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This experiment compared the motivational effects of cognitive incentives (goal setting techniques) and investigated these effects combined with social interaction (individual pupil-teacher conferences). Subjects were 48 predominantly Negro, low-socioeconomic status, third and fourth graders from three arithmetic classes, representing high, medium, and low achievement. The children were randomly assigned to a control group or to one of three experimental groups: (1) Do Best subjects simply were told to do their best, (2) Self-Set children stated their goal each week, and (3) Teacher-Set children's weekly goals were set by the teacher. Experimental groups met with the teacher once a week for 6 weeks. Tests and records measured performance, retention, and attitude change. Significant effects due to achievement level were found for acquisition and retention scores. Children attending conferences performed better than those who had not, and children with specific goals performed better than those with general goals. High achievement students reflected positive attitude change, while low achievers reflected negative attitude change. The effects of social and cognitive motives on attitude change were inconclusive. (DR)

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Technical Report No. 61

MOTIVATIONAL EFFECTS OF INDIVIDUAL CONFERENCES AND GOAL SETTING ON PERFORMANCE AND ATTITUDES IN ARITHMETIC

By Barbara J. Kennedy

Report from the Project on Situational Variables and Efficiency of Concept Learning
Herbert J. Klausmeier, Principal Investigator

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
Madison, Wisconsin

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PREFACE

A goal of this Center is to conduct both laboratory and classroom research in order to create knowledge and theory which will effectively improve learning in our schools. Professor Herbert J. Klausmeier and his associates have been productively engaged in one research project dealing, in general, with effects of various situational variables on efficiency of concept learning. From this project comes the present report of a classroom study concerned with motivation, a variable of fundamental importance in any learning situation. Specifically, four quite practical motivational conditions were related to the acquisition and retention of arithmetic concepts by third and fourth grade children.

The results of Mrs. Kennedy's study clearly indicate the beneficial effects of weekly pupil-teacher conferences and the advantages of setting specific weekly achievement goals for each pupil.

Harold J. Fletcher
Director of Program 1

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ABSTRACT

The purpose of this experiment w to compare the motivational effects of cognitive incentives in the form of different goal-setting techniques and to investigate the combined effects of cognitive incentives with social interaction in individual pupil–teacher conferences.

Ss were 48 third- and fourth-grade students from 3 arithmetic classes, representing High, Medium, and Low achievers. Within each achievement level group, Ss were randomly assigned to one of three experimental groups (Do Best, Self-Set, Teacher-Set) or to a Control group. All experimental Ss met briefly with a teacher once a week for 6 weeks to discuss their progress and to set goals for the following week. Do Best Ss were simply told to do their best each week. Self-Set Ss were asked to state a goal each week. Teacher-Set Ss had their weekly goals set for them by the teacher.

The dependent variables were acquisition scores (measured by performance in arithmetic during the 6 weeks), retention scores (score on an arithmetic achievement test administered at the conclusion of the experiment), and attitude change scores (difference scores between pre- and posttest administration of an attitude preference test). Analyses of variance with orthogonal contrasts were performed on each of the dependent variables. Significant effects due to achievement levels were found for both acquisition and retention scores ($p < .01$). Mean acquisition and retention scores indicated that Ss with weekly conferences performed better than those without. Acquisition score means showed that Ss with specific goals performed better than Ss with general goals. This comparison was significant ($p < .10$) for the retention data. There was a significant interaction ($p < .05$) between type of goal (specific vs. general) and achievement level for attitude change scores. Mean attitude change scores were related to level of achievement: the High Ss had large positive change scores, and the Low Ss had negative change scores. The results were discussed and interpreted in relation to a classroom research setting.

I
INTRODUCTION

The search for methods and materials to increase motivation of children in classroom learning situations is one which has been receiving increased attention in recent years. The trend has been to attempt to isolate various independent variables related to motivation—for example need for achievement (Weiner, 1967), success and failure (Sears, 1940), anxiety (Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960)—in highly structured and rigorously controlled laboratory situations and to attempt to extend the results to apply to the classroom situation. This trend has persisted despite Page's (1958a) defense of generalizable classroom research as more valuable than experimentally replicable laboratory research (cf. Page 1958b; Sweet, 1966).

The present experiment was one in a series of classroom studies initiated cooperatively by the staff of the Motivation Project at the Wisconsin Research and Development Center for Cognitive Learning and the local schools. The purpose of the project, as outlined in a preliminary report (Klausmeier, Schwenn, Lamal, Kennedy, & Buchanan, 1967), is to systematize motivational procedures into a program which can be used to improve the conduct and achievement of all children to whom it is applied.

This study considered two broad categories of motives applicable to the classroom situation: social motives and cognitive motives. Social motivation is here defined as that elicited by the interaction of a child with a nonpunitive adult on an individual basis (as opposed to that aroused in a peer group competitive situation) when a desire to gain approval and praise is stimulated in the child. Cognitive motivation refers to the motivation aroused in a situation with which the subject is familiar and to which he brings a knowledge of his past successes and failures. It can be considered a type of reality incentive within the framework of knowledge of past performance and probability judgments of future successes.

Sears and Hilgard (1964) discuss these two types of motives as being manipulable in the classroom. Their social motives involve relationships among people. Because the teacher is an adult, the social motive tends to take the form of dependency with the child guided by, and attempting to receive the approval of, the adult. Hence in an elementary school situation, the influence of a nurturant teacher may clearly relate to the performance of young children on learning tasks. Cognitive motives are those concerned with a "knowledge" of the environment and include such classroom-relevant activities as knowledge of results and goal setting.

The efficacy of the social technique employed was illustrated in a teacher-conducted classroom research study (Klausmeier, Quilling, & Wardrop, 1968). Second-grade students met individually with their arithmetic teachers on a weekly basis to discuss informally their progress and to receive praise and encouragement. These children performed significantly better on tests of acquisition and retention of arithmetic concepts than their counterparts who underwent identical instruction and practice but who lacked the specific personal interaction with the teacher. Although the students received a certain amount of feedback during the conferences, it was redundant of that received in the classroom and therefore any effects attributed to it could be termed motivational. Hence the superiority of the Ss with conferences can be accounted for by social factors rather than informational or "cognitive" factors.

In the present experiment, the conference procedure was replicated as the social motive component. In addition, however, the focus of the conference was extended to emphasize cognitive motives in the form of a comparison among goal-setting procedures. These are predicted on the Ss' familiarity with the situation (namely, classroom mathematics instruction)

and their knowledge of past performance (feedback from classroom exercises and tests).

Different types and levels of goal orientation have been shown to be powerful variables affecting both the acquisition of motor skills (Mace, 1935) and the refinement of complex mental exercises (Locke & Bryan, 1966b). The typical classroom goal instruction has been to "do your best" and whether this implies improvement or mere expenditure of effort is not specified. Results of various laboratory experiments (Locke & Bryan, 1966a; Mace, 1935) as well as experiments involving laboratory-type tasks within a classroom situation (Anderson & Brandt, 1939) indicate that this general performance instruction is relatively ineffective in producing increments in performance. The orientation toward a specific goal, either one imposed on S or solicited from S, served to improve performance significantly more than no goal or a very general goal orientation.

Finally, the present experiment considered the effects of these motivational procedures on attitudes. Although there is a lack of confirmatory evidence in the form of research findings, it seems reasonable to assume that effective motivation induced by social interaction and goal-setting techniques would lead to positive attitudes toward arithmetic.

The purpose of this experiment was to compare the motivational effects of cognitive incentives in the form of differential goal-setting techniques and to investigate the combined effects of cognitive incentives with social interaction in individual pupil–teacher conferences. Specifically, the questions which the experiment sought to answer were:

1. What are the effects of individual conferences which combine social and cognitive motivation on the acquisition and retention of arithmetic concepts?
2. What are the effects of specific as compared to general goals on the acquisition and retention of arithmetic concepts?
3. What are the effects of external teacher-set goals as compared to internal pupil-set goals on acquisition and retention of arithmetic concepts?
4. What are the effects of individual conferences which combine social and cognitive motivation, and of the goal comparisons, on attitude change scores?
5. What is the relationship of level of achievement to acquisition, retention, and attitude change scores in arithmetic?

II

REVIEW OF THE LITERATURE

SOCIAL MOTIVATION

A search of the literature reveals an abundance of studies involving social variables in child development and social learning. Although the studies are only peripherally related to the present experiment, many assumptions can be drawn concerning the potential effectiveness of teacher–pupil interaction.

For example, in an academic setting, McDavid (1959) considered over- and underachievement as related, at least partially, to differences in the incentive or motivational value of teacher approval as a social reinforcer. Page's (1958b) classroom study underscored the motivational significance of evaluative procedures beyond the mere indication of right and wrong answers. Students who received encouraging personal comments on their test papers improved their scores more than those whose papers were marked with a letter grade but no comment. These results indicate the effectiveness of displayed teacher interest in individual student progress.

In a study involving third, fifth, and eighth graders in a test-retest task using standardized IQ tests, Hurlock (1924) found that a greater percentage of Ss showed improvement following both praise and reproof than when the test was repeated without preliminary comment. Once again, the relation between some type of teacher–pupil interaction and performance improvement is suggested.

Related to this type of approach is the literature concerning positive reinforcement. Without going into the details of studies not directly relevant in the present context, it is worth noting the consistency of results favoring the usefulness of dispensing rewards to shape the desired behavior (Bandura & Walters, 1963; Crandall, Good, & Crandall, 1964).

One variable which appears frequently in the literature and which has been shown to have considerable influence in studies involving social reinforcement is dependency. Although no attempt was made in the present experiment to categorize Ss in terms of level of dependency, it is assumed that in children of this age at least some degree of dependency exists. Bandura and Walters (1963) define dependency as "a class of responses that are capable of eliciting positive attending and ministering responses from others [p. 137]." Person-oriented dependent responses such as seeking proximity, attention, reassurance, and approval are expected and reinforced throughout all stages of development and are particularly prevalent in young children.

Gewirtz and Baer (1958) verbally reinforced nursery school children for a "correct" choice in a two-response game. This social reinforcer was effective in increasing the number of responses which were approved and was found particularly effective following a brief period of social isolation. Similarly, Endsley and Hartup (1960) employed verbal reinforcers to increase the persistency and rate of responding of preschoolers on a simple repetitive motor task.

Another group of studies which can be considered here are those concerning identification and imitation. From the wealth of information currently available on this topic, two findings concerning the effectiveness of model attributes are particularly relevant to the present study. The first of these is that a model who serves as dispenser of rewards is readily conformed to. Bandura and Huston (1961) found that exposure to a model possessing rewarding qualities facilitates imitation. Bandura, Ross, and Ross (1963), using 3-person groups with one adult assuming the role of dispenser of rewards and the other, the role of consumer, found that the child, who represented the third group member, imitated only the former adult.

The second important attribute of the model is his status position. This is reported by Bandura and Walters (1963) in a context not

related to the present study, but its implications for a teacher—student situation are obvious.

The social motivation in the present experiment, while considering none of the preceding variables per se, involved the assumption that each of these variables could be operating to a certain extent, and that, in combination, they would have a positive effect on performance and attitudes. One important function of the interviewer was to positively reinforce the Ss verbally by expressing approval of, and by showing a concerned interest in, their work. Any dependency needs operating in the Ss would hence be expected to be satisfied by the nurturant adult. In addition, the teacher was both the dispenser of the social reward and a person occupying a status position to the children. It was hypothesized that such a condition would sufficiently arouse social motivation in the Ss that performance improvement would become a desired, strived-for goal.

COGNITIVE MOTIVATION

Knowledge of Results

The positive effects of knowledge of results (hereafter KR) on learning and performance are well documented whether the approach favors the informational (directive) or the motivational (incentive) properties (Ammons, 1956; Bilodeau & Bilodeau, 1961; Payne & Hauty, 1955). Typically the former refers to information given to Ss regarding the nature and locus of errors and stresses improvement in task proficiency through a correction of such errors. Presumably this is the type of KR given to students in the classroom assignment and testing situation. The latter, on the other hand, refers to a more general type of feedback which lacks cueing properties concerning specific error elements and guides for correcting them. An example is reporting total score alone without reference to correct and incorrect components. Beneficial effects of this type of KR on performance may be considered motivational since the emphasis is on interest, attitude, and effort. This type of KR would occur in a classroom situation when, for example, a record is kept of students' daily or weekly performance with the purpose of charting progress.

Studies on goal setting tend to emphasize the motivational effects of KR as influencing Ss' conscious intentions regarding level of performance (Locke, 1967; Locke & Bryan, 1966b; Mace, 1935). Hence KR is considered effective to the extent that it is instrumental in establishing a subjective commitment to a goal.

Various studies involving the variables KR and goal setting have confounded one with the other within treatment groups making it impossible to determine any causative relationship. For example, early studies of KR employed different goal instructions within the experimental groups (Book & Norvelle, 1922; Ross, 1927). Ss given knowledge of score were told to try to improve or were given explicit goals to reach, while No KR Ss were told not to think about improving their scores or were simply instructed to "do their best." Conversely, studies dealing with qualitatively different goals have confounded differential KR with goal groups (Anderson & Brandt, 1939; Locke & Bryan, 1966a; Mace, 1935). In this case, groups with specific goals were given knowledge of scores, while do-best or control groups were not.

Few studies are reported demonstrating the relation of knowledge of score to goal-setting and performance. In one of his experiments, using a target game, Mace (1935) found that performance improved when knowledge of scores was introduced and deteriorated when such knowledge was withheld. It was concluded that a prominent condition for good performance was the indirect suggestion of an appropriate standard by means of the presentation of scores from prior performance.

Locke (1967) attempted to separate the effects of KR from those of goal setting in order to determine whether KR influenced performance level automatically or whether its effects were mediated by goal-setting activity. When KR and No KR were manipulated with qualitatively different goals in a factorial design there were no overall differences in performance attributable to KR, nor was there an interaction between KR and type of goal. However, a significant goal effect was found in favor of Ss given specific hard goals under both KR conditions. Locke interpreted these results in support of the hypothesis that motivational effects previously attributed to differential KR were actually a function of differential performance goals associated with the KR conditions.

Similarly, when the dependent variable was total number of problems correctly solved on a complex computation task, there were no significant differences between KR and No KR groups (Locke & Bryan, 1966b). Regrouping according to Ss' a posteriori performance goal descriptions revealed a significant relationship of goals to performance—the Ss with a difficult goal standard showing the highest performance level. The authors suggested that giving Ss knowledge of total score doesn't result in automatic performance gains. What is important is how KR is used, i.e., what goals are set with it.

Conflicting results were found by Helmstadter and Ellis (1952) when KR and goal-setting procedures were combined on a simple block-turning task. In addition to a group receiving KR and no goal orientation, three other groups received KR with various goal-setting techniques. None of the KR-goal combinations resulted in better performance than KR alone.

In the present experiment, KR was used as a basis for the meaningful operation of the goal-setting procedures. It appears as a component of cognitive motivation, influential in relating past performance to realistic future goals.

Goal Setting

Studies investigating the effects of goal setting on subsequent performance have employed both quantitatively different goals (level of difficulty) and qualitatively different goals (specific compared to general). In addition, the relationship between the goal-setting agent (whether it is S, internally set, or E, externally set) and level of difficulty is considered.

Using predetermined "standards of success" (chosen arbitrarily by E) to differentiate Easy, Medium, and Hard levels on a creativity "brainstorming" task, Locke (1966d) found a significant linear relationship between level of intention and level of performance. The scores of the Medium and Hard groups were significantly superior to those of the Easy group despite the fact that the Easy group had a significantly higher mean output than each of the other two groups on an initial practice trial without goal instructions. In a second experiment (Locke, 1966d) the tendency toward a significant linear trend was supported as was the superior output of the Hard group even though the objective probability of reaching the "standard" was below .10. Within a Progressive experimental group, performance was increased as the standards were increased from very Easy to very Hard over successive trials.

Fryer (1964) found that requiring Ss to set a performance goal prior to performance on a Morse Code task led to better learning than giving knowledge of scores following the task alone. In a reanalysis of this data, Locke (1966a) determined that the results were dependent upon the level at which the goals were set. The Ss who set high goals performed better than Ss with KR alone; Ss who set low goals did not.

In an investigation of qualitatively different goals, Locke and Bryan (1966a) found that Ss given specific (but difficult) goals based on their previous scores performed at a higher level on a complex psychomotor task than Ss told to "do their best." Moreover, the goals intensified effort at all stages of the work periods.

Similar results were obtained in subsequent studies (Locke & Bryan, 1967) using perceptual speed and simple addition tasks with trial sessions extending for 1 1/2- and 2-hour periods.

Employing a different technique, Bryan and Locke (1967) identified a high and a low motivation group on the basis of initial performance and attitude ratings on an addition task. In two retests on the same task, the former group received "do best" instructions while the latter group was given specific goals to reach. By the end of the second retest there were no significant differences between the low motivation-specific goal group and the high motivation-do best group on measures of performance, interest, intensity of focus, and effort, whereas initially there were significant differences on all of these measures except performance.

There is some evidence of the differential effects of various goal-setting techniques. For example, Mace (1935) found that an adjustable standard based on previous performance was more effective in a computational task than "do best" instructions. In another experiment the latter technique was superior to a fixed goal set by E. The least effective technique was simple instructions to surpass previous performance.

Locke (1966d) found a greater mean output per trial for Ss allowed to set their own goals than for Ss in a group with Easy standards fixed in advance by E. Superior to both groups were Ss with fixed Hard standards. One group of Ss working initially on Easy standards, then under Self-Set goal conditions, and finally on Hard standards, progressively increased their output under successive conditions (scores corrected for practice effects).

Helmstadter and Ellis (1952) reported a study of the combined effectiveness of knowledge of results and goal setting with the emphasis on a comparison between self-set and externally-set goal techniques. They found no significant differences in performance improvement among groups. The results, however, were qualified by the authors' suggestion that the experimental situation may not have been favorable for a differential operation of the goal procedures. This is evident in the proximity of both externally- and internally-set goals to the actual performance and to each other. This suggests Locke's (1966a) finding that differences in performance level were related to differences in the level at which the goals were set.

In a simple manipulative task, Bayton (1948) confirmed his hypotheses that (a) as aspirations become more specific there will be an increase in performance and (b) expressing aspirations is associated with an increase in the level of

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performance. He ranked his groups from most to least effective as follows:

(1) S sets own goal (with knowledge of previous scores) and tells E
(2) S sets own goal (with knowledge of previous scores) and doesn't tell E
(3) S has knowledge of previous scores but no goal-setting instructions
(4) S has neither KR nor goal-setting instructions

Two conclusions are suggested by these studies: one, that level of performance is high when level of goal difficulty is high, and the other, that specific goals lead to higher performance than do general goals. Both of these hypotheses were investigated in the present experiment. Ss from three experimental groups met with a teacher individually on a weekly basis for goal-setting orientation. The Ss in one experimental group had weekly performance goals set for them at a level judged by the teacher, who was familiar with their past performance, to be slightly above what they could normally achieve. This group was compared to a group of Ss who set their own goals. It was assumed that the latter would set goals at a level ensuring frequent success (Sears & Levin, 1957) and these would therefore be lower than the goals set by the teacher to be above the level of frequent success. These two groups of Ss receiving specific goal instructions were compared to a third group who similarly met with the teacher but who were told only to "do their best" each week.

ATTITUDES

Systematic investigation of the relationship of satisfaction and attitudes to performance (output) has prevailed in business and industry and has been based on the anecdotal assumption that attitudes are significantly correlated with task performance. In a review of this literature, Brayfield and Crockett (1955) reported correlations between job performance and job satisfaction which are uniformly low and generally nonsignificant. These studies confirmed the absence of an appreciable relationship between employee attitudes and performance on the job.

In several of their studies, Locke and Bryan have considered the relationship between task variables such as degree of success and type of goal orientation on various affective characteristics of Ss. In addition, attributes accounting for positive and negative attitudes toward the task have been outlined.

Locke (1965) reported four experiments with tasks ranging from word unscrambling to learning a pursuit-rotor procedure. In all cases there was a significant positive linear relationship between degree of task success and degree of liking for and satisfaction with the task. These results were replicated (Locke, 1966b) using a repeated measures design and a "brainstorming" task. In a further replication (Locke, 1966c) Ss rated their personal satisfaction rather than satisfaction with the task. Locke interprets these results as indicating the causative effect of success on liking.

Using interest—boredom rating scales administered at regular intervals during 1 1/2- to 2-hour trials, Locke and Bryan (1967) found that giving Ss specific performance goals enhanced interest in the task as compared to giving Ss no specific goals. Further, the effects of goals on interest increased with length of the experiment and/or length of the trial periods.

In an attempt to extend the range of attitudes measured, Bryan and Locke (1967) included scales for degree and intensity of task focus (concentration) and extent of effort exerted in addition to the boredom—interest scale. Over two retests of the same initial test, the mean total scores of the Do-Best group decreased in performance, interest, focus, and effort while the Goal group increased on all these measures.

Ss who reported liking for tasks tended to cite reasons attributable to their own performance such as "feeling of improvement," "challenge of the task," and "novelty." On the other hand, Ss with unfavorable attitudes attributed these to task characteristics rather than to their own lack of success. Criticisms included statements that the tasks were "tiring," "boring," repetitive," etc. (Locke, 1965).

In the present study, change scores on an attitude test administered as a pre- and posttest were considered in their relationship to level of achievement and to goal setting. It was expected that the high achievers would have the most favorable attitudes and the low achievers, the least favorable attitudes. In addition, Ss with specific goal orientation were expected to show better attitudes toward arithmetic than general goal or control Ss.

III
METHOD

SUBJECTS

The 48 Ss who participated in the experiment were selected from the 142 students in the third- and fourth-grade R & I Unit in Stephen Bull School, Racine, Wisconsin. The school is located in the inner core of an industrial city and services a low socioeconomic area. The majority of the Ss were Negro.

SETTING

Stephen Bull School was organized in a Multiunit pattern with Grades K–6 incorporated into four R & I Units. The Multiunit Concept is outlined in a position paper from the Wisconsin Research and Development Center for Cognitive Learning (Klausmeier, Morrow, & Walter, 1967) and is an organizational plan for a cooperative approach to instructional improvement both within a single school and among schools in a district. The R & I Unit is the classroom-level organization. It consists of a team of teachers who are jointly responsible for the instruction of a group of children. The R & I Unit involved in the present study consisted of a Unit leader, six classroom teachers, and a teacher aide.

PROCEDURE

Early in the school year, an arithmetic achievement test was administered to the entire population of third- and fourth-grade students. On the basis of their scores on this test, the students were grouped into six achievement levels. Each achievement-level group represented one instructional group with the exception of level III which was divided into two groups because of its size (see Table 1).

Three classes were selected to participate in the experiment (Group II, Group IIIB, and Group IV) representing one group of low, one group of medium, and one group of high arithmetic achievers respectively.

Table 1

Instructional Groupings by Achievement Level

Achievement-Level Groups	Instructional Groups
Group I (scores 0–20)	N=9
Group II (scores 20–40	*N=17
Group IIIA Group IIIB (scores 40–60)	N=25 *N=24
Group IV (scores 60–80)	N=27
Group V (scores 80–100)	*N=23
Group VI (scores 100–130)	N=17

*Classes selected for participation in the experiment

The arithmetic instruction in these classes centered around the use of individual progress folders developed by Dr. John Leblanc, Mathematics Consultant for Racine Public Schools. The folders were designed in checklist form to include all of the major concepts from the third-grade arithmetic curriculum. The concepts were broken down into subconcepts stated in logical sequence as pupil behaviors indicative of skill mastery in each area. Beside the statement of each subconcept was a square to be colored in by the student following the completion of instruction and testing of that skill (see Appendix A).

Within each classroom the folders were used in the following manner. Each lesson was

presented originally to the class as a whole, and later to remedial subgroups if considered necessary by the teacher. Following the presentation of a lesson, the relevant test was administered. Acquisition of the concept or skill was defined as achieving a perfect score on the test. This was recorded by the student coloring in the square in his folder adjacent to the statement of that concept or skill. When a student failed to reach the criterion of a perfect score he could attempt the test again, on request, either during free class time or after school hours. In addition, tests measuring previously acquired skills not within the instructional program were made available to the students on request. There was no limit on the number of times a test could be attempted by a student.

From each of the three classes, 16 students were randomly selected and divided among the four treatment conditions: Do Best, Self-Set, Teacher-Set, and Control. Each week, during the 6-week experimental period, the experimental Ss met individually with the Unit leader to discuss briefly their progress and to set goals for the following week. The Ss in the general goal group (Do Best) were simply told to "do their best" from week to week. Ss in the Self-Set goal group were asked to state how many squares they would try to fill in during the week. In the Teacher-Set goal group, each S was given a specific goal by the teacher and was told to try to reach it during the week. Control Ss used the folders but had no weekly conferences.

All the conferences were conducted by the Unit leader. She was familiar with the background and scholastic performance of each S and, although she instructed some of them in other subject fields, she did not teach any of the arithmetic classes from which the Ss were drawn. The three teachers whose classes were involved did not know which treatment each student was receiving.

An attempt was made to keep the social content of the conferences as similar as possible across treatment groups. All Ss were given praise and encouragement with statements such as "you're doing fine." Differences were introduced only in relation to goal instructions. Eight conferences were held on Monday, and seven on each of Tuesday through Friday between the hours of 10:30 and 11:30 a.m. Ss were randomly assigned to conference day and time following which some changes were made to eliminate conflicts with physical education classes.

DATA GATHERED

For each S a record was kept of the number of squares colored prior to the commencement of the experiment, as well as a weekly record of the goals (Self-Set and Teacher-Set) and of the actual performance, i.e., number of squares colored in. The last is referred to as the acquisition data.

Following the completion of the experiment, an arithmetic achievement test which was designed for use in conjunction with the folders was administered as a retention test.

In addition, a form of the Adapted Activity Preference Test (Schotanus, 1967) was administered as a pre- and a posttest to measure attitude change toward arithmetic. The test consists of a series of all possible pairs of pictures of students engaging in various academic activities. There are parallel male and female forms differentiated only by the sex of the children indicated in the drawings. For each pair of pictures, S was instructed to select the picture representing the activity he would prefer, given a choice between the two.

EXPERIMENTAL DESIGN

The experimental design was a 4 x 3 randomized block design with three levels of achievement (High, Medium, and Low) and four goal-treatment conditions (Do Best, Self-Set, Teacher-Set, and Control). A total of 12 cells was formed with four Ss in each cell (see Table 2).

TREATMENT OF THE DATA

The dependent variables were number of squares colored in (acquisition), score on the arithmetic posttest (retention), and attitude

Table 2

Experimental Design

Achievement Level	Goal-Treatment Group			
	Do Best	Self-Set	Teacher-Set	Control
High	N = 4	N = 4	N = 4	N = 4
Medium	N = 4	N = 4	N = 4	N = 4
Low	N = 4	N = 4	N = 4	N = 4

change score. For each variable, an analysis of variance was used with orthogonal contrasts to compare:

(1) the control group with the three treatment groups

(2) the general goal group (Do Best) with the two specific goal groups (Self-Set and Teacher-Set)

(3) the Teacher-Set goal group with the Self-Set goal group.

IV
RESULTS

ACQUISITION

A two-way analysis of variance assuming the fixed effects model was computed for the dependent variable, number of squares colored in. The main effects tested for significance were achievement level and goal-treatment condition. The latter was subdivided into three orthogonal contrasts to compare the following:

(1) treatment groups (with conferences) vs. control group (without conferences)
(2) general goal group vs. specific goal groups
(3) Teacher-Set goal group vs. Self-Set goal group

The summary of the ANOVA table for acquisition scores is shown in Table 3. A significant F ratio was obtained for achievement level ($p < .01$).

Table 3

Analysis of Variance for Acquisition Scores

Source	df	MS	F
Achievement Level	2	12768.813	72.180*
Treatment Comparisons:			
1	1	225.0	1.272
2	1	325.126	1.838
3	1	18.375	---
Interaction	6	207.729	1.174
Error	36	176.903	
Total	47		

*p<.01

The mean number of squares colored in for each treatment by achievement level group is presented in Table 4. The four treatment means derived by summing across achievement level are also indicated. In every treatment condition, the Medium achievement group had the highest acquisition scores. Within the High group, the Ss who were allowed to set their own weekly goals scored highest on acquisition. In the Low group, the best performance was from the Ss who had their weekly goals set for them by the teacher. The overall treatment means indicate superior performance by the specific (Self-Set and Teacher-Set) goal groups, followed by the Do Best and the Control groups respectively. This ordering of results conforms to prediction with the exception that the Teacher-Set group was hypothesized to outperform the Self-Set group. This prediction was based on the assumption that the goal level would be highest in the Teacher-Set group and hence the level of performance would also be highest. In actual fact, at every achievement level, the goals set by the students themselves were higher than those set by the teacher (see Table 5). Thus Locke's (1966d) conclusion that performance level is high when the level at which the goals are set is high was confirmed.

The same information is presented graphically in Figure 1. The Medium and Low groups closely paralleled one another in performance, while the High group showed a marked superiority in the Self-Set treatment and noticeably lower performance under Do Best and Control conditions.

The means for the planned comparisons are presented in Table 6. Although none of these comparisons reached statistical significance, the results are in the hypothesized direction.

RETENTION

The retention data were pupil scores on an arithmetic achievement test. Scores from the pretest administration of this instrument were analyzed for internal consistency of the test.

Table 4

Mean Acquisition Scores

Achievement Level	Do Best	Self-Set	Teacher-Set	Control
High	30.75	57.25	45.75	38.25
Medium	68.25	66.75	67.75	59.00
Low	9.75	6.50	11.75	9.25
Treatment Means	36.25	43.50	41.75	35.50

Table 5

Mean Acquisition Scores

Achievement Level	Self-Set Goals	Teacher-Set Goals
High	9.917	4.583
Medium	6.208	3.958
Low	3.708	3.625

Figure 1. Mean acquisition scores over treatment groups as a function of achievement level.

Table 6

Comparison Means for Acquisition Scores for All Achievement Levels

Comparison 1	Conferences 40.5	No Conferences 35.5
Comparison 2	General Goals 36.25	Specific Goals 42.625
Comparison 3	Self-Set Goals 43.5	Teacher-Set Goals 41.75

The Hoyt reliability coefficient was .98. The analysis of variance for retention scores was computed in an identical manner to that described for acquisition scores. A summary of the ANOVA table is shown in Table 7. Significant F ratios were obtained for achievement level ($p < .01$) and for the general- vs. specific-goal treatment comparison ($p < .10$).

Table 7

Analysis of Variance for Retention Scores

Source	df	MS	F
Achievement Level	2	5148.25	20.379**
Treatment Comparisons:			
1	1	40.094	---
2	1	806.735	3.193*
3	1	2.046	---
Interaction	6	267.528	1.059
Error	36	252.625	
Total	47		

*p<.10
**p<.01

The mean scores on the retention test for each treatment by achievement level group are presented in Table 8. The four treatment means are also shown. As was the case with the acquisition scores, Ss in the High group who were allowed to set their own goals had the highest scores, while Low-achievement Ss who had their goals set for them by the teacher outperformed the others. The treatment means indicate that, across achievement levels, Ss in the specific goal groups had highest retention scores.

This information is presented graphically in Figure 2. Both the High and Low groups show curves approaching the expected, with lower scores under Do Best and Control conditions and higher scores under the specific-goal treatments.

Table 8

Mean Retention Scores

Achievement Level	Do Best	Self-Set	Teacher-Set	Control
High	101.75	111.50	108.50	103.25
Medium	84.75	95.00	81.25	91.50
Low	59.75	69.00	87.50	65.25
Treatment Means	82.083	91.833	92.417	86.667

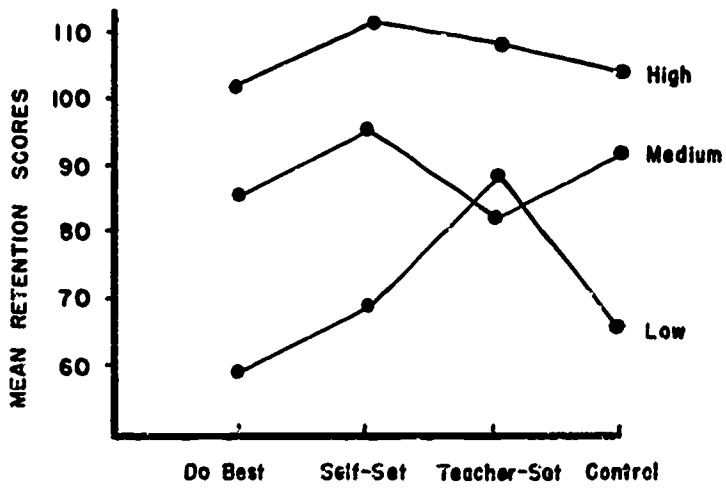

Figure 2. Mean retention scores over treatment groups as a function of achievement level.

The means for the planned comparisons for all achievement levels are presented in Table 9. The students with the conferences achieved a higher mean retention score than those without. The comparison between general goals and specific goals was statistically significant ($p < .10$), confirming in a classroom setting the results found by Locke and Bryan (1966a; 1967) in a laboratory setting.

Table 9

Comparison Means for Retention Scores for All Achievement Levels

Comparison 1	Conferences 88.778	No Conferences 86.667
Comparison 2	General Goals 82.083	Specific Goals 92.125
Comparison 3	Self-Set Goals 91.833	Teacher-Set Goals 92.417

ATTITUDE CHANGE

The attitude tests were scored by tallying the number of times each S selected arithmetic as the preferred activity. Change scores were determined by subtracting the posttest score from the pretest score for each S. The resulting range of possible scores for an individual was -2 to +2.

The attitude change scores were analyzed in an identical manner to the acquisition and retention scores with the addition that the interaction component was also broken down into the three comparisons as was the treatment effect. The summary of the ANOVA table is presented in Table 10. Significant F ratios were found for achievement level ($p < .10$), for the general- vs. specific-goal treatment comparison ($p < .10$), and for the achievement level by goal treatment comparison ($p < .05$).

Table 10

Analysis of Variance for Attitude Change Scores

Source	df	MS	F
Achievement Level	2	1.896	2.873*
Treatment Comparisons:			
1	1	.173	---
2	1	2.350	3.561*
3	1	.378	---
Interaction Comparisons:			
1	2	.716	1.085
2	2	3.430	5.197**
3	2	.874	1.324
Error	36	.660	
Total	47		

*$p < .10$
**$p < .05$

The mean attitude change scores for each achievement level are presented in Figure 3. It can be seen that the major source of variance is attributable to the high positive change in attitudes for the High achievement group under Self-Set and Teacher-Set goal conditions, and

the negative attitude change for the Medium achievement Ss in the Teacher-Set condition.

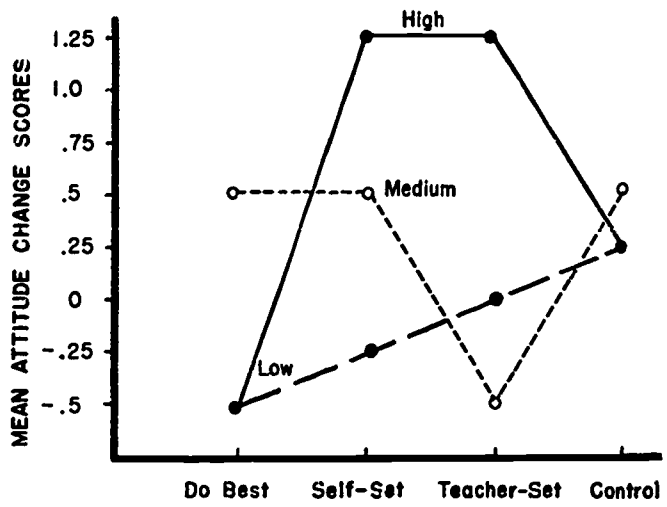

Figure 3. Mean attitude change scores over treatment groups as a function of achievement level.

The type of goal (Comparison 2) by achievement level interaction was found to be significant at the .05 level. The data are presented in Figure 4. The major source of variability is accounted for by the reversal of attitude change scores between High and Medium achievement groups for general and specific goals. High achievement Ss have high positive changes in attitude when working toward specific goals and negative attitude changes when working under general goal conditions. Medium achievement level Ss have positive attitude change in the general goal treatment and no attitude change in the specific goal treatments. Low achievement Ss have negative change scores under both kinds of treatment. The mean attitude change scores over all achievement levels were .375 for specific goals and -.167 for general goals.

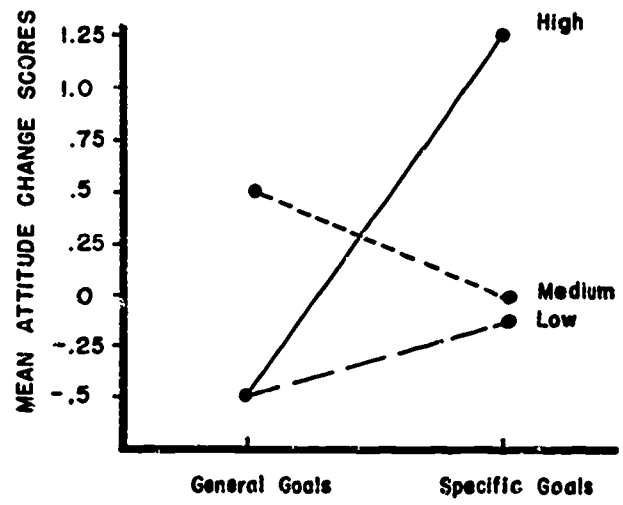

Figure 4. Interaction of type of goal x achievement level.

In Table 11 are presented the mean attitude change scores for each achievement by treatment group. The treatment means derived by summing across achievement levels are shown. as well as the achievement level means derived by summing across treatments. The achievement level means indicate results corresponding to Locke's (1966b; 1966c) relationship between success and liking. The High achievement Ss have attitudes changing in a positive direction; the Low achievement Ss change their attitudes in a negative direction. As expected also, the Ss with specific goals (Self-Set and Teacher-Set) have positive attitude changes while Ss with general goals have negative attitude changes (Locke & Bryan, 1967).

Table 11

Mean Attitude Change Scores

Achievement Level	Do Best	Self-Set	Teacher-Set	Control	Achievement Level Means
High	-.5	1.25	1.25	.25	.563
Medium	.5	.5	-.5	.5	.25
Low	-.5	-.25	0	.25	-.125
Treatment Means	-.167	.5	.25	.333	

V
DISCUSSION

Prior to a discussion of the results presented in the previous chapter, some comments are in order concerning the limitations and difficulties imposed on this study by the fact that it was conducted in a classroom situation. Most relevant is the difficulty of achieving stringent control.

In the present study three arithmetic classes were chosen from which to draw subjects. The teachers of these classes were required to introduce an instructional technique for six weeks which allowed for maximum individual mobility of students. This required considerable daily planning, constant regrouping of students within a class, and continuous scoring of tests and bookkeeping. To give an indication of the latter, the highest acquisition score for a single week was 50, and the average weekly acquisition scores per Ss across all treatments were: High 7.67; Medium 10.91; and Low 1.55. Furthermore, the acquisition score is an indication only of those tests on which a score of 100% correct was achieved. Students could try as many tests as they could handle and there was no restriction on the number of times any test could be attempted.

Thus the sheer mechanics of the operation were considerable, and there is no guarantee that procedures were followed in an identical manner across achievement levels. One obvious reason for this is that the teacher variable is confounded within the achievement level factor. Another contributing factor may be that there was no one-to-one equivalence ratio among the difficulty levels of the work for different classes or among the numbers of squares which could conceivably be filled per week for different classes.

An attempt was made to control the treatment applications by having one person hold all the conferences and thus administer all of the goal-setting procedures. In addition, the teacher who conducted the interviews was not one of the three arithmetic instructors involved. A further control was that the teachers did not know which treatment each student was getting.

Two features of the experimental organization which are suggested as imposing limitations on the results of the study are the relatively short time period (6 weeks) and the small number of Ss in each cell (N = 4). Both of these restrictions were necessitated by practical factors involved in such an experimental setting. For example, the size of the classes was inadequate to increase the N, and the constraints of the curriculum and teaching devices curtailed a longer session.

Two other factors which should be taken into account when judging the results have to do with the students themselves. Teacher reports indicated that all students enjoyed working with the individual progress folders and with the tests. Therefore the motivation induced by the instructional method alone may have been great enough to offset some of the effects of the conferences. This is suggested by the data in a few places where mean control scores are superior to a particular treatment mean. This is also suggested by the high positive attitude mean for the control group shown in Table 11. The other factor which may have played a significant role in offsetting treatment effects was student interaction. This is the type of situation which is difficult, if at all possible, to overcome in such a research setting. Teachers reported a comparing of goals among students from different treatments as well as a generally high level of competition to acquire as many squares as possible in the folders. Attempts to limit this included allowing the students to consult and bring their folders up to date only once a week and to reduce emphasis on interstudent comparisons, but the effectiveness of such techniques was limited.

The data for the acquisition scores yielded no statistically significant results beyond the expected effect of achievement level. The fact

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that the Medium group had the highest scores is interpreted mainly in terms of the teacher variable in this situation. The Medium group began work at the base level in the folder and thus were able to proceed very rapidly. On the other hand, the High group worked at their own difficulty level and students were given easier tests only on request during free time or after school. Consequently, the variability of scores among treatments within the High group is indicative of differential motivation of the Ss. The Low group began work also at the base level in the folders. However, instruction there proceeded much more slowly and opportunities for individual mobility were limited.

An examination of mean treatment and comparison scores yields information worth considering. Differential treatment effects appear to be operating at different achievement levels. Within the High and Low groups respectively, there was a definite superiority of performance in different treatment groups as indicated in Table 4. High-achievement students performed better when they were allowed to set their own standards for performance, whereas Low-achievement students had higher scores when a teacher set the goals for them. This finding is particularly noteworthy since it was replicated by the retention scores. One possible reason for this is the operation of a social incentive. High-achieving students with confidence in their scholastic ability may prefer some degree of independence, or at least may not feel the need to rely on external guidance. On the other hand, low-achieving students may rely more heavily on the teacher's help and judgment. Further, the latter students may be those in whom dependency needs and social reinforcement needs are particularly prevalent, and a desire to please the teacher may have caused the better performance under this condition.

The retention data is possibly more representative than the acquisition data of the actual experimental effects since it was not as directly affected by the within-class variations discussed earlier. Of particular interest is the close relationship between the retention and the attitude data presented in Table 8 and Table 11 respectively. Two unexpected results were indicated. One was the apparently negative reaction of the Medium level Ss to the Teacher-Set treatment. Surprisingly enough, the mean acquisition scores shown in Table 4 don't reflect this since there is little variation among the three treatment groups within this achievement level. With a sample size of four, it is difficult and dangerous to attempt to explain such a finding which is probably due to some unique personality interaction factor. The other unexpected result was the reversal of the Do Best and Control groups from the hypothesized ordering. As mentioned previously, the better-than-expected performance of the Control Ss is partially accounted for by their high interest in this type of arithmetic instruction and by interaction with the experimental Ss. The low retention scores and negative attitude change scores of the Do Best Ss may be the most significant finding of the study as far as the classroom teacher is concerned. Obviously, instruction to "do one's best" is ineffective, and even detrimental, to classroom learning.

In summary, the results of the present study are considered briefly in terms of the questions posed in Chapter 1.

QUESTION 1. What are the effects of individual conferences which combine social and cognitive motivation on the acquisition and retention of arithmetic concepts?

Mean acquisition and retention scores indicate that Ss who had weekly conferences performed better than Ss who had no conferences.

QUESTION 2. What are the effects of specific as compared to general goals on the acquisition and retention of arithmetic concepts?

Acquisition score means for all achievement levels combined show that Ss with specific goals acquired more concepts than Ss with general goals. The comparison between these two types of goals was significant ($p < .10$) for the retention data.

QUESTION 3. What are the effects of external teacher-set goals as compared to internal pupil-set goals on acquisition and retention of arithmetic concepts?

Mean scores indicate little difference between externally-set and internally-set goals across achievement levels. On the acquisition data, the level at which the goals are set appears to be more important than the goal-setting agent. The finding of differential effects for different achievement levels was discussed.

QUESTION 4. What are the effects of individual conferences which combine social and cognitive motivation, and of the goal comparisons, on attitude change scores?

The effects of the motivational techniques on attitude change scores are inconclusive. Possible factors contributing to this were discussed.

QUESTION 5. What is the relationship of level of achievement to acquisition, retention, and attitude change scores in arithmetic?

Significant effects due to achievement level were found for both acquisition and retention scores ($p < .01$). There was a significant interaction ($p < .05$) between type of goal (specific vs. general) and achievement level for attitude change scores. Mean attitude change scores were related to level of achievement: the High Ss had the highest change scores in a positive direction, followed by the Medium Ss. The Low Ss had negative change scores.

APPENDIX

Sample Section from the Individual Progress Folder

PLACE VALUE

Read and write numerals to 100.

Read and write numerals to 1000.

Read and write numerals to 10,000.

Count by:

2's to 100 5's to 150

10's to 300 3's to 99

4's to 100

Write numerals for sets of tens and ones

Regroup for addition and subtraction

Write numerals for sets of hundreds, tens, and ones

Write numerals for sets of thousands, hundreds, tens, and ones.

Explain tens and ones, for example, 12 means 1 ten and 2 ones.

Write numerals showing tens and ones.

Rename tens and ones.

Explain ones, tens, and hundreds, for example, that 245:

is 2 hundreds 4 tens 5 ones

is 200 + 40 + 5

Explain place value for example, that 2872 is:

2 thousands 8 hundreds 7 tens 2 ones

2000 + 800 + 70 + 2

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