title of Research Project: A Comparison of the Effects of the Look, Tell and Say and the Pause, Prompt and Praise Tutoring Methods

Dear Parent,

Your child has been selected to participate in a study to determine which of two error correction procedures is the most beneficial to students in a peer tutoring program. The participating children will be divided into tutors and tutees. Your child will be assigned to one of these groups based on pre-test and TCAP scores and teacher nomination. The tutors will be taught one of two tutoring methods and a math concept. They will be assigned a partner (tutee) and will teach the math concept to the tutee. The tutoring sessions will last approximately 15 - 30 minutes. Some of the children will be videotaped to ensure they followed the methods they were taught. They will not be identified in any way on the tape. Only the Investigators will have access to the tape and you may review the tape at any time. The tapes will be erased when the data analysis is completed.

There will be no discomforts, inconveniences, or risks to your child.

Benefits will include learning a math concept earlier in the school year than would normally be taught, learning tutoring and study skills and positive social interaction with peers.

All test results will be confidential. No test results will contain the name of the examinee. All materials, with the exception of the Informed Consent Form will be recorded with a code number. The Principal and Co-Principal Investigators will have access to the Informed Consent Forms and these will be stored in a locked file cabinet in the office of the Co-Principal Investigator.

I understand that my child's participation in this research is voluntary and that I may withdraw my child's participation at any time without penalty to me or my child. I understand the procedures to be used in this study and if I have further questions about this study I understand that I can call Betsye Robinette or Don Dickinson at (615) 974-5131. I understand that I will receive a copy of this form to read at my leisure.

Date	Signature of Legal Guardian
Date	Signature of Principal Investigator

VITA

Betsye Hunter Robinette was born in Nashville, Tennessee on September 30, 1960. She attended elementary schools in Nashville, St. Louis, Missouri, and Roanoke, Virginia. She graduated from Cave Spring High School in Roanoke, Virginia in June, 1978. The following September, she entered Virginia Polytechnic Institute and State University in Blacksburg, Virginia where she graduated in 1982 with a Bachelor of Science degree in Psychology.

After a short term mission project with Campus Crusade for Christ in Tokyo, Japan, she entered Wheaton Graduate School in Wheaton, Illinois. She graduated with honors with a Masters of Arts degree in Clinical Psychology in May, 1984. She began attending the University of Tennessee, Knoxville, in 1987 in the Doctoral program in Education, concentrating in School Psychology.

Betsye married Michael Robinette in August, 1988. Son David was born in June, 1992. She is currently listed in Who's Who of American Women and is a member of Pi Lambda Theta and Phi Kappa Phi.

In December of 1993 she received her PhD in Education from the University of Tennessee in Knoxville, Tennessee.

She is a Licensed Psychological Examiner and a Certified School Psychologist. She is currently employed as a School Psychologist with the Knox County School system in Knoxville, Tennessee.