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**The effect of training in self-set goals vs. assigned goals on
achievement behaviors, self-efficacy and transfer of training**

Pisano, Leonard Vincent, Ph.D.

City University of New York, 1991

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THE EFFECT OF TRAINING IN SELF-SET GOALS
VS. ASSIGNED GOALS ON ACHIEVEMENT
BEHAVIORS, SELF-EFFICACY AND TRANSFER
OF TRAINING

by

LEONARD VINCENT PISANO

A dissertation submitted to the Graduate Faculty in
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Abstract

THE EFFECT OF TRAINING IN SELF-SET GOALS
VS. ASSIGNED GOALS ON ACHIEVEMENT
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OF TRAINING

by

Leonard Vincent Pisano

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The purpose of the present study was to extend the work of Bandura and Schunk on goal-setting and achievement behaviors while incorporating self-set proximal goals. Specifically, the effects of training in self-set proximal goals were compared with an assigned goal-setting group (proximal goals) and control conditions for both training and transfer of training experimental phases.

The experimental design involved the comparison of pretest and posttest scores across the following three treatment and one control group conditions through an a priori analysis of covariance with two covariate scores:

- 1) Assigned goal-setting condition : students were assigned specific goals (proximal in nature) by the experimenter while working on a self-directed subtraction task.

2) Self-set goal-setting condition : students were given training in developing proximal goals, including modelling by the experimenter and practice prior to working on a self-directed subtraction task.

3) No treatment control group : students received only pretest and posttest assessments.

4) No goals group : students received the self-directed subtraction task without directions regarding goal-setting.

The experimental design utilized two phases in order to maximize contrast effects. Phase 1 was a self-directed subtraction task and exposure to a self-set proximal goal-setting strategy for the self-set group. Phase 2 was a transfer of training condition and involved a parallel form self-directed subtraction task with the opportunity for all treatment groups to set their own proximal goals.

The dependent variables were three achievement behaviors: level of self-efficacy, an achievement skill measure and level of intrinsic interest. These variables are related to Bandura and Schunk's research (1981). The number of pages (worksheets) completed for Phases 1 and 2 for each treatment group was also analyzed.

The hypotheses to be tested involved comparisons among the groups on each dependent variable controlling for

pretest scores on an achievement skill measure and a self-efficacy measure. Each hypothesis was tested using an a priori analysis of covariance. It was hypothesized that the self-set proximal goal-setting group would have a more positive impact on the dependent variables when compared with the assigned group or other control groups. This referred to both the training and the transfer of training phases.

Eighty regular education elementary students in the 2nd to 4th grades, who were identified by the teacher as deficient in mathematics subtraction skills were the identified sample population. Students were of low socioeconomic, minority group status from two large apartment projects and in attendance at an urban elementary public school. The ethnic make-up of the sample was approximately 85% black, 10% hispanic and 5% white. Students who were deficient in mathematics at these grade levels were selected because they were representative of the student ages (age 7.3 to 10.1) and level of academic difficulty that Bandura and Schunk (1981) utilized in their study. The criterion for inclusion in the sample was a pretest score on an achievement skill measure in subtraction that was less than or equal to 40% correct. In addition, all students were also rated by their teachers as manifesting low ability in math.

The results from this investigation do not support the

major predicted hypotheses. The performance on the achievement measures of the self-set training and assigned goal-setting groups were not superior when compared with control groups or each other. The findings of this study indicate that training in a self-set goal-setting technique utilizing proximal goals did not significantly impact on academic behaviors for the sample population. Students did not demonstrate gains in their achievement skill level or their level of self-efficacy. Positive results after a transfer of training task (phase 2) for the self-set proximal goal-setting group were not evidenced on any of the dependent variables. A measure of intrinsic interest also did not yield any significant results. The expected impact of increased commitment and responsibility as part of the self-set goal-setting training as viewed from a cognitive social-learning orientation was not supported by this study with this sample population.

The results for the assigned goal-setting group were also not supportive of the predicted hypotheses.

Possible factors responsible for the lack of results include age/grade level, sample size and variability of scores, questionable reporting of self-efficacy and use of an "at-risk" population.

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I dedicate this dissertation to Maria Graziella, whose encouragement and love has been instrumental in making this event happen.

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CHAPTER 1

Goal-setting and Education

The use of goal-setting strategies in educational settings has resulted in improved achievement behaviors such as task persistence, specific skill acquisition, level of perceived self-efficacy, and intrinsic interest level (e.g., Bandura & Schunk, 1981; Schunk, 1985). Goal-setting has enhanced performance of children who have previously demonstrated failure to acquire specific skills such as subtraction, division and reading comprehension (Bandura, 1986; Bandura & Schunk, 1981; Schunk, 1985). Goal-setting conferences in an ongoing educational environment have resulted in positive achievement outcomes as well (Gaa, 1973, 1978). Gaa (1973) investigated the effect of individual goal-setting conferences as a motivational technique influencing classroom achievement, attitude and goal-setting behavior. Results with elementary age children showed significantly higher classroom achievement and different goal-setting behavior when compared with the non-goal-setting group. A subsequent study by Gaa (1978) examined the effects of individual goal-setting conferences on classroom achievement and locus of control orientation for high school students. Analyses of the data supported a positive effect for achievement and suggested that goal-setting

conferences can influence a student's perceptions of his/her ability to control reinforcements in the classroom.

Differing approaches to teaching/employing goal-setting strategies with students have not been systematically addressed in the educational area. Goal-setting researchers such as Schunk and Bandura have suggested that participation by the student in the process of goal-setting will further enhance achievement behaviors through heightened personal involvement, commitment and responsibility toward a learning task. Thus, an important issue in exploring factors that influence the effectiveness of goal-setting (other than the goals themselves) is if goals should be externally assigned or the product of varying levels of collaboration/participation between the student and teacher. For the purposes of this study, participation is operationally defined as a collaborative interaction between the student and teacher/experimenter that is hypothesized to impact on a student's perceived sense of personal control, level of commitment and responsibility toward a task. The efficacy of participation in proximal goal-setting during an actual academic task has not been sufficiently researched. Additional research on how participation during proximal goal-setting impacts on motivation, academic performance and self-efficacy is needed. Locke et al. (1981) reviewed the literature between 1969 - 1980 on the influence of goal-setting on task performance and generally found

positive relationships. Both Bandura and Schunk reference Locke's work with regard to goal-setting properties and the role of participation. Unfortunately, results on the effect of the degree of student participation in goal-setting are inconsistent and inconclusive.

The study attempts to examine and compare the effects of student participation during proximal goal-setting with assigned proximal goals and control groups. In addition, this study will seek to support underlying explanations for participation hypothesized in Bandura's social cognitive learning theory (Bandura, 1986). According to this model, the degree of participation in goal-setting can affect strength of commitment to goal attainment. When a person plays an important role in goal selection, that person feels responsible for progress toward those goals. This further engages self-evaluative mechanisms as part of the process. If goals are assigned by others, people may not actually accept them or feel obligated to obtain them. Thus, self-evaluative motivations for reaching a goal may be less when performance standards are assigned by others. This proposed study will examine the relationship between assigned and participatively set proximal goals on academic behaviors, interest and self-efficacy.

In the sections that follow, the literature on proximal goal-setting, goal properties and participation with emphasis on achievement and educational contexts will be

reviewed. Bandura's social cognitive learning theory and its application to goal-setting and participation will be expanded upon within relevant areas in order to provide the model for this study.

Goal-setting properties have been shown to have positive effects on performance in achievement contexts (Bandura, 1986; Schunk, 1984). Goal-setting is an important factor in social cognitive theory (Bandura, 1986). Bandura and Schunk have examined goal-setting properties, self-motivation and achievement behaviors from a social cognitive learning theory perspective with associated constructs of self-efficacy and self-evaluative mechanisms. The model underlying this study will be Bandura's social cognitive learning theory (Bandura, 1986) and includes elements of Schunk's model of classroom learning (Schunk, 1985).

Social-Cognitive Theory: Self-Efficacy, Goals and
Motivation

Social-cognitive theory is conceptualized as a triadic interactional model of causation whereby behavior, cognitive and other personal factors, and environmental events all function interactively as determinants of each other (Bandura, 1978, 1986). The concept of interaction involves reciprocal determinism; the term reciprocal implies mutual action between causal factors. Determinism

refers to outcome effects that are due to a multiplicity of factors and not independent sequences of events. A given effect is often the result of many factors. Due to these multi-interactional influences, the same factor can also be part of another entirely different and separate effect.

Self-efficacy is an important expectancy variable in social cognitive theory hypothesized to have different effects in many settings (Bandura, 1986; Brown & Inouye, 1978; Schunk, 1981). Bandura (1977) posited the centrality of the self-efficacy mechanism in human functioning. Self-efficacy percepts can impact on thought patterns, actions and emotional arousal. In the school/achievement area self-efficacy impacts upon achievement behaviors/strivings, growth of intrinsic interest, and career ambitions (Bandura, 1977, 1986; Schunk, 1984, 1985;). Self-efficacy is defined as a personal judgment about one's capabilities to organize and implement action within various contexts (Bandura, 1986). The main concern is not the actual skill level a person has but the judgments of what one can do with whatever abilities he/she has. A person's level of self-efficacy can affect functioning in an achievement setting, that is, choice of activities, motivation, effort, persistence and level of skillful performance. Students who have a high level of self-efficacy will engage in a more difficult task, expend more effort and persist on it longer than those who doubt their capabilities (low level of self-efficacy) (Bandura,

1986).

Bandura also differentiates between two types of personal judgments, personal efficacy and response-outcome expectations. Perceived self-efficacy is a self-assessment of one's ability to reach a specific level of performance while an outcome expectation is a judgment of the anticipated consequences that the behavior will result in. Efficacy and outcome statements are distinguished from each other because a person could believe that a specified course of action would result in a certain set of outcomes while one would not act on the expectations due to the belief that they could not actually master it. Perceived self-efficacy is a significant determinant of performance that operates partially independent of underlying skills (Locke, Frederick, Lee & Bobko, 1984; Schunk, 1984). Locke et al. (1984) examined the effect of self-efficacy, goals, and task strategies on task performance. Self-efficacy and task strategies were manipulated through training in order to demonstrate that they could influence performance. This is in contrast to Bandura and Simon's (1977) goal-setting study where the dieting subjects with goals further developed (improvised) their own personal subgoals (eating strategies) as a means of facilitating goal achievement. In Locke et al.'s study the subjects were trained in different task strategies rather than being allowed to develop them on their own. The purpose of the study was to analyze the joint effects of goals, task strategies and

self-efficacy on task performance across repeated trials. The training in task strategies was utilized in order to develop individual differences on the task strategies actually used as well as the amount of self-efficacy experienced. After a practice trial period subjects were assigned to one of three conditions or manipulations for the training trials. The task was giving uses for common objects. The conditions were 1) a high strategy group where subjects were trained to use three methods for getting a large number of uses, 2) a low strategy group whose subjects were told to give only good or high quality ideas, and 3) a control or no training group that used the practice trials just to become familiar with the task. On later tasks subjects were either assigned a quantitative goal level or chose one, while the final condition was to self-set their own goal level. Both self-efficacy and goal commitment scales were administered.

Results demonstrated that ability and training affect strategies used and are also the main determinants of posttraining performance. Self-efficacy was influenced by posttraining performance, strategies used and ability. Self-efficacy had the only direct effect on goal choice. Self-efficacy, goals, ability, posttraining ability and strategies used all affected performance.

The most unexpected result of the study was the significant effect of self-efficacy, even with ability and past performance controlled. Self-efficacy demonstrated an

effect on goal level, task performance, goal commitment (when the goal was self-set) and choice of a specific goal rather than a nonspecific goal. These results further support Bandura's assertion that self-efficacy is a key causal variable in performance (which includes both direct and indirect effects).

In the social-cognitive view, judgments of self-efficacy whether accurate or inaccurate are based on four principle sources of information: 1) performance attainments, 2) vicarious experiences of observing others performing something, 3) verbal persuasion and 4) physiological states (Bandura, 1982, 1986; Weinberg, Gould & Jackson, 1979).

Performance Attainments

Performance attainments offer the most influential and valid source for assessing one's self-efficacy because they reflect actual mastery experiences. Successes increase efficacy appraisals while repeated failures lower them. The effect of failures is more apparent especially if the failures occur early in the performance situation and are not attributed to lack of effort or adverse external circumstances.

Performances are seen as offering the most valid information for assessing self-efficacy; a person's active engagement in activities increases skill development and

enhances self-efficacy more than other experiences (Bandura, 1977).

Vicarious Experiences

Efficacy appraisals are also partly influenced by vicarious experiences. If one observes or visualizes other similar people performing a task, it can increase self-percepts of efficacy. The observer feels that he/she also has the capabilities to master similar tasks. In contrast, if one observes a failing performance of someone thought to be similarly competent, then self-efficacy estimates decrease and adversely impact on performance.

Verbal Persuasion

Verbal persuasion and allied types of social influences suggesting that one has the capability to do something also impact on judgments of self-efficacy. People who have been verbally persuaded that they could master something are likely to demonstrate more sustained effort when encountering difficulties than if they doubted themselves.

Physiological States

Information from physiological states partly conveys impressions of one's capability, strength and

vulnerability. People interpret their somatic arousal level in demanding situations as signs of one's vulnerability to dysfunction. For example, a student's emotional symptoms such as sweating or trembling before a test could be perceived as a sign that he/she is incapable of doing well. Fear reactions and subjective thoughts about ineptitude further decrease levels of self-efficacy.

Information obtained from these four sources does not affect self-efficacy directly. The critical factor is how this material is appraised cognitively. Thus, there is a weighting and combining of both personal and situational factors in developing efficacy appraisals. In addition, self-efficacy is not directly reflective of past performances and outcomes. Research has supported that perceived self-efficacy can demonstrate an increase, occasionally match and sometimes remain below past performance levels depending on how performance on a task is cognitively appraised (Bandura, Reese & Adams, 1982). When people are confident of their capabilities they persist in their level of self-efficacy and perseverance, even when they continuously fail on unsolvable problems (Brown & Inouye, 1978). If self-percepts of efficacy were direct reflectors of past performance outcomes, people would have shown a significant decline in efficacy as well as performance.

Goal-setting: Overview from a Social-Cognitive Position

In general, from a social-cognitive learning theory orientation, goal-setting represents a form of self-motivation in which one compares present performances with internal standards. The anticipatory satisfaction of reaching a goal leads to sustained efforts until one's performance matches or exceeds these standards (Bandura, 1977,1986). Goal systems do not directly affect motivation but gain motivating power through associated processes of self-evaluative and self-efficacy mechanisms (Bandura & Cervone 1983, 1986; Locke et al., 1984). Bandura and Cervone (1983) investigated the hypothesis that self-evaluative and self-efficacy mechanisms mediate the effects of goal systems on performance motivation. That is, self-evaluative and self-efficacy mechanisms function differentially in performance motivation, depending on the type of comparative performance information. The overall conceptual base posits that both of these self-processes (self-evaluative and self-efficacy mechanisms) affect the regulation of effort under situations involving cognitive comparison between a personal standard and knowledge of performance. Both the anticipated self-satisfaction for attaining accomplishments and the self-dissatisfaction with below level performances provide incentives for increased efforts.

In order to test this hypothesis, treatment conditions were developed in which both comparative factors were

present, one of the comparative factors was lacking, or both were absent. After a baseline session, students performed a strenuous physical activity on an ergometric device under randomly assigned conditions. These included either goals with performance feedback, goals alone, feedback alone or neither goals nor feedback. The goals involved a 40% increase in effortful performance and feedback represented a 24% gain in performance. These values were utilized in order to establish a moderate level of negative discrepancy sufficient to trigger self-dissatisfied reactions without adversely influencing perceived self-efficacy to obtain a goal. Bandura's theory hypothesized that the higher the subject's self-dissatisfaction, the more he/she would increase performance to match it with the standard. In addition, the higher the self-percepts of efficacy, the greater one's effort toward goal attainment. Thus, subjects who were not satisfied with their below level performance but also perceived themselves as being able to achieve their goals (efficacious) would demonstrate the highest performance gains. Results demonstrated that when both comparative factors of goals and performance feedback were evident, the self-evaluative and self-efficacy factors had the greatest effect on motivation. Neither the goals alone nor the feedback alone treatment groups had significant performance increase. In a related study, Bandura and Cervone (1986) tested the hypothesis that self-reactive influences impact

on motivation differently as a function of the level and direction of the discrepancy between a comparative standard and attainments. Subjects tried to attain a challenging standard in a strenuous physical activity and received pre-selected feedback. They were informed that their effort was either markedly, moderately, or minimally short of the standard, or that it exceeded the standard. Afterwards, they recorded their level of self-efficacy, self-evaluation and self-set goals. In agreement with the study's prediction, perceived self-efficacy was a factor contributing to motivation across a wide range of discrepancy conditions. Self-evaluation was only influential toward motivation when attainments were judged to be markedly or moderately short of a comparative standard. Self-set goals had an impact on motivation at all discrepancy levels except when attainments fell markedly or moderately discrepant from their standard. The relevant self-influences operating together at particular discrepant levels were felt to explain a substantial amount of the variance in motivation.

Locke et al. (1984) investigated the effect of self-efficacy, goals and task strategies on task performance. Results demonstrated a significant effect of self-efficacy, even when ability and past performance were controlled. This supports self-efficacy's impact as a key causal variable in performance with effects on performance being both direct and indirect. Goal intentions also do

not automatically trigger increased performance. Certain properties of goals determine the probability that self-evaluative effects will be utilized in a given activity.

Goal Properties

Of central importance to the goal-setting process are goal properties. The main areas which have been investigated involve the properties of goal specificity, goal challenge level, and goal proximity (Bandura, 1977, 1986; Locke, Shaw, Saari & Latham, 1981; Schunk, 1984; Schunk & Gaa, 1981).

Goal Specificity

Goal specificity refers to the actual standards of performance that a person sets in order to obtain a goal. Clear standards aid in delineating the type and amount of effort needed to reach the goal as well as provide self-motivation and feedback to self-evaluate one's accomplishments. Goal specificity also results in feelings of self-satisfaction and self-efficacy due to a defined level of personal accomplishment.

Goal Challenge Level

Goal challenge level refers to a person's level of task proficiency in relation to a standard. Harder goals lead to better performance than easy goals on a wide variety of tasks. The level of challenge that is set influences the amount of effort and self-satisfaction. When self-satisfaction is dependent upon attaining challenging goals, more effort is utilized than if easy goals were used. Challenging goals that include specific standards of performance are more likely to trigger self-evaluative reactions and result in higher performance than general directions or goals to "do your best". Thus, the knowledge of goal specificity and challenge level has functional importance in examining the influence of participation during proximal goal-setting.

Goal Proximity

Proximal goals serve as a subgoal and means of assessing progress against an immediate goal in relation to more distal, long range goals. In addition, the knowledge that progress is being made fosters positive feelings, notably perceived self-efficacy (Bandura & Schunk, 1981; Bandura & Simon, 1977). Bandura and Schunk (1981) investigated the hypothesis that self-motivation through proximal goal-setting is an effective strategy for developing competencies, self-percepts of efficacy, and intrinsic interest. Children who demonstrated significant

deficits in subtraction skills were assigned a program of self-directed learning under treatment conditions involving either proximal subgoals, distal goals or no goals. Children in the experimental conditions were given a packet of subtraction examples and an explanatory page consisting of working through similar operations. Seven sets of instructional materials were utilized for the projected 7 sessions. Children in the proximal goal-setting condition were suggested the rate of one packet per session; a second group pursued a distal goal of completing all sets by the end of the last session; a third group was given the instructional packet without any reference to goals other than " try to complete as many pages as possible as you go along ". Lastly, a fourth group of children served as a control for any possible impact of testing or concomitant classroom instruction. The control group was administered the full set of assessment procedures without any exposure to instructional material. Results from pre and posttest assessment indicated support for the superiority of proximal goal-setting. Children who set themselves attainable subgoals in this condition demonstrated success in their mastery of subtraction operations, developed a sense of personal efficacy, achieved a higher level of skill acquisition and heightened intrinsic interest in arithmetic activities that initially held limited interest for them. Distal goals yielded no demonstratable effects.

At least three major psychological effects on behavior

have been suggested as a result of incorporating proximal subgoals (Bandura & Schunk, 1981; Bandura, 1981, 1982, 1986). First, briefly, there are motivational effects through attainable subgoals that lead to larger future goals. They provide immediate incentives and guides for performance in contrast to distal goals which would be too far removed in the distant future, easy to temporize and to lessen efforts (put off) in the current situation. Bandura and Simon (1977) examined the hypothesis that self-regulation of refractory behavior varies as a function of goal proximity. The study investigated the level of impact of proximal intentions on behavior that is highly resistant to change - excessive eating behaviors. Obese subjects were randomly assigned following a baseline period to one of the following treatment conditions: a.) Distal self-monitoring. These subjects just continued recording their food intake which was the same as the baseline activity. b.) Proximal self-monitoring. The subjects continued recording their food intake but in relation to four daily time intervals. c.) Distal goal-setting. Subjects in this treatment were assigned distal goals defined in terms of weekly goal limits. They were to reduce their food intake by 10% of the baseline aggregate amount, and by an additional 10% on each of the 3 succeeding weeks. d.) Proximal goal-setting. Subjects in this condition similarly pursued the same goal levels as those in the distal goal-setting group with an additional

component of subgoals being computed for each of the 4 daily time periods. Bandura and Simon's (1977) results suggest that the effects of goals on behavior is largely determined by how far in the future they are projected. Proximal goals demonstrated greater self-motivation directed toward attainment than more distal goals. Goal-setting had a positive affect on self-directed change as measured by reductions in both eating behavior and weight. The higher the goal attainments, the greater were the associated weight losses. It was noteworthy that both goal-setting groups (proximal and distal) demonstrated comparable overall results due to the majority of distal goal-setting subjects assigning their own personal subgoals as a means to better control their eating behavior. In contrast, those subjects in the distal group that solely maintained the directions for their treatment condition and did not develop any personal subgoals only demonstrated small changes. The marked differences in the subjects in the distal group who stayed with the directives and those who improvised with subgoals can be viewed as further evidence of the motivational and regulative functions of goal proximity. Second, proximal subgoals can also influence the level of self-efficacy. Without standards by which to measure one's performance people would have little basis for assessing how they are doing or their capabilities. These obtained subgoals provide a sense of mastery which has a positive effect on self-efficacy.

Third, goal proximity can possibly impact on the development of intrinsic interest. When people set goals or performance levels and attain them, they experience feelings of satisfaction. These feelings related to subgoal attainment coupled with associated perceptions of increased personal causation and self-efficacy can build intrinsic interest.

Goal Intentions and Motivational Effects

Social-cognitive theory takes the position that goals enhance motivation through self-reactive mechanisms (Bandura, 1986). When people commit themselves to specific goals, the perceived incongruity between what they do and what they aspire to achieve results in self-dissatisfactions which function as incentives for increased effort. The motivational effects do not directly stem from the goals themselves but from the fact that people react evaluatively to their own actions. The development of goals specifies the prerequisites for positive self-evaluation.

The self-evaluative processes that are triggered through internal comparison require both a set of personal standards as well as a knowledge of results (feedback) of how one is doing. Overall, the knowledge of one's performance in relation to attainable challenging goals will result in enhanced motivation. Both factors of knowledge of performance and standards need to coexist in

order to effectively influence self-evaluative reactions. If one factor is not present self-motivation will probably be lowered. Research varying goal level and performance feedback has demonstrated results consistent with this relationship (Bandura & Cervone, 1983, 1986; Strang, Lawrence & Fowler, 1978;). In general, results support the notion that self-evaluative influences are activated through cognitive comparisons requiring both personal standards and knowledge of performance. Overall, knowledge of results and challenging attainable goals result in the most impact on motivation.

It is important to point out that the relationship between the degree of perceived discrepancy and performance motivation is not linear. If an individual's performances fall much lower than his/her standards then this results in the abandonment of one's goals due to discouragement and diminished perceived self-efficacy for attaining them. A level of moderate discrepant performances which doesn't undermine one's perceived attainability of assigned standards results in self-dissatisfactions that will increase the amount of effort toward attaining one's goal.

Social-cognitive theory differentiates between distal goals and proximal subgoals. Distal goals, which are projected into the future and may be long-term function at a generally directive level. Proximal subgoals (specific short-term goals) directly influence one's immediate choice of activities and how much effort they will expend on it.

Overall, the most positive conditions for continued self-motivation are those with attainable proximal subgoals that ultimately realize the distal goal.

Goal-setting's impact on motivation and effort extends to increased attentional and cognitive factors. Goals increase and focus attention toward the activity. In addition, the cognitive processing of information is heightened due to increased involvement in the ongoing activities. Goals not only impact on one's actions in terms of influencing directions and incentives for action, but also serve an important part in the development of self-efficacy. People would have little information to judge how they are doing or their capabilities without standards with which to compare their performance. Temporal proximal goals affecting subgoal attainments provide indicators of mastery which have a positive impact on self-percepts of efficacy (Bandura & Schunk, 1981).

Perceived self-efficacy and internal standards function as interrelated mechanisms that impact on self-motivation. The attainment of a goal builds self-efficacy. In addition, self-judgments of one's capabilities will affect what one will aspire to do, how much effort to invest toward a goal, and the response to discrepancies between valued standards and performances. Self-evaluation reactions operate differently when there are different patterns of comparative information. When goals and knowledge of results are below performance expectations,

self-dissatisfaction influences effort. When either variable operates alone, effort is determined by the level of self-satisfaction. Also, difficult goals result in increased effort in self-efficacious individuals but lower effort in those not self-assured of their capabilities (Bandura, 1986). In addition, the efforts of self-assured individuals are more resistant to difficulties and setbacks when compared with those doubting their capabilities. Overall, perceived self-efficacy for goal attainment heightens the level of self-set goals, reconfirms commitment to goals, and aids performance. The motivational effect of goals can be viewed as a dynamic interaction between self-evaluation, perceived self-efficacy, and self-set standards.

The attainment of challenging goals further impacts on intrinsic interest through the contribution of heightened levels of self-satisfaction and feelings of fulfillment. Proximal goals have demonstrated a positive impact on the cultivation of intrinsic interest (Bandura & Schunk, 1981). Goal-setting and increased performance does not necessarily increase interest and self-satisfaction. This is dependent on the particular situation and what the goals have been directed toward (i.e., improving competencies, mastering challenges directed at one's skills, or increased productivity). For activities that are valued or involve self-improvement the relationship between goal-setting,

effective performance and increased interest will most likely be observed.

Goal-Setting and Educational Practices in School Settings

Research has demonstrated that educational practices can affect performance or task outcomes in addition to feelings of self-efficacy (Schunk, 1983, 1984, 1985). With reference to Schunk's model (1985), educational practices involve the many contextual factors (i.e., goal-setting, rewards, performance feedback and strategy training) associated with classroom learning. Educational practices differ in the kind of information they convey about a student's capabilities. Successful performance or task outcome does not necessarily result in increased self-efficacy nor does failure always decrease it. The effect of performance outcomes on self-efficacy can be altered by events reflecting educational practices. Within an achievement context students consider factors like their self-perception of task outcomes, ability level, effort put forth, task difficulty, situational circumstances and the pattern of successes and failures, among others (Bandura, 1986, Schunk, 1984, 1985;).

It is important to find educational practices that serve to enhance self-efficacy by demonstrating a student's acquisition of skills and knowledge which also impacts on motivation. In negative situations motivation will be

adversely affected and there will be doubt of one's capabilities. Schunk (1985) examined the role of perceived self-efficacy within a classroom context for learning cognitive skills. An important assumption is that self-efficacy is a key variable in understanding motivated learning (motivation to acquire skills and knowledge). Schunk's orientation and theoretical background is strongly influenced by Bandura's social cognitive learning theory. Schunk (1985) outlined a model of motivated learning which consists of four general classes of variables - 1) student entry characteristics, 2) expectancies relating to the learning situation, 3) processes and practices that occur during task engagement, and 4) factors incorporated into appraising self-efficacy. Within this model educational practices have been hypothesized to be significant contextual factors influencing a student's self-efficacy. Goal-setting has been hypothesized to be a task engagement contextual factor associated with classroom learning (Schunk, 1985). Each class of variables within Schunk's model will be discussed below.

Student Characteristics

The first component to the model, student characteristics recognizes that students will approach learning tasks in reference to their levels of various aptitudes and prior learning/school experiences. Thus,

students will differ on individual entry characteristics encompassing aptitudes, academic/specific skills, interests and personality variables. In addition, prior educational experiences such as teacher relationships, schools attended and time spent on difficult subjects further contribute to classroom learning. Aptitudes and prior experience are also viewed as interdependent.

Expectancies

Student characteristics all contribute to influencing a student's efficacy expectations for learning new material. For example, if one has previously done well on mathematical tasks, he/she should perceive himself/herself as more efficacious for learning a new skill than a student who has a history of repeated difficulties with mathematics. In conjunction with this, Schunk's model recognizes that one's level of self-efficacy is not merely a reflection of past experiences and abilities.

Efficacy expectations are further affected by student's outcome expectations (beliefs concerning the outcome of one's actions) toward the learning activity they are involved in. Expectancies regarding how performances affect outcomes (outcome expectations) are distinguishable from judgments concerning one's perceptions of capability to do a particular action (self-efficacy expectations). For example, a student may half-heartedly perform on a task

because he/she may doubt his/her ability to master it (low self-efficacy) or a highly efficacious individual may give up because of his/her expectation to not be able to satisfactorily complete the task (negative outcome expectancy). This might reflect a situation where the student believed the teacher disliked him/her. In addition, outcome expectancies and self-efficacy often are related. A student who sees himself/herself as capable of doing well anticipates (and probably will receive) positive responses from teachers after successful task performances which generate increased self-efficacy.

Task Engagement Variables

Task engagement variables comprise perceptions of cognitive abilities/processes and educational practices involving the many contextual factors associated with classroom learning. These provide a means for assessing self-efficacy. Educational practices can moderate the effects of task outcomes on self-efficacy. Some practices may validate these feelings of efficacy by clearly conveying that students are acquiring skills and knowledge which in turn help in sustaining motivation and developing self-efficacy and skills.

Efficacy Cues

The last class of variables within Schunk's model are efficacy cues utilized to appraise self-efficacy. Performance outcomes, attributions, situational circumstances, model similarity and persuader credibility are factors in this grouping. Overall, self-efficacy is hypothesized to be continually affected during classroom learning in relation to a student's perception of outcomes and other cues. In addition, changes in self-efficacy can influence task engagement variables such as motivation and learning experiences.

Of particular relevance to this study is goal-setting's impact as a contextual factor associated with classroom learning. The utilization of proximal goals can convey reliable information about one's knowledge and skills. As students observe their progress toward a proximal goal they are likely to develop a greater sense of learning self-efficacy. An increased level of self-efficacy has a positive effect on sustaining task motivation.

In addition, participation can be interpreted as a type of task engagement variable involving instructional presentation which may promote task success and skill performance. Schunk did not include "choice of activities" as a motivational factor because within the context of a classroom situation this is often not the case. Furthermore, the components outlined in Schunk's model were noted as important features of motivated learning, not as

an exhaustive listing. In addition, this model as well as Bandura's is sensitive to many interrelated factors between self-efficacy and learning experiences. The existence of multiple cues and the weighting and combining of efficacy information from diverse sources is understood. Techniques that raise self-efficacy and are applicable to the classroom are important research concerns.

In terms of achievement, children who have major deficits in cognitive skills have shown enhanced feelings of self-efficacy by self-directed learning supplemented with goal structures, causal-attribution feedback, social comparison information, self-verbalization of strategies and positive incentives (Bandura, 1986; Bandura & Schunk, 1981; Schunk, 1981, 1982a, 1982b, 1983a, 1983b, 1983c). Social cognitive theory constructs of self-efficacy and self-evaluative mechanisms are important components in the achievement/self-motivation literature.

Self-Set Goals

Results of students participating in individual goal-setting conferences suggest that self-set goals foster school achievement over regular classroom instruction (Gaa, 1973, 1979). Gaa (1973) investigated the effects of individual goal-setting conferences on classroom achievement, attitudes and goal-setting behavior. It was hypothesized that students who participated in individual

goal-setting conferences when compared to students who received only individual conferences without goal-setting would demonstrate a higher level of classroom achievement, more positive attitudes, and demonstrate differences in subsequent goal-setting behaviors. The results of the study generally supported the hypotheses and demonstrated that goal-setting conferences can serve as a motivational technique in an ongoing educational context. The goal-setting group produced significantly higher achievement levels, set fewer goals and had a smaller difference between goals set and achieved. Attitudes toward reading and reading skills were a dependent variable that did not reach significance. A possible explanation was too short a time period (four weeks) to influence change in attitudes.

In a subsequent study Gaa (1979) further investigated the impact of goal-setting conference procedures on a secondary school level and the effect on locus of control orientation. It is important to note that students in the goal-setting conferences not only set goals but discussed appropriate strategies and means toward accomplishing the goals. Results demonstrated a significant treatment effect for achievement levels for the goal-setting group. The effect of changes in locus of control were not significant. There was only a suggestion that a student's perception of his/her ability to control reinforcement in relation to academic tasks can become more internal for

goal-setting students.

In another study, it was hypothesized that students who were low in need of achievement and experienced low expectations for success might perform better when they participated in the goal-setting process than when goals were externally assigned (Schunk, 1983b). Sagotsky, Patterson and Lepper (1978) investigated the effect of training in self-monitoring and goal-setting in the classroom for math performance. Subjects were 67 elementary school children in an individualized mathematics instruction program. After a baseline period with timed observations, children were randomly assigned to one of four treatment conditions : 1) goal-setting condition, 2) self-monitoring condition, 3) goal-setting and self-monitoring condition, and 4) a control condition. In the goal-setting condition students were shown a simple method of setting and recording daily performance goals during their math class. They recorded a projected page and problem number which they thought they could complete and wrote down the actual page and problem number reached at the end of each period. In the self-monitoring condition the students were shown a simple system for observing and monitoring daily records of their own study behavior during their math classes. These students were to note on a grid from time to time if they were actually working on their math units and then to resume studying. The page and problem number completed at the end of the

period was also recorded. Children in the combined group received both sets of instructions and corresponding sheets for tracking goals and self-monitoring boxes used in recording study behavior. The control group only received a cover sheet where they recorded the page and problem number they reached at the end of the period.

The dependent variables involved observations of study behavior during the daily math periods and successful completion of mathematics units (academic achievement).

The results indicated that exposure to self-monitoring techniques significantly increased both measures involving study behavior and math achievement. Goal-setting did not have a significant impact on either study or achievement data. Also, in the combined group it did not influence the effectiveness of the self-monitoring treatment.

Possible factors accounting for the lack of efficacy in the goal-setting procedure include the mathematics materials utilized and the wide variance of item difficulty from unit to unit and even sometimes from page to page. Thus, it would be very difficult for a child to set reasonable and productive estimates of daily goals with this curriculum format. These researchers further suggest that for goal-setting procedures to be effective tasks that are more constant or predictable in terms of difficulty level during training are more appropriate. The Bandura and Simon (1977) study is an example of this. In conjunction with this, in order for goal-setting to be more

effective children should be given training in making challenging, yet reasonable goals. These above concerns are informative in developing the design and training of this study.

Research in the area of self-management and self-control also includes goal-setting and issues around self-set goals; results indicate positive effects on academic behaviors. The self-selection of goals (performance standards) by children has been investigated in several major studies (Bandura & Perloff, 1967; Brownell, Colletti, Ersner-Hershfield, Hershfield & Wilson, 1977; Dickerson & Creedon, 1981; Flexibrod & O'Leary, 1973, 1974; Lovitt & Curtiss, 1969; Switzky & Haywood, 1974). In general, these studies show that self-selected goals (standards) are at least as effective as externally determined standards assigned by the teacher or experimenter. These results were demonstrated in both classroom and nonclassroom settings, and involved academic, motor, and matching tasks.

Dickerson & Creedon (1981) point out that studies earlier than theirs were limited due to small sample size, the use of special and regular education students, and the absence of a between groups experimental design which is not confounded by possible order effects, too few sessions, or a single task. These researchers attempted to replicate the findings of Flexibrod and O'Leary (1973, 1974) which demonstrated that self-set (self-determined) goals and

externally determined academic performance standards (goals) were equally effective in the performance of a math task. Dickerson and Creedon examined the effects of contingent reinforcement under treatment conditions of pupil-selected and teacher-selected standards of performance on academic response rates. Some procedural changes were introduced in order to identify conditions under which self-selection of standards might increase academic performance above that of externally assigned teachers. Thirty students (15 2nd graders and 15 3rd graders) were randomly assigned to one of three experimental conditions based on matched triplets. One group was given the opportunity to choose their own pupil-selected standards; the second group worked under teacher (experimenter) selected standards with each student yoked to a member of the pupil-selected group. The third and final group served as a no contingency control group. After baseline academic response rates for writing and math were obtained, five experimental sessions were conducted. During these sessions reinforcement was given in the form of points which could later be redeemed for tangible rewards. The pupil-selected group standards of performance were chosen by the students and the teacher-selected standards of performance group were assigned performance standards for the five sessions. Both groups were involved in the calculation of their daily points. At the end of the experiment the students were given the opportunity to

choose prizes from their accumulated points. Results demonstrated a significantly greater number of correct responses in the writing and math tasks for the pupil-selected group. The stringency or leniency of goals in combination with different reinforcement systems also may play a part in effectuating whether self-set or other goals result in higher performance (Brownell, Colletti, Eisner-Hershfield, Hershfield & Wilson, 1977).

Only one other study prior to Dickerson and Creedon (1981) provided evidence for a stronger effect of self-determined standards over externally assigned standards (Lovitt & Curtis, 1969). However, this was a single subject design involving a 12 year old student in a class for children with behavior disorders and thus, limited generalizability. Overall, the results of studies involving self-set goals versus assigned goals and the possible superiority of the former situation are not conclusive and require additional research.

Statement of the Problem / Research Issue

Overall, research on goal-setting and self-motivation within the achievement area requires further investigation with regard to the role of participation in goal assignment and its impact on achievement behaviors. Results from goal-setting studies have demonstrated that there is an impact on performance, skill acquisition, level of

self-efficacy and intrinsic interest. Schunk maintains that since self-efficacy is postulated to have motivational effects, it seems especially relevant to children's achievement behaviors. Thus, experiences designed to raise self-efficacy should also enhance persistence and skillful performance. Children with higher percepts of self-efficacy subsequently persisted longer and achieved more success on arithmetic tasks than their less efficacious and persistent counterparts (Schunk, 1981).

From a social-cognitive learning perspective this happens in an interrelated system. Other factors specific to the situation, the expectancy level, level of self-efficacy and subsequent cognitive appraisal will determine goal-setting's influence on achievement behaviors. Further investigation of the effects of participation vs. assigned goal-setting strategies has important educational implications. Should goal-setting be externally assigned by the teacher in order to influence achievement behaviors/self-motivation or does a participative condition increase goal-setting's effects? This is especially relevant to students who have demonstrated poor skill acquisition, low expectancy to succeed and negative feelings of self-efficacy. Bandura and Schunk as well as other researchers have already demonstrated that proximal goals impact on achievement behaviors while only informally dealing with participation/self-set goals as an additional positive

factor. Gaa (1973, 1979) has demonstrated positive results with students in individual goal-setting conferences within an ongoing educational context. The application of proximal goal-setting and participation may result in an effective motivational strategy.

For the purposes of this study, participation is defined as a collaborative interaction between an experimenter and student. However, there are problems in utilizing this variable that seriously limit the interpretation and generalization of results. For example, as in the Bandura and Schunk (1981) and Gaa (1973, 1979) studies participation can only be inferred as a process in relation to the procedures used. Participation as a variable was not operationalized or quantified. In addition to questioning both the meaning of participation and the intensity of it, one need be concerned with its comparison to other studies. The role of participation as having a positive impact on self-efficacy and academic behaviors is not negated, but a specific and consistent definition needs to be developed in order for research to determine its impact in educational contexts.

A more appropriate variable that has been utilized in the goal-setting area is self-set goals. Goal-setting research on self-set goals has demonstrated positive effects on motivation and behavior in different settings (Bandura & Cervone, 1986; Bandura & Simon, 1977; Locke et al., 1984). Bandura & Schunk's study (1981) in terms of

procedural elements can also be viewed as utilizing a variation of self-set goals. Proximal goals and distal goals were mentioned suggestively rather than prescriptively which actually left the goal-setting decision to the children. Thus, the eventual self-selection was determined by the children. This interpretation involving self-set goals, although it was not directly manipulated nor training provided in their study, appears to be a more appropriate match in the determination of an independent variable (rather than participation) for ongoing research purposes. In addition, goal-setting studies in the self-management/self-control areas comparing self-determined (self-set) and externally determined (assigned) goals suggest at least equal positive effects, if not superior for self-set goals (Dickerson & Creedon, 1981). Self-set goals can also be viewed as impacting on a student's feelings of commitment, responsibility and personal control. These factors are very similar to what Bandura (1986) also describes for participation. As with participation (or even self-set goals), when people play a contributing role in selecting goals, they hold themselves responsible for progress toward those goals which also activates self-evaluative mechanisms in the process.

CHAPTER II

The Study

Overview

The results of the studies reviewed indicate a number of unresolved issues with regard to training in self-set proximal goals. An empirical test of training in self-set goals and transfer of training would address these concerns. The use of a technique (strategy) for self-set proximal goal-setting that a student could utilize to effectively set goals has not been systematically addressed in the literature. In conjunction with this, the impact of this training on a similar transfer of training task is a situation with further educational implications that warrant investigation. This study attempted to examine and compare a treatment group receiving training in self-set proximal goals with an assigned goals group (proximal in nature) and the transfer of that training to a similar task in a free choice self-set goal condition. The objectives were to demonstrate that the process of training in self-set proximal goals would enhance 1) academic behaviors, 2) interest, and 3) level of self-efficacy due to the associated impact of increased commitment and responsibility toward one's actions. This finding would be consistent with and supportive of Bandura's cognitive

social learning theory with particular emphasis on self-regulatory and self-evaluative mechanisms. Schunk's model for motivated learning and the centrality of self-efficacy as a key variable in understanding motivated learning (motivation to acquire skills and knowledge) also predicts a positive impact for self-set proximal goals as a task engagement variable on performance. Thus, experience in setting one's goals and the opportunity to transfer that skill should influence the student's level of self-efficacy and appraisal of performance. This heightened sense of efficacy for learning may further lead to improved academic behaviors, motivation and interest.

The purpose of this study was to extend the work of Bandura and Schunk on goal-setting and achievement behaviors while incorporating self-set proximal goals. Specifically, the effects of training in self-set proximal goals were compared with an assigned goal-setting group (proximal goals in nature) and control conditions for both training and transfer of training experimental phases. The assigned goal-setting condition was chosen as a treatment manipulation and comparison group because it is an external performance standard and reported to have a positive impact on achievement.

The experimental design and the measured variables are depicted in Table 1. For example, subjects in Treatment Group 2 were administered pretests involving an achievement skill measure (#1) and a self-efficacy measure (#2). Next,

Table 1
Phases of the Experiment.

Group	Pre- tests	Phase1	Post- test1	Phase2	Post- test2	Other test
1.	1 2	Assigned goals & math packet	1 2 3	self-set goals with math packet	1 2 3	4
2.	1 2	training and math packet	1 2 3	same as above	1 2 3	4
3.	1 2	none	1 2	same as above	1 2 3	4
4.	1 2	math packet only	1 2 3	same as above	1 2 3	4

Note.

Test 1 = Achievement Skill Measure.
 Test 2 = Self-Efficacy Measure.
 Test 3 = Number of Pages Completed.
 Test 4 = Intrinsic Interest Measure.

they were involved in training in self-set proximal goals and then given a self-directed packet in mathematics (Phase 1). Posttests (Posttest 1) after the training and self-directed task repeated tests #1 and #2 while also collecting data on the number of pages completed (#3). A transfer of training task (Phase 2) took place under identical treatment conditions for all groups. Each student received a parallel form self-directed subtraction packet with the opportunity to self-set their own proximal goals. Additional posttests (Posttest 2) were then administered (#1 and #2); the number of pages completed (#3) was also collected. On the following day the last measure, intrinsic interest (#4) was administered.

The experimental design involved the comparison of pretest and posttest scores across the following three treatment and one control group conditions through an a priori analysis of covariance with two covariate scores (Kerlinger, 1973):

- 1) Assigned goal-setting condition : students were assigned specific goals (proximal in nature) by the experimenter while working on a self-directed subtraction task.

- 2) Self-set goal-setting condition : students were given training in developing proximal goals, including modelling by the experimenter and practice prior to working

on a self-directed subtraction task.

3) No treatment control group : students only received pretest and posttest assessments.

4) No goals group : students received the self-directed subtraction task without directions regarding goal-setting.

The experimental design utilized two phases in order to maximize contrast effects. Phase 1 was a self-directed subtraction task and exposure to a self-set proximal goal-setting strategy for the self-set group. Phase 2 was a transfer of training condition and involved a parallel form self-directed subtraction task with the opportunity for all treatment groups to set their own proximal goals.

The dependent variables reflected achievement behaviors regarding the level of self-efficacy, achievement skill measure and level of intrinsic interest. These variables are related to Bandura and Schunk's research (1981). The comparison of the number of pages (worksheets) completed for Phases 1 and 2 for each treatment group was also analyzed.

The hypotheses to be tested involved various comparisons among the groups on several dependent variables controlling for pretest scores on an achievement skill measure and a self-efficacy measure. Each hypothesis was

tested using an a priori analysis of covariance. The analyses involved a comparison among the four groups on some set of dependent variables controlling for the same set of prescores (covariates). The actual contrasts involved were expressed as part of the hypotheses with the covariate scores as constants. The hypotheses generated as a result of reviewing self-set proximal goal-setting from a social-cognitive learning orientation predict the relationships that follow.

Experimental Hypotheses

The first set of hypotheses (1-6) tests which treatments (self-set proximal goal-setting or assigned goal-setting) after phase 1 were effective in enhancing academic skill level, perceptions of self-efficacy and pages completed. Contrast pairs for each dependent variable involved the self-set proximal goal-setting condition versus the assigned goal-setting condition. Additional contrast combinations also compared each of these treatments with the no treatment control group and the no goals group. The second set of hypotheses (7-12) tests the effect of a transfer of training condition via a free choice self-set proximal goal-setting opportunity on the same dependent variables. Contrast pairs were similar to phase 1. In addition, a final measure of intrinsic interest was also tested. All analyzes utilized pretest

scores on achievement skill level (Form1A) and self-efficacy (SE) as covariate measures.

Phase 1 Hypotheses

The Self-Set Proximal Goal-Setting Condition

1. Students receiving self-set proximal goal-setting training will demonstrate higher achievement skill levels in subtraction compared with students in the a) assigned goal-setting condition (Group 2 vs. Group 1), b) the no treatment control group (Group 2 vs. Group 3), and c) the no goals group (Group 2 vs. Group 4).
2. Students receiving self-set proximal goal-setting training will demonstrate enhanced perceptions of self-efficacy compared with students in the a) assigned goal-setting group (Group 2 vs. Group 1), b) the no treatment control group (Group 2 vs. Group 3), and c) the no goals group (Group 2 vs. Group 4)
3. Students receiving self-set proximal goal-setting training will outperform the assigned goal-setting group and the no goals group (Group 2 vs. Group 1 and Group 2 vs. Group 4) on the number of pages completed during phase 1.

The Assigned Goal-Setting Condition

4. Students in the assigned goal-setting condition will

outperform the no treatment control group (Group 1 vs. Group 3) and the no goals group (Group 1 vs. Group 4) on achievement skill levels in subtraction.

5. Students in the assigned goal-setting condition will outperform the no treatment control group (Group 1 vs. Group 3) and the no goals group (Group 1 vs Group 4) on perceptions of self-efficacy.

6. Students in the assigned goal-setting condition will outperform the no goals group (Group 1 vs. Group 4) on the number of pages completed during phase 1.

Phase 2 Hypotheses

7. Students who received training in self-set proximal goal-setting will demonstrate higher achievement skill levels after a transfer of training task (phase 2) when compared with students in the a) assigned goal-setting condition (Group 2 vs. Group 1), b) the no treatment control group (Group 2 vs. Group 3) and c) the no goals group (Group 2 vs. Group 4).

8. Students who received training in self-set proximal goal-setting will demonstrate enhanced perceptions of self-efficacy after a transfer of training task (phase 2) when compared with students in the a) assigned goal-setting condition (Group 2 vs. Group 1), b) the no treatment control group (Group 2 vs. Group 3) and c) the no goals group (Group 2 vs. Group 4).

9. Students who received training in self-set proximal goal-setting will differ in pages completed after a transfer of training task (phase 2) when compared with students in the a) assigned goal-setting condition (Group 2 vs. Group 1), b) the no treatment control group (Group 2 vs. Group 3) and c) the no goals group (Group 2 vs. Group 4).

10. Students who were in the assigned goal-setting condition will not differ in achievement skill levels after receiving a parallel form self-directed subtraction packet with the opportunity to self-set their own goals (phase 2) when compared with the no treatment control group (Group 1 vs. Group 3) and the no goals group (Group 1 vs. Group 4).

11. Students who were in the assigned goal-setting condition will not differ in their perceptions of self-efficacy after phase 2 when compared with students in the no treatment control group (Group 1 vs. Group 3) and the no goals group (Group 1 vs. Group 4).

12. Students who were in the assigned goal-setting condition will not differ on the number of pages completed after a free choice self-set goal-setting task when compared with students in the no treatment control group (Group 1 vs. Group 3) and the no goals group (Group 1 vs. Group 4).

13. Students who received training in self-set proximal goal-setting will demonstrate a higher level of intrinsic interest after phase 2 when compared to students in the

other 3 treatment conditions (groups 1, 3 and 4).

CHAPTER III

Method

Subjects

Eighty regular education elementary students in the 2nd to 4th grades, who were identified by the teacher as deficient in mathematics subtraction skills were the identified sample population. Students were of low socioeconomic, minority group status from two large apartment projects and in attendance at an urban elementary public school. The ethnic make-up of the sample was approximately 85% black, 10% hispanic and 5% white. Students who were deficient in mathematics at these grade levels were selected because they were representative of the student ages (age 7.3 to 10.1) and level of academic difficulty that Bandura and Schunk (1981) utilized in their study. The criterion for inclusion in the sample was a pretest score on an achievement skill measure in subtraction that was less than or equal to 40% correct. In addition, all students were also rated by their teachers as manifesting low ability in math (see Appendix E - Teacher Rating Sheet sample).

Materials

Mathematics subtraction packets for the self-directed learning task were used. The actual instructional packet for the Bandura and Schunk (1981) study developed at the Stanford Institute of Mathematical Studies has been generously supplied by D. Schunk (Personal communication, January 25, 1988). The instructional material reflected an analysis of subskills required to demonstrate competence in the various subtraction operations (Friend & Burton, 1981). In addition, pretesting reported from Bandura and Schunk indicated that children could complete each self-directed set in about 25 minutes. A parallel form instructional packet was developed in order to address the second phase of the treatment (transfer of training). The same explanatory pages were used with similar subtraction skill examples substituted for Schunk's worksheets (see Appendix A).

Procedure

The procedures for this study reflected components of Bandura & Schunk's (1981) research on goal-setting. Students were randomly assigned to treatments. Participants in the study were told that the experiment was investigating how subtraction skills are learned. The subjects that comprised Treatments Groups 1 & 2 (assigned

goal-setting condition and self-set proximal goal-setting condition) were told in small groups about the possibility of being able to choose their own self-set goals as compared to a group that would have goals assigned to them. These subjects were then involved in a random draw from a box where they were assigned to Treatment Group 1 or 2. This procedural manipulation was elected in order to further highlight the groups and treatments. All treatment groups with the exception of the no treatment control group during phase 1 received instructional packets involving mathematics skill development exercises. The format was individual self-directed and self-paced packets for each session with a preceding explanatory page illustrating applied solution strategies. The six worksheet pages that followed involved solving similar problems. Each of the sessions and phases utilized the same format with different subskills and examples. Phase 1 and Phase 2 differed on the number of worksheets given in order to represent a transfer of training situation. During each session children were given identical packets and directed to the instructions and illustrative examples. Whenever they reached an instruction page they were told to call the experimenter to read it to them. If a student asked for assistance, the experimenter reread the instruction page. Students in different treatment conditions met in small groups no larger than five students to a group.

Students that met their goal (worksheets completed) for

the session had the choice to continue for the remainder of the 25 minute time period or finish for the day. Those students who did not meet their session goal were asked to stop work at the end of the 25 minute time period. At the next session they were asked to begin with the same number of worksheets goal which remained constant during each phase. All students who began the study completed the appropriate sessions. Make-up sessions in groups of 1 - 5 students were utilized when students were absent for either their session or posttest assessment.

The use of two phases to the experiment differed from Bandura and Schunk's experimental design. The first phase (training) involved the initial four lessons from Bandura and Schunk's study (1981). Students in the self-set goal-setting group initially received training in a proximal goal-setting strategy through modelling by the experimenter and several opportunities for practice. Then, they were given a self-directed math packet and asked to set their own daily proximal goals from the knowledge of how many sessions and worksheets to complete. This group (Group 2) was told that they had 24 worksheets to complete by four sessions.

The second phase (transfer of training) used a parallel form subtraction packet combining the explanatory pages with similar examples for lessons two - five. This manipulation was developed in order to highlight the impact of self-set goal-setting training and the transfer of this

skill. All treatment groups were given the opportunity to self-set goals on this second self-directed math task. In phase 2 all subjects were told that they had 20 worksheets to complete by 4 sessions. No other information regarding a proximal goal-setting strategy was offered to any group. Students were told that they were to choose their own daily goals in order to complete the packet on time. It was further stated that they could not change their daily goal once decided upon. Children, across treatments, individually stated to the experimenter how many pages per day they had chosen to do. The amount was then written on the top right hand corner of their first packet page. It was also repeated that they could not change this number. At the onset of subsequent phase 2 sessions, each student was directed to remember their proximal goal and point to the goal number on the packet cover sheet.

Treatment Conditions

A description of the treatment and control groups follows:

Phase 1 (training phase).

Assigned goal-setting (Treatment 1)

- 1) Assigned goal-setting condition (Treatment 1) where

the experimenter unilaterally stated both the daily proximal goals required and the number of sessions in order to complete a self-directed mathematics task. Children in this condition received directions to do at least a daily prescribed number of worksheets. Each session lasted approximately 25 minutes. The following dialogue was offered :

"Students do better when daily goals are set. There are 24 worksheets and we are meeting 4 times. Do at least 6 sheets per session. At the end of each session I will tell you how many sheets you did."

If children asked for assistance while pursuing the worksheet examples, the experimenter referred them to the self-explanatory page depicting the steps to correctly do the example (see Appendix A). The sequence to solve the type of example that the student was asking assistance on was read orally by the experimenter.

In this treatment the daily goals were stated prescriptively rather than suggestively so as to highlight the externally assigned aspect of goal-setting for this group.

Self-set goal-setting (Treatment 2)

2) Self-set goal-setting condition (Treatment 2) where the experimenter modeled a goal-setting strategy and the students received practice in choosing self-set daily

proximal goals. The students were then given a self-directed mathematics task and chose their own daily goals from the knowledge of the number of sessions and pages to complete. Children in this condition were encouraged to develop a strategy which would enable them to set their own daily proximal goals. Each session allotted approximately 25 minutes for the students to work on the self-directed subtraction packet.

During the initial 10 minutes of the first two sessions the experimenter modeled a goal-setting strategy and then gave the students practice with sample sets of worksheets. This strategy consisted of the experimenter organizing a sample packet of math sheets into equal sets (concretely illustrated by the number of sheets of paper) depending on the number of worksheets and assigned sessions. For example, the first sample demonstration packet contained 15 worksheets and the number of sessions was set at three. The experimenter stated, "If you were given 15 worksheets and you only had three days to finish them, how many should you do each day in order to finish?" Then, the experimenter dealt out the worksheets into three equal piles representing how many times they would meet and how many worksheets they should do each day. Afterwards, the experimenter stated, " If you received 15 sheets and you had three days to complete them you now could choose how many sheets you need to do each day. Here are 15 worksheets like the ones I just put into piles. See if you

can sort them into equal piles if you also had three days to do them in." After everyone was finished they received practice in sorting two additional sets of worksheets - 12 worksheets in four days and six worksheets in 2 days. The second session utilized a demonstration proximal goal-setting strategy for 12 worksheets in three days and practice for 1) eight worksheets in two days and 2) nine worksheets in three days.

Prior to receiving a worksheet packet after the first part of the initial session 1 training phase the following dialogue was offered: "Remember, students do better when they set up and choose a daily goal plan. We are going to meet for four sessions and you will choose a daily goal plan to help you finish these 24 worksheets by then. Put the worksheets into piles in order to find how many you need to do each day. At the end of each session we will check off how many worksheets you completed." The involvement and practice was suggestive and designed to increase the students perceived level of personal responsibility and commitment to subgoals.

As with the other treatment groups, student questions regarding computations of specific examples were directed to the relevant self-explanatory page whereby the experimenter read the correct sequence of steps to solve the example.

No treatment control group (Treatment 3)

3) No treatment control group (Treatment 3) only received assessments prior to Phase 2. These children were administered all pre-test and post-test assessments without any exposure to the instructional package or reference to goal-setting. This group controlled for any testing effects and ongoing classroom instruction.

No goals group (Treatment 4)

4) No goals group (Treatment 4) where a self-directed mathematics task was given to the students and they were told to do as well as they can without reference to daily goals or the number of sessions. Children in this group were given the self-directed learning packet without directions regarding the use of daily proximalgoal-setting. In general, the experimenter stated, "Try to do as many pages as possible as you work."

In addition, the children (as with Groups 1 and 2) were given assistance in solving computation examples by the experimenter reviewing the pertinent subtraction demonstration example.

Phase 2 (transfer of training phase).

Treatment 1, 2, 3, and 4

During the transfer of training phase all four treatment groups (Treatments 1, 2, 3, and 4) were given identical directions and materials. Children in all treatment groups received a parallel form self-directed subtraction packet and were given the opportunity to set their own daily proximal goals. It was then explained that they would be meeting for four sessions and they would not be able to change their worksheet daily goal.

The experimenter stated, "Now, I have some more math packets which I would like you to do. You can choose your own daily goals for worksheets. You are to decide how many worksheet pages you need to do each day in order to finish on time. Here are 20 worksheets and we will be meeting for four times. Set your own daily goals so that you will be finished by then." At the start of each session the children were reminded of the daily goal they had set. They were not able to change it.

As with phase 1 all computation questions were directed to the relevant self-explanatory page and the sample example solution was read to them.

Pretest and Posttest Assessment Measures

Dependent Measures

1) Self-efficacy measure (Bandura & Schunk, 1981).

Children were presented for 2 seconds each, a series of

20 cards comprised of pairs of subtraction problems of varying difficulty. Each of the 20 pairs of efficacy assessment examples corresponded in form and difficulty to subtraction problems in the achievement skill test but involved different sets of numbers. The same set of efficacy assessment items were then utilized for all administrations. After each exposure, children were asked to judge (rate) their capability to actually solve the type of problem shown. They were given prior practice with addition examples in rating self-efficacy judgments on a 10 unit intervals scale from 0 - 100 with the higher the scale value, the greater the perceived capability to do the problem. The scoring system was developed on a continuum of 0 - 100. The strength of self-efficacy measure was obtained by dividing the summed degree of certainty scores by the total number of problems. Children's mathematical self-efficacy measure was administered as a pretest measure after the children took the achievement skill pretest. They were retested again following posttests 1 & 2 of the achievement skill measure (after Phase 1 & Phase 2, respectively).

2) Achievement skill measure (Bandura & Schunk, 1981).

Mathematical skills in subtraction involved the measuring of the student's ability to solve 25 subtraction problems of increasing difficulty. Two parallel forms of the achievement skill measure used in the pretest were

developed for the posttreatment assessments (Posttest 1 & Posttest 2) of subtraction competency which were administered after each Treatment Phase. The problems were representative of the instructional packet and required the different subtraction operations. More difficult examples requiring generalization of skills were also included. The measure of competency was the number of problems solved correctly in relation to a scoring continuum from 0 - 100.

3) Intrinsic interest measure (Bandura & Schunk, 1981).

Children in this task were given the choice to freely select doing more subtraction examples or another task (adapted from the WISC-R Coding subtest). They were shown two stacks of 10 pages each - one of varied subtraction examples and the other of rows of digit - symbol fill ins adapted from the Coding subtest.

The number of subtraction problems that the child solved during a 20 minute period made up the measure of intrinsic interest. This task was administered after Phase 2 Posttests had been completed. The experimenter explained that the children should feel free to choose to work on either one, or the other, or both of the tasks. It was emphasized that it would be up to the children to decide how much time they wanted to spend on each activity.

Posttreatment measures (Posttests 1 & 2) were administered after the third treatment session of both

Phase 1 & Phase 2 interventions. This intermediate point was utilized in order to assess the treatment effects on the dependent variables within a specified and equal time period. In addition, the number of worksheets completed daily during phase 1 and phase 2 were monitored. Test scores were compared through an a priori analysis of covariance with specific contrasts in order to determine treatment effects.

CHAPTER IV

Results

Major hypotheses 1 - 12 were tested by ANCOVA followed by a priori contrasts. Further, hypothesis 13 was tested by a linear logistic regression analysis. This analysis was conducted in order to analyze the results for the intrinsic interest variable. It was chosen due to the high incidence of zeros on students' scores and a more appropriate depiction of the data as a binary dependent variable. Thus, any attempt by a student to do a subtraction example was coded as a one and the absence of this response as a zero.

Table 2 lists the dependent variables and the contrast pairs developed in order to examine the effectiveness of the self-set proximal goal-setting group (Group 2) and the assigned goal-setting group (Group 1).

The dependent variables included achievement behaviors involving achievement skill measures, levels of self-efficacy, pages completed during phase 1 and phase 2, and level of intrinsic interest. Pretest scores on an achievement skill measure (Form1A) and level of self-efficacy (SF) were utilized as covariates which were

Table 2
A Priori Contrasts for Major Hypotheses

Hyp.	Dependent Variable	A Priori Contrast
Phase 1 - Training Condition		
1	Achievement Test (Form 1B)	Gr. 2 vs. Gr. 1, Gr. 2 vs. Gr. 3, Gr. 2 vs. Gr. 4.
2	Self-Efficacy Level (SF1)	Gr. 2 vs. Gr. 1, Gr.2 vs. Gr. 3, Gr. 2 vs. Gr. 4.
3	Pages Completed (Phase 1)	Gr. 2 vs.Gr.1, Gr. 2 vs. Gr. 4.
4	Achievement Test (Form 1B)	Gr. 1 vs. Gr. 3, Gr. 1 vs. Gr. 4.
5	Self-Efficacy Level (SF1)	Gr. 1 vs. Gr. 3, Gr 1 vs. Gr. 4.
6	Pages Completed (Phase 1)	Gr. 1 vs. Gr. 4.
Phase 2 - Transfer of Training Condition		
7	Achievement Test (Form 1C)	Gr. 2 vs. Gr. 1, Gr. 2 vs. Gr. 3, Gr. 2 vs. Gr. 4.
8	Self-Efficacy Level (SF2)	Gr. 2 vs. Gr. 1, Gr. 2 vs. Gr. 3, Gr. 2 vs Gr. 4.
9	Pages Completed (Phase 2)	Gr. 2 vs. Gr. 1, Gr. 2 vs. Gr. 3, Gr. 2 vs. Gr. 4.
10	Achievement Test (Form 1C)	Gr. 1 vs. Gr. 3, Gr. 1 vs. Gr. 4.
11	Self-efficacy Level (SF2)	Gr. 1 vs. Gr. 3, Gr. 1 vs. Gr. 4.
12	Pages Completed (Phase 2)	Gr. 1 vs. Gr. 3, Gr. 1 vs. Gr. 4.

included as constants for each contrast examined.

After analyzing each of the dependent variables in relation to Group 1 or Group 2 effectiveness, additional analyses were conducted. The contribution of student grade levels (grade 2 or 3) was investigated as a possible factor affecting treatment outcomes. A 4x2 analysis of covariance (ANCOVA with 4 Treatment Groups x 2 Grade Levels) with 2 covariates from the original experimental design was conducted. Group means and standard deviations were computed for each treatment group (both within and between means for dependent variables). In addition, descriptive statistics were analyzed for group and grade levels as factors.

Major Hypotheses

Table 3 presents the results of the effectiveness of the self-set goal-setting group (Group 2) in terms of a priori hypothesis contrasts for each dependent variable. Table 4 presents the unadjusted means, standard deviations and range of scores for individual treatment groups by dependent variable. It is important to note the relatively higher mean scores and standard deviations on the achievement skill pretest scores (Form1A) for Groups 3 and 4. In addition, the mean scores for the self-efficacy pretest score (SF) Groups were generally the same but had significantly large standard deviations.

Table 3
Phase 1 Hypotheses Results for ANCOVA A Priori Contrasts.

Hyp.	Dependent Variable	Contrast	Adj. Mean Diff.	F
1	Form1B	2 vs. 1	.17	.003
		2 vs. 3	-6.52	4.84 *
		2 vs. 4	4.10	1.92
2	SF1	2 vs. 1	.45	.02
		2 vs. 3	4.05	1.15
		2 vs. 4	.35	.01
3	Pages (Phase 1)	2 vs. 1	2.23	2.26
		2 vs. 4	.77	.26

Note.

Covariates = Form1A (Achievement Pretest) & SF (Self-efficacy Pretest) for all analyses.

Form1B = Achievement skill measure.

SF1 = Self-efficacy measure.

Pages = Pages completed.

Df = 1,74 for Form1B & SF1; Df = 1,55 for Pages.

* $p < .05$, F value (1,74) = 3.98

(table continues)

Table 3
Phase 1 Hypotheses Results for ANCOVA A Priori Contrasts.

Hyp.	Dependent Variable	Contrast	Adj. Mean Diff.	F
4	Form1B	1 vs. 3	-6.70	5.11 *
		1 vs. 4	4.26	2.09
5	SF1	1 vs. 3	4.50	1.42
		1 vs. 4	.79	.05
6	Pages (Phase 1)	1 vs. 4	1.45	.91

Note.

Covariates = Form1A (Achievement Pretest) & SF (Self-efficacy Pretest) for all analyses.

Form1B = Achievement skill measure.

SF1 = Self-efficacy measure.

Pages = Pages completed.

Df = 1,74 for Form1B & SF1; Df = 1,55 for Pages.

* $p < .05$, F value (1,74) = 3.98

Table 4
Means, Standard Deviations and Range of Scores for
Individual Treatment Groups By Dependent Variable.

Group	Count	Mean	SD	Min	Max
Variable: Form1A (achievement skill pretest measure)					
Group 1	20	14.20	7.28	0	24
Group 2	20	13.80	7.94	0	36
Group 3	20	22.30	13.25	0	40
Group 4	20	19.40	13.06	0	40
Variable: Form1B (achievement skill measure)					
Group 1	20	24.20	16.29	4	76
Group 2	20	22.80	11.47	4	48
Group 3	20	28.60	18.04	0	64
Group 4	20	27.20	15.28	4	60
Form1C (achievement skill measure)					
Group 1	20	28.10	15.92	10	68
Group 2	20	24.80	17.44	0	72
Group 3	20	33.00	18.62	0	60
Group 4	20	26.40	18.96	0	84
SF (self-efficacy pretest measure)					
Group 1	20	79.20	20.40	23	100
Group 2	20	76.65	22.12	23	100
Group 3	20	75.80	22.64	15	100
Group 4	20	76.25	24.11	10	100
SF1 (self-efficacy measure)					
Group 1	20	85.25	15.36	40	100
Group 2	20	84.60	16.18	40	100
Group 3	20	86.95	11.23	69	100
Group 4	20	83.90	16.80	42	100
SF2 (self-efficacy measure)					
Group 1	20	86.05	18.50	32	100
Group 2	20	83.50	21.94	25	100
Group 3	20	88.75	9.45	66	100
Group 4	20	89.25	16.04	45	100

(table continues)

Table 4
Means, Standard Deviations and Range of Scores for
Individual Treatment Groups By Dependent Variable.

Group	Count	Mean	SD	Min	Max
PG1 (pages completed)					
Group 1	20	13	4.72	7	22
Group 2	20	10.70	5.60	4	24
Group 3	0
Group 4	20	12.05	3.68	7	20
PG2 (pages completed)					
Group 1	20	11.35	4.80	6	20
Group 2	20	8.35	3.60	3	15
Group 3	20	11.20	4.70	2	20
Group 4	20	10.45	4.85	5	20

Phase 1 Results

Hypothesis 1:

Hypothesis 1 predicted that students receiving self-set proximal goal-setting training (Group 2) would demonstrate higher achievement skill levels in subtraction compared with the other treatment groups. The analysis of covariance (ANCOVA) revealed a significant difference for the self-set group versus the no treatment control group (Group 2 vs. Group 3) with an obtained F score of 4.83 and a corresponding critical F value $(1,74) = 3.98$ (.05 level). However, the direction of the difference was not predicted nor supportive of the hypothesis. The mean scores for the self-set group and the no treatment control group were 22.80 and 33.00, respectively. In addition, the contrasts for both the self-set goal-setting group (Group 2) versus the assigned goal-setting group (Group 1) and the self-set goal-setting group (Group 2) versus the no goals group (Group 4) were not significant. Obtained F scores were .003 and 1.92, respectively. Thus, the hypothesis was not supported by the achievement skill results.

Hypothesis 2:

The second hypothesis predicted that students receiving self-set goal-setting training would demonstrate enhanced

perceptions of self-efficacy. The ANCOVA results did not support any of the contrast pairs (Group 2 vs. Group 1, Group 2 vs. Group 3, and Group 2 vs. Group 4) predicted by the hypothesis.

Hypothesis 3:

The third hypothesis predicted that students in the self-set goal-setting treatment would outperform the assigned goal-setting group (Group 1) and the no goals group (Group 4) on the number of pages completed during phase 1. The results of the ANCOVA did not demonstrate significance for either contrast. The resulting obtained F scores were 2.26 and 0.26, respectively with a corresponding critical F value $(1,74) = 3.98$ (.05 level).

Hypothesis 4:

The fourth hypothesis proposed that students in the assigned goal-setting condition would outperform the control groups (Groups 3 and 4) on achievement skill levels in subtraction. As with Group 2 ANCOVA results, no significance in the predicted direction of the contrast pairs was obtained. Results of the assigned group (Group 1) contrasted with the no treatment control group (Group 3) demonstrated significance with an F score = 5.11 which exceeded the critical F value $(1,74) = 3.98$ (.05 level). The obtained means for the assigned group and the no

treatment control group were 24.20 and 28.60, respectively. This was not supportive of the predicted higher achievement skill level for the assigned group (Group 1).

Hypothesis 5:

Hypothesis 5 proposed that students in the assigned goal-setting condition (Group 1) would demonstrate enhanced perceptions of self-efficacy when compared with students in the no treatment control group (Group 3) and in the no goals group (Group 4). As with hypothesis 2 ANCOVA results, neither of these contrasts were significant. The resultant F scores were 1.42 and 0.05 respectively, which did not exceed the critical F value (1,74) = 3.98 (.05 level).

Hypothesis 6:

Hypothesis 6 proposed that students in the assigned goal-setting condition would outperform the no goals group (Group 4) on the number of pages completed during phase 1. As with the self-set goal-setting group's ANCOVA results, significance was not obtained for this contrast. The obtained F score of 0.91 was less than the critical F value (1,55) = 4.05 (.05 level).

Phase 2 Results

Phase 2 a priori contrast hypotheses results of a transfer of training condition for each dependent variable are depicted in Table 5.

Hypothesis 7:

Hypothesis 7 predicted that students who received training in self-set goal-setting would demonstrate higher achievement skill levels after a transfer of training task (phase 2) when compared with students in the other groups. The ANCOVA did not reveal any significant contrast pair comparisons in support of the hypothesis. Significance (in an unpredicted direction) was found for one contrast (Group 2 vs. Group 3) with an F score of 4.22 which exceeded the critical F value $(1,74) = 3.98$ (.05 level). The original means for the self-set group (Group 2) and the no treatment control group (Group 3) were 24.80 and 33.00, respectively. Contrast pairs with Group 1 and Group 4 yielded obtained F scores of 0.04 and 2.9, respectively.

Hypothesis 8:

Hypothesis 8 predicted that students who received training in self-set goal-setting would demonstrate

Table 5
Phase 2 Hypotheses Results for ANCOVA A Priori Contrasts.

Hyp.	Dependent Variable	Contrast	Adj. Mean Diff.	F
7	Form1C	2 vs. 1	.59	.04
		2 vs. 3	-6.31	4.22 *
		2 vs. 4	5.18	2.94
8	SF2	2 vs. 1	1.55	.11
		2 vs. 3	7.35	2.33
		2 vs. 4	7.06	2.26
9	Pages (Phase 2)	2 vs. 1	-2.91	4.19 *
		2 vs. 3	-3.08	4.32 *
		2 vs. 4	2.25	2.41

Note.

Covariates = Form1A (Achievement Pretest) & SF (Self-efficacy Pretest) for all analyses.

Form1C = Achievement skill measure.

SF2 = Self-efficacy measure.

Pages = Pages completed.

Df = 1,74.

* $p < .05$, F value (1,74) = 3.98 (table continues)

Table 5
Phase 2 Hypotheses Results for ANCOVA A Priori Contrasts.

Hyp.	Dependent Variable	Contrast	Adj. Mean Diff.	F
10	Form1C	1 vs. 3	-6.90	5.12 *
		1 vs. 4	5.77	3.65
11	SF2	1 vs. 3	5.80	1.45
		1 vs. 4	5.52	1.38
12	Pages (Phase 2)	1 vs. 3	0.17	.01
		1 vs. 4	0.66	.21

Note.

Covariates = Form1A (Achievement Pretest) & SF (Self-efficacy Pretest) for all analyses.

Form1C = Achievement skill measure.

SF2 = Self-efficacy measure.

Pages = Pages completed.

Df = 1,74.

* $p < .05$, F value (1,74) = 3.98

enhanced perceptions of self-efficacy after a transfer of training task (phase 2) when compared with students in the other groups. Consistent with hypothesis 2 results, the ANCOVA did not demonstrate significance for any of the contrast pairs involving the level of self-efficacy (Group 2 vs. Group 1, Group 2 vs. Group 3, and Group 2 vs. Group 4).

Hypothesis 9:

Hypothesis 9 predicted that students who received training in self-set goal-setting would complete more pages during phase 2 when compared with the other groups. The results of the ANCOVA revealed two significant contrasts with both not supporting the predicted hypothesis. Results demonstrated that the self-set group did not outperform the assigned goals group nor the control group in the number of pages completed. The resultant F tests were 4.19 and 4.32, respectively which exceeded the critical F value $(1,74) = 3.98$ (.05 level). The means for the self-set group, the assigned group, and the no treatment control group were 8.35, 11.35, and 11.20, respectively. As typical of other significant findings the results were not in the predicted direction. The contrast pair for Group 2 versus Group 4 also did not yield any significance (F score = 2.41).

Hypothesis 10:

Hypothesis 10 predicted that students in the assigned goal-setting condition would not differ in achievement skill level after phase 2 when compared with the control groups (Groups 3 and 4). The results of the ANCOVA revealed that the assigned group was not statistically different from the no goals group. However, the assigned group was statistically significant when compared with the no treatment control group (Group 3) with an obtained F score = 5.12 which exceeded the critical F value (1,74) = 3.98 (.05 level). The means for the assigned group and the no treatment control group were 28.10 and 33.00, respectively. However, this significant finding did not support the predicted hypothesis.

Hypothesis 11:

Hypothesis 11 predicted that students in the assigned goal-setting condition would not differ in their perceptions of self-efficacy after phase 2 when compared with the control groups (Groups 3 and 4). The results of the ANCOVA supported the hypothesis. As predicted, the F scores of 1.45 and 1.38 for the Group 3 and Group 4 contrasts, respectively were not significant. They did not exceed the critical F value (1,74) = 3.98 (.05 level).

Hypothesis 12:

Hypothesis 12 proposed that students in the assigned goal-setting group would not differ in the number of pages completed after phase 2 when compared with the other control groups (Groups 3 and 4). As predicted, the resultant F scores of 0.01 and 0.21 for contrasts with Group 3 and Group 4, respectively were not significant (critical F value = 3.98).

Hypothesis 13:

The last major hypothesis predicted that students who received training in self-set goal-setting would demonstrate a higher level of intrinsic interest after phase 2 when compared to students in the other treatment groups. Results of a linear logistic regression analysis demonstrated no significant findings (R -Square = 0.1446).

Summary of Major Hypotheses Results

In sum, the ANCOVA with a priori contrasts did not reveal predicted findings for either the self-set or the assigned goal-setting treatments. This included outcomes as a result of phase 1 training for the self-set proximal goal-setting group as well as externalized performance

goals for the assigned group.

Phase 1 results demonstrated no significant effects in relation to predicted hypotheses for achievement skill level (for either treatment), level of self-efficacy and number of pages completed. The superiority of either treatment was not supported by the data.

Phase 2 transfer of training condition results also did not demonstrate any significant findings on the dependent variable measures of achievement skill, self-efficacy level, and number of pages completed. As with phase 1 results, no superiority of either treatment as well as transfer of training was supported. Finally, a measure of intrinsic interest after phase 2 did not demonstrate significance.

Post Hoc Analyses and Descriptive Statistics

Further analysis of the data using a 4 x 2 (4 groups x 2 grade levels) analysis of covariance with 2 covariates (Form1A and SF pretest scores from the original data) is depicted in Table 6. These analyzes investigated grade level as a possible factor impacting on treatment outcome. The results for each dependent variable (not including the intrinsic interest measure) did not demonstrate any significance for either main effects or interaction effects. Additional post hoc contrasts representative of the initial major hypotheses were not conducted due to the

Table 6
4 x 2 ANCOVA (4 Treatments x 2 Grades) Results

Source	SS	MS	F	Prob > F
Response Variable: Form1B				
A (Group)	65.18	21.73	0.14	0.94
B (Grade)	0.64	0.64	0.00	0.95
AB	67.78	22.60	0.15	0.93
Error	9650.28	155.65	(DF =1,71)	
Form1C				
A	322.94	107.64	0.49	0.69
B	420.37	420.37	1.89	0.17
AB	585.20	195.07	0.88	0.46
Error	13758.56	221.91	(DF = 1,71)	
SF1				
A	176.89	58.96	0.43	0.73
B	14.56	14.56	0.11	0.75
AB	710.77	236.92	1.71	0.17
Error	8566.14	138.16	(DF = 1,71)	
SF2				
A	784.87	261.62	1.20	0.32
B	328.44	328.44	1.51	0.22
AB	1299.69	433.23	1.99	0.13
Error	13513.72	217.96	(DF = 1,71)	

Note.

Form1B = Achievement skill measure; Form1C = Achievement
skill measure; SF1 = Self-efficacy measure; SF2 =

Self-efficacy measure.

(table continues)

Table 6
4 x 2 ANCOVA (4 Treatments x 2 Grades) Results

Source	SS	MS	F	Prob > F
Response Variable: Pages (Phase 1)				
A (Group)	16.56	8.28	0.39	0.68
B (Grade)	5.22	5.22	0.24	0.62
AB	54.86	27.43	1.28	0.29
Error	1007.06	21.43	(DF =1,54)	
Pages (Phase 2)				
A (Group)	122.47	40.82	1.98	0.13
B (Grade)	0.28	0.28	0.01	0.91
AB	46.56	15.52	0.75	0.52
Error	1276.57	20.59	(DF =1,71)	

Note.

Pages = Pages completed.

lack of any significant findings. Data involving the intrinsic interest measure was further analyzed with grade level as an additional predictor variable. A linear logistic regression analysis did not yield significance (R-Square = 0.1746).

Lastly, the results of means, standard deviations, and range of scores examining individual treatment groups for each dependent variable (see Table 4) indicate a high degree of variation within treatment group scores. For example, the standard deviations of the 4 treatment groups for Form1B ranged from 11.47 - 18.04. The occurrence of variability may also have been an important factor masking/limiting the statistical results of the contrasts and outcome of the predicted hypotheses.

CHAPTER V

Discussion

Summary of Findings

The results from this investigation do not support the major predicted hypotheses. The performance on the achievement measures of the self-set training and assigned goal-setting groups were not superior when compared with the control groups or each other. The findings of this study indicate that training in a self-set goal-setting technique utilizing proximal goals did not significantly impact on academic behaviors for the sample population. Students did not demonstrate gains in their achievement skill level involving the acquisition of subtraction skills. Similarly, their level of self-efficacy was not affected by this treatment condition. Positive results after a transfer of training task for the self-set proximal goal-setting group were not evidenced on any of the dependent variables obtained after phase 2. A measure of intrinsic interest also did not yield any significant results. The expected impact of increased commitment and responsibility as part of the goal-setting training as viewed from a cognitive social-learning orientation was not supported by this study with this sample population.

The results for the assigned goal-setting group were

also not supportive of the predicted hypotheses. Students did not differ with regard to achievement, self-efficacy and interest levels or pages completed when compared with their contrast groups (Groups 3 and 4). Thus, externally determined standards (assigned goals) did not result in any positive treatment effects involving academic behaviors. Assigned goals which are typical of classroom instruction and have shown positive effects did not benefit any individual grade level in this study.

Observations

Some observations other than empirical results were noteworthy and suggest reasons for the lack of predicted findings.

During phase 1 students in the self-set proximal goal-setting group attempted to utilize the proximal goal-setting strategy to complete the self-directed packet. Many of the students required assistance from the experimenter in dividing the worksheets into even amount sets in order to correctly end up with six sheets per day as their daily proximal goal. In addition, all but two students did not exceed their daily goal during subsequent sessions in phase 1. It is important to note that the need for the experimenter to assist many of the children with the self-set goal-setting strategy was unexpected and

changed the nature of the treatment group. Thus, the treatment was not carried out as planned. During a pilot study with 16 children (4 children per treatment) the same level of experimenter assistance was not needed. Also, results from a pilot study suggested a positive effect.

At the onset of phase 2 no students in the self-set group (Group 2) attempted to employ the proximal goal-setting strategy that they had been trained to use. They did not utilize any overt strategy but characteristically paused (five to ten seconds) and ventured a guess. Perhaps more initial training and practice in the goal-setting technique during phase 1 would have resulted in the students applying this skill.

The second graders, across treatment groups, were very demanding for attention/assistance, easily frustrated, had limited independent work skills, and more conflicts with peers. Classroom observations also confirmed these impressions.

Third graders appeared to be more mature and amenable to dealing with a situation involving increased mathematics instruction and training in goal-setting. However, during phase 2 children in both grades became increasingly vocal about wanting to do another activity instead of subtraction. Increased frustration, fatigue, and boredom may have further contributed to a lack of treatment

effects. This may have influenced posttest scores after phase 2 and on the interest measure. The introduction of a math-related or even a novel phase 2 choice situation may have been received with more enthusiasm by the students, resulting in more motivation and transfer of training.

Conclusions Based on the Findings

Possible factors responsible for the lack of results include age/grade level, sample size and variability, accurate reporting of self-efficacy and type of population.

Age/grade level

Age/grade could possibly be a factor affecting treatment effectiveness. Behaviorally, in general, children in the older age/grade levels (grades 3 and 4) demonstrated a longer attention span and more independent work skills than younger children (grade 2) across all treatment groups. Even with the goal-setting training the older students appeared to better comprehend the presentation and successfully practiced on setting appropriate self-set goals. Working with the older group required less experimenter assistance and refocusing to enable them to stay on task. Maturation, exposure to school routines/expectations, and development of more independent work skills may have contributed to the higher

grades being more manageable.

A 4 x 2 ANCOVA (post hoc analysis with grade as a factor) did not demonstrate any significant findings for grade as a factor impacting on results. Unfortunately, when grade was examined within the design of the initial study the corresponding smaller sample size may have masked significant contributions of this factor. Future studies need to address how this factor contributed to the impact of goal-setting on achievement behaviors.

Sample size and variability

A large spread of scores for dependent variable responses and subsequent large standard deviations adversely affected the discrimination of possible predicted treatment effects in relation to the sample size. This refers to both the initial a priori contrasts and post hoc results analyzed for this study. Even though random assignment and an ANCOVA with two covariates were utilized, the variability of scores both between and within groups may have had an impact on not obtaining predicted results.

Further, the examination of unadjusted mean scores (see Table 4) for the pretest achievement skill covariate suggests that the two control groups (Groups 3 & 4) were not similar to the other two treatment groups (Groups 1 & 2), despite randomization in the assignment process. The lack of results may be a reflection of these groups having

started at a higher level and then maintaining this position over time. This calls into question the initial randomization and assumption of equal groups which resulted in the lack of findings. It also offers a possible explanation for the significantly better performance of these groups on the achievement skill measure and number of pages completed.

Self-efficacy reporting

Both second and third graders demonstrated an inflated sense of self-efficacy even when posed with obviously difficult pairs of subtraction examples involving multiple regroupings and missing subtrahends. Within a related concept of self-competence, young children have been found to have inaccurate and inflated perceptions of their competence (Butler, 1990). This possible inability of the students in this sample to accurately self-evaluate their perceived competencies is another area of concern affecting treatment outcome.

A correlation analysis examining the relationship between self-efficacy and achievement measures did not demonstrate any significant relationships. The correlation coefficients for pretests Form1A and SF, posttests Form1B and SF1, and posttests Form1C and SF2 were .21, .21, and .17, respectively. Thus, a predicted positive relationship between achievement skill level and self-efficacy was not

supported by the data and continues to call into question the validity of the self-efficacy measure with this age group or sample.

Population

Students in this study were all in attendance at the same elementary school and representative of an urban (inner city) population. Subjects were primarily black or Hispanic and came from basically two large apartment projects that house low socioeconomic minority status families. Single parent families receiving public assistance were not uncommon. Thus, economic and family stressors may have influenced the experiment's results for this sample.

In contrast, Schunk and Bandura's (1981) sample population of 40 children was from predominantly middle-class backgrounds. In addition, the students were selected from six elementary schools. This may be indicative of a different type of mathematics deficient student even though the above-mentioned sample and the present study chose students with minimal skills in mathematics. Unfortunately, neither study has assessed functioning outside of mathematics. Perhaps the present study's sample was more globally deficient in overall school performance and with little assistance/support from parents.

The expectation for mastery, pacing of work and amount of practice could have been too fast and frustrating for the urban minority sample population. Informal consultation with second, third, and fourth grade teachers reported that their students have had difficulty retaining information from day to day, transferring it and building upon it in order to solve more difficult problems in math and other areas. It should also be pointed out that the two phases of the experiment were possibly too demanding for positive results. This is with regard to the number of sessions offered, the level of the students' math difficulties, and the expectation for both mastery of self-set goal-setting as well as the transfer of that skill to a similar task. The fact that the children in Group 2 had difficulty in adequately utilizing the goal-setting strategy in phase 1 is illustrative of the poor prognosis of transfer of training.

Another explanation for the lack of positive results of this study can be extracted from literature addressing instructional practices that help "at-risk" children (Slavin and Madden, 1989). "At-risk" children were defined as those in danger of failing to adequately complete their education. Risk factors associated with the present study were low socioeconomic status and attendance at a school with a large number of poor students.

Slavin and Madden reported that traditional pullout programs are generally not effective with an "at-risk"

population, similar to the one used in this study. Criticisms were that pullout programs provided instruction that was poorly integrated with the students' regular classroom instruction, that it was disruptive and it labelled students.

All students in the present study also received Chapter 1 programming in reading. Anderson and Pellicer (1990) examined the research on compensatory and remedial education, under which Chapter 1 is subsumed. Chapter 1 programs were found to be poorly coordinated with regular programs resulting in actually impeding student learning. Overall, these programs were viewed as contributing to a fragmentation of the curriculum. This research highlights the ineffectiveness of pull-out programs in dealing with an "at-risk" population. This issue might have been a factor which contributed to the lack of results of the present study, even though this study was not a typical pull-out program but an experiment.

Implications from the above include the need to recognize what are effective programs with "at-risk" children that foster the development of academic skills. Effective programs for this population are comprehensive, intensive and have frequent assessment/modifications based on the student's progress. Students who utilize self-set proximal goal-setting might benefit further if it was part of a remedial or compensatory program. A focus on specific proximal goals can provide necessary meaningful feedback to

both the student and teacher. An important limitation of this study was that the student's mastery or non-mastery of setting proximal goals was not sufficiently monitored by the experimenter and/or the student.

School experiences with goal-setting in one-to-one, small group and classroom contexts would address disadvantages of pullout programs being fragmented and disruptive. An integrated, intense and varied application of goal-setting would also foster transfer of training regarding self-set proximal goal-setting to different domains.

The modelling and training of an effective proximal goal-setting strategy practiced at the beginning of the first two sessions of phase 1 was probably not sufficient for acquiring mastery and for transfer of training to occur. The fact that no students at the beginning of phase 2 employed the self-set goal-setting technique, even incorrectly, highlights the need for more training with this population.

In addition, the self-directed math packet might have not been compatible enough with regard to learning needs of the sample population. The manner of explaining directions and procedures was restricted to specific key phrases and approaches. Especially with an "at-risk" population this form of self-directed learning and instruction would conceivably not be intensive nor comprehensive enough for students to reach mastery. Perhaps higher functioning

students could have gained from the self-directed packet and even more so, with the inclusion of sufficient development of proximal goals.

Alderman (1990) proposed a model for motivation and success with low achieving and "at-risk" students. Her theoretical orientation is representative of social-cognitive learning theory. Alderman's employment of an individualized, flexible format in addressing individual student's proximal goals and progress with "at-risk" children has relevance for future studies. Although this individualized approach is more time consuming, a dialogue between the student and teacher examining goal-setting and self-evaluation could have resulted in more understanding of and use of goal-setting by Group 2 students, notably in the transfer of training phase.

Another design element from Aldermann's model involves the identification of particular learning strategies that will help the students meet their learning goals that were developed as part of proximal goal-setting. This area was not investigated in the present study. In addition, the importance of teacher modelling and feedback about why the student succeeded or failed is important to consider.

Educational Implications Based on the Findings

One of the major objectives of this study was to examine the effect of self-set proximal goal-setting

training and its transfer to a similar task on academic behaviors. The hypothesized positive impact of this training was also contrasted with the effect of assigned goals. Goal-setting researchers such as Schunk and Bandura have suggested that involvement by the student in the process of proximal goal-setting will further enhance academic behaviors through increased personal involvement, commitment, and responsibility toward a learning task (Bandura, 1986; Schunk, 1984, 1985). Both the utilization of self-selected goals and externally determined standards (goals) assigned by the teacher or experimenter have resulted in positive effects (Bandura, 1986; Brownell et al., 1977; Dickerson & Creedon, 1981).

Determining which techniques are more productive within differing achievement contexts, sample populations and age/grade levels has important educational implications. The issue of in what situations (different grade level or content areas) should students be involved in self-setting proximal goals or be assigned goals by the teacher in order to enhance success is directly applicable to classroom instruction and many diverse learning contexts. Once a student has mastered a technique for self-set goal-setting, it can be applied to different contexts as well as the concept conceivably generalized to different approaches aimed at goal-setting. Experiences in effectively setting ones goals provides positive feedback that can influence the student's level of self-efficacy and appraisal of

performance. This heightened sense of efficacy for learning may extend to increased academic behaviors, motivation and interest.

Research within a natural setting such as a school leads to many problems associated with trying to control for confounding variables that might influence results. However, educational implications can be extracted from both the treatment conditions as well as the reaction of the sample population utilized. For the purpose of this study, the latter issues are more relevant to educational implications.

It is also difficult to specifically address educational implications based on this experiment due to the lack of significant findings and factors that might have impeded demonstrable results for either the self-set or assigned goals treatment groups. Observations of this sample population for this study and teacher contact does result in some inferred guidelines reflecting educational implications. In order to effectively engage these students in a task and work through a project classroom management issues need to be addressed. Working with the students within the actual classroom and in collaboration with the teacher are important means of maximizing the students' attention and exposure to the targeted activities. In contrast, these children demonstrated difficulty in transition to a different room and with staff that are not their primary teachers. Much time, especially

non-instructional time, is wasted on leaving the class, walking through the halls, settling in to a new classroom and commencing an activity. This is also disruptive to the classroom routine upon re-entry of the group into their class. Thus, coordinating any type of training session/project within the classroom itself is a basic educational implication for students in this sample population. In addition, increased training and self-directed sessions for shorter durations might also maximize results. The use of academic skill development training paralleling what is taught in the classroom is also important to consider. This would provide more repetition, review and application by students reported to have difficulty in developing, retaining and generalizing skills. Furthermore, the possibility of confusion and frustration introduced with differing strategies would be avoided. An entire class utilizing self-set goal-setting or even just assigned goal-setting directed by the teacher would probably benefit more than when small groups are taken out of the class for training as was attempted in this study.

Future Research

Future research investigating already outlined issues as a result of this study are essential to understanding the major hypotheses regarding self-set proximal

goal-setting versus assigned goal-setting and their impact on self-efficacy and achievement behaviors. Research questions need to address not only the main goal-setting issues but the characteristics of sample populations (age/grade level, socioeconomic status, etc.) that are being investigated.

Continued investigations are necessary to examine the relationship between training in self-set proximal goals and the transfer of training to a similar task. The established objectives to demonstrate that the process of training will enhance 1) academic behaviors, 2) interest, 3) amount of work completed, and 4) level of self-efficacy continue to be valid areas of examination. In addition, the comparison of a self-set goal-setting group with an assigned goals group should be part of the research design. Specific avenues of inquiry should address the following issues:

- 1) The study to be replicated with a larger sample size and different populations. Age/grade level should be analyzed as a contributory factor. The effect of a student's age/grade level in a larger sample may be able to examine this issue. Four treatment groups with a sufficient number of second, third and fourth graders are required to analyze both main and interaction effects. The influence of age/grade level on self-efficacy and achievement remains unclear. Developmental issues regarding the ability to understand and accurately self-report self-efficacy

judgments for each grade level could also be examined within a larger study.

2) Training and practice in self-set proximal goals that would vary both the nature of the task and the use of a mastery criterion for termination of the number of practice sessions required for each individual student should be explored. This, perhaps could result in the self-set proximal goal-setting group proficient enough to actively employ the goal-setting technique in the free-choice transfer task. This might further impact on increased commitment and responsibility of students toward their actions and resultant positive effects on achievement skill, interest and self-efficacy levels.

3) To divide the sample group by ability in terms of different levels of pretest mathematics skills designating severe, moderate and mild levels of dysfunction. Perhaps less deficient children representative of the current sample population might benefit from training in self-set goal-setting.

4) Shorter time intervals and increased sessions undertaken within the classroom might lessen difficulties in transition time, with peers, and minimize disruptions to the classroom routines. The teacher being present and involved in training the students could benefit the acquisition of and transfer of the self-set proximal goal-setting technique. Children in this sample were generally more appropriately behaved and responsive when

observed in the presence of their teacher. This could facilitate more actual time learning and practicing rather than dealing with management issues.

5) To investigate the impact of a more flexible, individualized student-teacher collaborative approach to proximal goal-setting training. In addition, to further explore the use of feedback to the self-set proximal goal-setting group by teachers through modelling and teacher-student conferences.

6) To compare and contrast proximal goal-setting training within preventive and remedial program contexts with "at-risk" students.

In closing, the predicted positive effect of training in self-set goal-setting versus assigned goal-setting on achievement behaviors, self-efficacy and transfer of training has not been supported by the results of this study. Future research needs to systematically and carefully monitor self-set goal-setting and assigned goal-setting effects in relation to phase 1 manipulations. Afterwards, once positive results have been supported, the issue of transfer of training can more realistically be expected and assessed.

Appendix A

Math Subtraction Packet (sample)

(Mathematics Subtraction Packet)

Lesson 1 - How to Work with 0

1	Subtract $\begin{array}{r} 72 \\ -70 \\ \hline ? \end{array}$	2	In the ones place we have $2-0$.	3	$\begin{array}{r} \text{tens} & \text{ones} \\ 72 & \\ -70 & \\ \hline & 0 \end{array}$	4	When we subtract 0 from any number we get that number.
1	Subtract $2-0=2$	2	In the tens place we have $7-7$.	3	$\begin{array}{r} \text{tens} & \text{ones} \\ 72 & \\ -70 & \\ \hline & 2 \end{array}$	4	When we subtract a number from the same number we get 0.
2	Subtract $7-7=0$	3	$\begin{array}{r} \text{tens} & \text{ones} \\ 72 & \\ -70 & \\ \hline 0 & 2 \end{array}$	4	So,	5	$\begin{array}{r} 72 \\ -70 \\ \hline 2 \end{array}$
1	Subtract $\begin{array}{r} 36 \\ -\square\square \\ \hline 31 \end{array}$	2	In the ones place we have $6-\square=1$.	3	$\begin{array}{r} \text{tens} & \text{ones} \\ 36 & \\ -\square\square & \\ \hline & 1 \end{array}$	4	You know that $6-\square=1$.
2	In the tens place we have $3-\square=3$.	3	$\begin{array}{r} \text{tens} & \text{ones} \\ 36 & \\ -\square\square & \\ \hline 3 & 1 \end{array}$	4	So,	5	$\begin{array}{r} 36 \\ -\square\square \\ \hline 31 \end{array}$

Math Subtraction Packet (continued)

Page 2

$$\begin{array}{r} 829 \\ -821 \\ \hline \end{array}$$

$$\begin{array}{r} 74 \\ -30 \\ \hline \end{array}$$

$$\begin{array}{r} 62 \\ -12 \\ \hline \end{array}$$

$$\begin{array}{r} 87 \\ -\square\square \\ \hline 57 \end{array}$$

$$\begin{array}{r} 33 \\ -\square\square \\ \hline 10 \end{array}$$

$$\begin{array}{r} 48 \\ -\square\square \\ \hline 44 \end{array}$$

$$\begin{array}{r} 58 \\ -\square\square \\ \hline 6 \end{array}$$

$$\begin{array}{r} 837 \\ -\square\square\square \\ \hline 432 \end{array}$$

$$\begin{array}{r} 48 \\ -3 \\ \hline \end{array}$$

Appendix B

Self-Efficacy Measure (sample)

$$\begin{array}{r} 47 \\ -30 \\ \hline \end{array}$$

$$\begin{array}{r} 86 \\ -4 \\ \hline \end{array}$$

0 10 20 30 40 50 60 70 80 90 100
No maybe Yes

Appendix C

Achievement Skill Measure (sample)

$$\begin{array}{r} 36 \\ -20 \\ \hline \end{array}$$

$$\begin{array}{r} 57 \\ -4 \\ \hline \end{array}$$

$$\begin{array}{r} 835 \\ -304 \\ \hline \end{array}$$

$$\begin{array}{r} 97 \\ -\square\square \\ \hline 57 \end{array}$$

$$\begin{array}{r} 947 \\ -\square\square\square \\ \hline 435 \end{array}$$

$$\begin{array}{r} 81 \\ -25 \\ \hline \end{array}$$

$$\begin{array}{r} 63 \\ -\square\square \\ \hline 38 \end{array}$$

$$\begin{array}{r} 84 \\ -\square\square \\ \hline 6 \end{array}$$

$$\begin{array}{r} 62 \\ -34 \\ \hline \end{array}$$

$$\begin{array}{r} 757 \\ -183 \\ \hline \end{array}$$

$$\begin{array}{r} 625 \\ -\square\square\square \\ \hline 342 \end{array}$$

$$\begin{array}{r} 50 \\ -34 \\ \hline \end{array}$$

$$\begin{array}{r} 380 \\ -218 \\ \hline \end{array}$$

$$\begin{array}{r} 40 \\ -\square\square \\ \hline 11 \end{array}$$

$$\begin{array}{r} 850 \\ -\square\square\square \\ \hline 627 \end{array}$$

Appendix D

Intrinsic Interest Measure (sample)

SAMPLE																		
1	5	4	6	2	8	2	3	1	9	8	5	7	4	1	3	6	5	2
4	9	6	8	4	5	7	8	1	6	7	4	8	5	2	9	6	4	7
9	7	2	6	3	4	9	8	5	7	3	6	9	4	1	5	7	3	9
3	7	4	5	2	4	2	8	7	9	6	8	1	6	7	4	8	2	5
1	4	6	3	7	9	8	2	5	4	7	3	6	8	1	5	4	9	6
5	8	1	2	5	3	7	1	9	1	7	6	5	3	8	7	6	9	7
4	7	3	6	8	9	1	5	8	7	6	9	7	3	8	7	5	8	6
3	4	3	4	2	7	2	3	1	4	7	2	9	5	8	2	6	9	1

Appendix E

Teacher Rating Sheet*Please rate each student on a scale from 1 to 3 on Math Ability*

STUDENT NAME	1 = Low Ability	2 = Average Ability	3 = High Ability
1. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix F

Consent Form (sample)

Dear Parent,

Your child has been selected to be involved in a research study involving practice in subtraction skills. He/she may also receive some training in setting work goals. This will depend on the group that he/she will be chosen to participate in. Participation is entirely voluntary and your child could ask to withdraw at any time. All test scores and results pertaining to any specific child will be kept confidential.

This study is attempting to examine if children learn subtraction skills better when goals are assigned to them or when they get training and choose their own goals. We will be measuring subtraction skills, feelings toward math ability and interest. Your cooperation will be very much appreciated.

Please check off the appropriate box below indicating your decision about consent and have your child return it to his/her teacher.

.....

I give consent for my child to participate.

I do not give consent.

Parent's Signature _____ Date _____

Child's Name _____ Class _____

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