

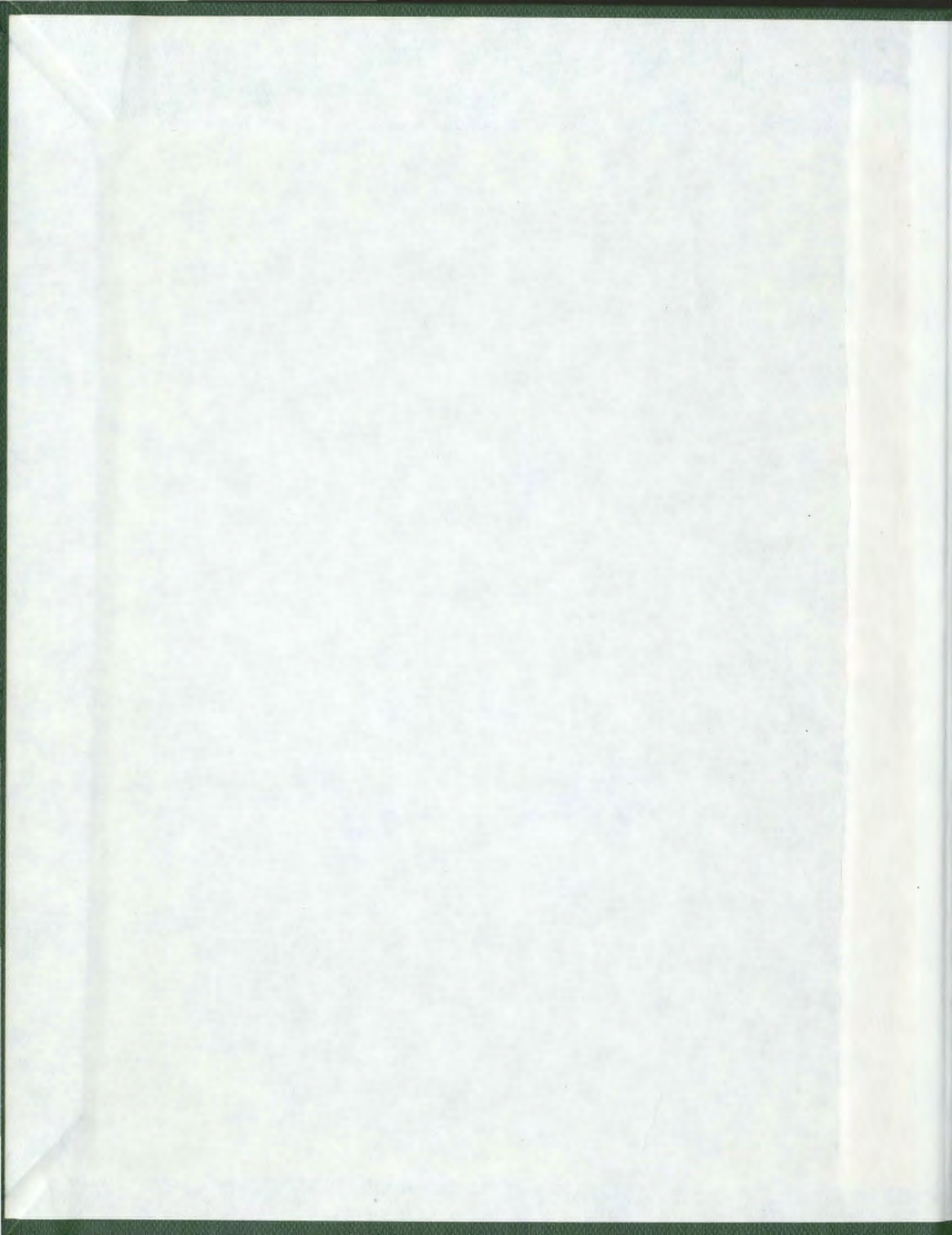
THE EFFECT OF MONETARY
INCENTIVE AND THE TIMING
OF SUCH INCENTIVE ON
TRANSFER OF LEARNING
TASKS

CENTRE FOR NEWFOUNDLAND STUDIES

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**THE EFFECT OF MONETARY INCENTIVE AND THE TIMING
OF SUCH INCENTIVE ON TRANSFER OF LEARNING TASKS**

by

Calvin David Wheeler, B.A. (Ed.), B.Sc.



**A Thesis Presented to
The Department of Educational Psychology
Memorial University of Newfoundland**

**In partial fulfillment
of the requirements for the degree
Master of Education**

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Newfoundland

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-ABSTRACT-

The purpose of this study was to investigate the effect of monetary incentive, offered at different times, on transfer of learning tasks. A total of 108 grade seven students in three rural Newfoundland Central High Schools were tested on a letter series reasoning test. Each of the three equal groups were sub-divided and given either high or low transfer practice sets. They were then re-examined. The control group was given a test-practice-retest session. The second group differed in that after the practice session they were told that they would receive 10¢ per gain score point. The third group was given this information prior to the practice session.

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The data were statistically analyzed by use of ANCOVA and Scheffé multiple comparisons. The results indicated significantly that the use of monetary incentive increases gain scores and that this is particularly true when the incentive is offered prior to practice. Also significant was the fact that IQ and sex had no great effect on performance. It was also shown that no significant interactive effect existed between the timing of the incentive and type of practice.

ACKNOWLEDGEMENTS

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Appreciation is extended to Dr. Cathy Penny for help with the original idea and to Dr. Terry Boak for his help in the statistical analysis of the data.

Without the cooperation of the administration, staff and students of the schools involved, this study might not have been completed.

To Nancy, my appreciation for her patience and drive when mine waned.

Pamela and John, daddy is coming home now.

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CHAPTER I

INTRODUCTION

This chapter provides the statement of purpose for this study and a rationale for its significance as a research problem. Also included are the definitions of the terms relevant to this study as well as the hypotheses resulting from the research questions raised.

Statement of Purpose

The purpose of this study was to investigate the effect of the timing of monetary incentive, the effect of the incentive itself, and the effect of the type of transfer of learning practice, on learning transfer.

As well, the researcher was concerned with the interactive effect that the timing of the incentive and the type of transfer of learning practice would have on learning transfer.

More specifically, this study dealt with the effect of monetary incentive, administered before or after practice, on the scores that seventh grade students obtained on a letter series reasoning task which involved high and low transfer of learning practice.

Significance of the Study

A review of the literature indicated that there has been a great deal of interest expressed regarding the effects

of extrinsic incentives on various aspects of learning and the effectiveness of such incentives. Studies covered such areas as classroom behavior (O'Leary & Becker, 1967), academic performance (Clark, Lachowicz & Wolf, 1968), and achievement on IQ tests (Edlund, 1972). O'Leary and Drakman (1971) have recently published a detailed review of the research as it relates to extrinsic incentives. While research on extrinsic incentives is extensive, questions raised by findings made by Ellis (1965) and Skanes, Sullivan, Rowe and Shannon (1974) justify research on the effect that such incentives have on transfer of learning. Transfer of learning is defined as a "change in performance on one task with change resulting from practice on another" (Ferguson, 1956, p. 124).

Ellis (1965) suggested that motivational variables likely influence transfer of learning to the extent that they influence learning in general. Further support for such research came from the study by Skanes et al. (1974). They suggested that motivation might be a factor in transfer of learning with lower IQ students in that they might become discouraged by the difficulty of the learning tasks.

A second question raised in the area of extrinsic incentives is the timing of the knowledge of the incentive. Limited information is available on the effect that varying the time of informing the subjects of the incentive has on learning. Therefore, one question to be answered is, "Can the effectiveness of the incentive, in particular, monetary incentive, be increased by varying the time at which the

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subject is informed of the incentive. This study provided the opportunity for the researcher to investigate the question of whether the timing of the monetary incentive would affect the achievement of the subjects. If subjects, who received knowledge of monetary incentive prior to practice, scored significantly higher than subjects who received the knowledge of the incentive after practice, then this might indicate that prior knowledge of the incentive had a positive effect on the practice session. It might suggest that the subjects with prior knowledge of the monetary incentive would try harder to learn during the practice session.

Also significant is that if monetary incentives were shown to be strong enough to result in increased transfer of learning by students who were not achieving to their full potential, then the fact that they increased their scores should be self-reinforcing. Further, it might demonstrate to teachers that the students' previous low achievement was not entirely due to inadequate academic potential. It should, as found in studies by Rosenthal and Jacobson (1968), have a positive influence on teachers' perceptions and expectations of the students.

This study provided an opportunity for the student to compete against himself. It also provided an extrinsic incentive that was judged to have significance for the student because of its ability to be used to purchase secondary reinforcers.

Definition of Terms

1. Gain Scores. This refers to the difference in number of correct answers on the post-test (Form B of the Letter Series Test) over the pre-test (Form A of the Letter Series Test).

2. Student. This refers to a boy or girl enrolled in the seventh grade in Central High Schools in the following communities: Campbellton, Twillingate and Virgin Arm, Newfoundland.

3. High Transfer of Learning (HTL) Practice. This refers to the practice condition in which the student completes items that are symbolically similar to items in the letter series test.

4. Low Transfer of Learning (LTL) Practice. This refers to the practice condition in which the student completes items that are symbolically different from items in the letter series test.

5. Treatment I (T_1). This refers to the treatment condition in which students are told, after the practice set, that they will receive a monetary incentive.

6. Treatment II (T_2). This refers to the treatment condition in which students are told, prior to the practice set, that they will receive a monetary incentive.

7. Control Group. This refers to the treatment condition in which students receive no knowledge of a monetary incentive.

8. Secondary Reinforcers. This refers to items that

a student may purchase from any monetary incentive obtained.

Hypotheses

Reference has been made to a number of questions regarding monetary incentive and its effect on transfer of learning. To answer these questions a number of hypotheses were formulated regarding the effect of monetary incentive and the timing of this incentive on transfer of learning.

Hypothesis I. The gain scores for all students receiving a monetary incentive are significantly greater than the gain scores for students not receiving a monetary incentive, irrespective of the type of practice.

Hypothesis II. There are significant gain scores on the transfer of learning task for all students receiving a monetary incentive regardless of the order in which the monetary incentive is presented and irrespective of the type of practice.

Hypothesis III. There are significantly greater gain scores on the transfer of learning task for all students in the high transfer of learning practice group than for those students in the low transfer of learning group regardless of whether or not they received a monetary incentive and irrespective of when the incentive was administered. More specifically:

- (a) Within the control group the students receiving high transfer of learning practice score signif-

icantly higher than students receiving low transfer of learning practice.

(b) Within the group receiving the monetary incentive after the practice, the students receiving high transfer of learning practice score significantly higher than students receiving low transfer of learning practice.

(c) Within the group receiving the monetary incentive prior to practice, the students receiving high transfer of learning practice score significantly higher than students receiving low transfer of learning practice.

Hypothesis IV. There are significantly greater gain scores for students in the high transfer of learning group who receive the monetary incentive prior to practice than for those students in the high transfer of learning group who receive the monetary incentive after practice.

Hypothesis V. There are significantly greater gain scores for students in the low transfer of learning group who receive the monetary incentive prior to the practice than for those students in the low transfer of learning group who receive the monetary incentive after practice.

Hypothesis VI. There is a significant interaction between the time at which the monetary incentive is administered and the type of practice. Students receiving

knowledge of the incentive prior to the low transfer of learning practice score higher than students receiving knowledge of the incentive after the high transfer of learning practice.

Summary

This chapter provided a statement of purpose for this study and its research significance. Furthermore, it presented an operational definition of the terms relevant to the study as well as the hypotheses to be considered. Subsequent chapters contain a review of related literature, the methodology of the study, statistical analysis of the research data as well as a discussion of the results. The concluding chapter outlines limitations of the study, recommendations to be made, and implications for further research and for education.

CHAPTER II

REVIEW OF LITERATURE

This chapter provides a review of the literature related to the study. The areas of concentration judged to be related were incentive systems and general use of incentives; token economies; effectiveness of incentives with standardized tests; material incentive systems and their value to teachers; and transfer of learning and motivation.

Incentive Systems and Their General Use

Bandura (1969) in writing on incentive systems, made the following statement:

Incentive theories of motivation assume that behavior is largely activated by anticipation of reinforcing consequences. From this point of view, motivation can be regulated through arrangement of incentive conditions and by means of satiation, deprivation and conditioning operations that affect the relative efficacy of various reinforcers at any given time. Thus, for example, in producing intellectual striving in children who display little interest in academic pursuits, one would arrange favorable conditions of reinforcement with respect to achievement behavior rather than attempt to create in some ill-defined way an achievement motive. Given that performance is extensively determined by reinforcement conditions, the selection and development of an effective incentive system is of central importance. (pp. 225-226)

A wide range of incentives have been used on a broad spectrum of behavior changes and support Bandura's statement (see O'Leary & Drakman, 1971). For example, Staats, Staats, Schutz and Wolf (1962) compared learning and attention span

of preschool children under two conditions: praise for correct responses; and tangible rewards such as candy, trinkets and tokens for such responses. Under the praise conditions the subjects worked for 15 - 20 minutes before becoming bored and restless. Under the second condition not only did they work enthusiastically for the 45 minute period, but took part in additional sessions.

Further support for the use of extrinsic incentives is found in the following studies. Levin and Simmons (1962) found food a better reinforcer than praise for hyperaggressive boys. Others (Slack, 1960; Martin & Power, 1967; Whitlock & Bushnell, 1967; Wolf, Giles & Hall, 1968) indicated that material or extrinsic incentives are essential, particularly during early phases of behavior change. Studies conducted with children (O'Leary, 1968), adolescents (Phillips, 1968), and adult schizophrenics (Ayllons & Azrin, 1964) showed that verbal reinforcement in the absence of material incentives was not so effective as when it was used in combination with material incentives.

Token Economy

O'Leary and Becker (1967) found that with emotionally disturbed children, the use of tokens reduced disruptive behavior from 76% to 10%. Birnbrauer, Wolf, Kidder and Tague (1965) used token reinforcement with 15 retarded children. They found improvement in accuracy and rate of study. Clark et al. (1968) found significant improvement in academic

behavior of special remedial classes. Tyler and Brown (1968) found significant changes in the academic behavior of delinquents. Staats and Butterfield (1965) showed that \$20.31 spent for token exchange items had significant results on a 14-year-old adolescent. The boy, in $4\frac{1}{2}$ months of training with token reinforcement went from an overall grade level of 2 years to an overall grade level of 4 years, 5 months.

Incentive and Standardized Tests

There is considerable evidence of the effect of incentives on standardized test performance. Quereshi (1960) demonstrated that monetary rewards produced a significant increase in performance on an intelligence test. Tuinman, Farr and Blanton (1972) found that when students were offered material rewards, their performance on the Nelson Reading Test increased significantly. Edlund (1972) worked with 5 to 7-year-old low-middle and low-class students. He found that by offering students a M&M candy for each correct point on an IQ test, they made a median gain of 12 points on Form M of the Stanford-Binet IQ test, over a control group.

Defense of Material Incentives and Their Value to Teachers

Many of the arguments against material incentives are based on the concept that subjects develop a dependence on such incentives. There is ample evidence that this is not necessarily true.

Dickenson (1974) investigated what happens when reinforcement is taken away. He found that students who had been reinforced with tokens during the sixth grade scored higher on the Metropolitan Achievement Test at the end of the eighth grade than those who had not been reinforced during sixth grade. O'Leary, Becker, Evans and Saudargas (1969) working with second grade students found that the use of tokens reduced the amount of disruptive behavior and increased academic performance. They also found that the token reinforcement program could be replaced with a variant of the program without an increase in disruptive behavior. Glynn (1970) working with ninth graders found similar support. He found improvement in performance with the use of tokens; at the same time he suggested that there was little evidence to justify the claim that children become dependent upon token reinforcement so as to be unable to perform without it.

Studies have been conducted that show the value of extrinsic incentives as an aid in teacher effectiveness. Chadwick and Day (1971), working with 8 to 12-year-old under-achieving minority students, provided points that could be exchanged for: lunch, store bought items or field trips. During the token reinforcement session, time at work, number of problems solved and number of problems correct increased significantly. During treatment II (social reinforcement) students maintained their improvement in number of problems solved and number of problems correct. Another significant finding of the study was the shift in teacher behavior from

social control responses to supportive and instructional responses during the reinforcement program.

Hewitt, Taylor and Artuso (1969) used tokens with 54 children having learning and behavior problems. They found significant changes in both learning and behavior for the students receiving tokens. They also found that the group that had the tokens removed after one semester continued to show significant improvement. They hypothesized that this was due to increased effectiveness of teachers as secondary reinforcers after association with success due to primary reinforcers. Also, competencies developed with tokens were in themselves reinforcing after the tokens were removed.

Learning Transfer, Pre-test and Motivation

Ferguson (1954, 1956) proposed that general intelligence is correlated with positive transfer of learning. This suggests that subjects with high scores on intelligence tests would be expected to profit more from practice on an intellectual task and should show greater improvement on a related task than low-scoring subjects.

Sullivan and Skanes (1971) and Skanes et al. (1974) tested that proposal. It was found that students scoring high on intelligence tests had higher transfer scores than low-scoring subjects of similar mental age, on a letter series reasoning task, following practice. Sullivan and Skanes (1971) also found that students with high intelligence scores performed better when a pre-test was given prior to the practice

session, while low-scoring students did best without the pre-test. A further study (Skanes et al., 1974) supported this earlier finding. For high Otis IQ subjects, the pre-test resulted in higher performance than no pre-test, the opposite was true for low IQ subjects. This is a modification of the findings of Campbell and Stanley (1973) who suggested that pre-test leads to improved performance on retest. Skanes et al. (1974) demonstrated that the effect of a pre-test was a function of the intelligence of the child. Samuels (1969) found that pre-tests with feedback resulted in greater retention of the material read. Hartley (1971) found that the pre-test had no appreciable effect if actual learning occurred, but that it facilitated performance when the task was difficult.

As cited earlier, Ellis (1965) suggested that motivation is a factor in transfer of learning. Sullivan and Skanes (1971) and Skanes et al. (1974) suggested that the cause of the pre-test effect might be motivational. Higher IQ subjects might have been stimulated by the difficulty of the pre-test, making them more attentive during practice and causing them to exert greater effort during the second test. Lower IQ subjects might have been discouraged by the difficulty and the apparent meaningless problems with which they were faced.

Summary

This chapter has reviewed the literature as it relates to the use of incentives in a variety of learning

situations. It has included support for the use of extrinsic incentives in such areas. It shows also that the question of when incentive should be used for best motivational effect has not been thoroughly answered.

CHAPTER III

METHODOLOGY

This chapter describes the procedures followed in conducting this research. It provides the location of the schools from which students were obtained, the method of selection of students, the testing instruments used as well as the procedure followed to test the hypotheses. As well, there is a discussion of the design of the study and the statistical procedures to be utilized in analyzing the research data.

Sample

The students were selected from the seventh grade classes in three Central High Schools in the Notre Dame Integrated School District. The schools had a number of common aspects. The grades taught in all three schools were grades 7 to 11 inclusive. In each school most students were bused to the school daily from surrounding communities. The school populations ranged from 250 to 300 students. All three schools were in rural settings. The economic base for each area was mainly that of fishing, farming and logging. As a result of random selection 34 students from Greenwood Central High School, Campbellton, 19 students from Twillingate Central High School, Twillingate, and 55 students from New World Island Central High School, Virgin Arm, participated in the study.

Intelligence Test

The Raven Progressive Matrices (Raven, 1938), with a 30-minute time limit, was administered to all students in the sample. The Raven Progressive Matrices was selected for several reasons. The test could be administered to a group and be hand scored by the tester. It is considered by Jensen (1970) to be culture-fair. It consists of problems that are graduated in such a manner that the solution of earlier problems can lead to success in later, more difficult items. The Raven does, in the belief of Horn (1968), measure the same type of intelligence, fluid intelligence, as does the type of series tests used in this research.

Learning Tests

The learning tests consisted of Form A and Form B of a letter series test. This instrument was developed by Sullivan and Skanes (1971) and was used by them with over 2000 students. The tests consisted of letter series similar to the Reasoning subtest of the Tests of Primary Mental Abilities (Thurstone, 1938). Each item of the 20-item test consisted of a series of letters which formed a logical sequence. They were of the form

D E F G H I J K

or AA BB CC DD EE

The students were required to reason out the sequence and to provide the next two letters in the series for each item, thus giving a maximum possible score of 40 (see Appendix A).

Practice Sets

Two forms of practice were used. The letter or high transfer of learning practice set was considered to have high transfer because the items to be completed by the students were letter series similar to those found in the learning tests. This practice set consisted of 40 items with the odd-numbered items (1, 3, 5 . . .) comprising number series (for example, 5 6 7 8 9) and the even-numbered items (2, 4, 6 . . .) comprising letter series equivalent to those found in the learning tests. The number or low transfer of learning practice set consisted of 40 items. This practice set was considered to have low transfer because the items that were to be completed by the students were number series. These items were similar to the test items only in relation to sequence and method of solution (for example, 2 4 6 8 10 as opposed to B D F H J). The odd-numbered items on both practice sets were identical, and the even-numbered items on the high transfer of learning practice set were equivalent to the even-numbered problems on the low transfer of learning practice set in terms of sequence and method of solution (see Appendix B).

Procedure

During February, 1975, the Raven Progressive Matrices was administered with a 30-minute time limit, to all seventh grade students in the three schools involved in the study. From this population of approximately 180 students, 120

students were randomly selected by drawing names from the total population. Because of absenteeism during the experiment, the sample was reduced to 108 subjects.

An equal number of students was assigned to each of the three treatment groups by alternately placing each name drawn in one of the three groups. Similarly, each treatment group was subdivided into equal size subgroups for high or low transfer of learning practice.

Controls (C). These students were given Form A of the learning test which they were to complete in a 10-minute period. The tester first gave several examples on the blackboard. This test was followed by a 5-minute break. The students then completed, over a 30-minute period, the practice sets. Individual students did either the high or low transfer of learning practice set depending on whether assignment had been to the high or low transfer of learning practice set subgroup. Following another 5-minute break, all students in the control group were given Form B of the learning test. This test was also of 10-minute duration. At no time were monetary incentives offered (see Appendix C).

Treatment I (T_1). These students were given Form A of the learning test which they were to complete in a 10-minute period. The tester first gave several examples on the blackboard. This test was followed by a 5-minute break. The students then completed, over a 30-minute period, the practice sets. Individual students did either the high or low transfer of learning practice set depending on whether

assignment had been to the high or low transfer of learning practice set subgroup. A second 5-minute break followed. During this time the students were told that they would receive 10¢ for each gain score point that they obtained. All students were then administered Form B of the learning test to be completed in 10 minutes (see Appendix C).

Treatment II (T_2). These students were given Form A of the learning test which they were to complete in a 10-minute period. The tester first gave several examples on the blackboard. This test was followed by a 5-minute break. During this break the students were told that they would receive 10¢ for each gain score point they obtained. The students then completed, over a 30-minute period, the practice sets. Individual students did either the high or low transfer of learning practice set depending on whether assignment had been to the high or low transfer of learning practice set subgroup. During the second 5-minute break the monetary reward was emphasized. All students were then administered Form B of the learning test to be completed in 10 minutes (see Appendix C).

Practice Session. The practice session was the same for all three treatments. Explanations were carefully given. The tester gave the solution for item one, explaining the principle involved. The students then wrote down the correct answers in the blanks provided. The students then attempted the second item on their own. This procedure was followed throughout the practice session. The tester solved and ex-

plained the odd-numbered item and the students wrote down the answers and then attempted the subsequent even-numbered item. The high transfer of learning practice set subgroup had to solve items that had letter sequences that corresponded to the number sequence in the item previously completed by the tester. The low transfer of learning practice set subgroup had to solve items that had number sequences that corresponded to the number sequence previously completed by the tester. Any questions asked by the students were answered (see Appendix C).

Testing Conditions. In each school the students were tested by the investigator assisted by two of the regular teachers of that particular school. Each treatment group was administered the tests in a separate classroom.

While it was the contention of the investigator that little variability would be attributed to experimenter effects, precautions were taken to eliminate as much as possible any such variability. Neither of the teachers was unfamiliar to the students tested, nor in the first year of teaching at the particular school. All testers were of the same sex. The investigator did not have the same treatment group in any two schools, that is, in one school he had the Controls, in a second the Treatment I group and in the third the Treatment II group. Then the two teachers of the particular school were given one each of the remaining two groups for testing purposes.

While such assignment of groups did not assure the investigator of receiving one-third of each treatment group, it did give him a segment that was relatively proportionate to the sample size from each school. This provided a common tester to a portion of each treatment group. To further control, each tester was provided with a written instruction sheet (see Appendix C). In each school, prior to testing, the investigator discussed the instruction sheet with the teachers involved to clarify any questions that might arise.

Observation of the length of time each group needed to complete the testing and conversation with the teachers after testing assured the investigator that all students worked under highly similar conditions.

All students were aware that this work was research for the university and not for any of their teachers. This controlled for any situations where subjects might desire to perform in a particular manner because of any particular pupil-teacher relationship that existed.

The testing time for each group was approximately 60 minutes. This being a one-session program with definite time limits, teachers would have little opportunity to operate under conditions other than those outlined in the common instruction sheet.

Design

The study used a 3 x 2 factor design. There were three levels of treatment and two levels of practice.

	Controls	Treatment I	Treatment II
HTL Practice			
LTL Practice			

Statistical Treatment of Data

The statistical methods used to analyze the data were the analysis of covariance (ANCOVA) and the Scheffé method of multiple comparisons (Roscoe, 1969). The ANCOVA was used because of its benefits in controlling any variables that might influence the criterion variable and because it enables the error variance in the analysis to be substantially reduced. The Scheffé method was used to make comparisons among the different cells to determine where any significance lay. The alternate hypotheses were tested for acceptance or rejection at the alpha .05 level of significance. The data were keypunched for the NYBMUL program (State University of New York at Buffalo Computing Centre, 1969). The computer program was run at the Newfoundland and Labrador Computer Services Limited.

Summary

This section has outlined in detail the procedure for the sample selection, the instruments used and the procedure for conducting this study. The design, statistical

procedures and the rationale for these procedures have been provided.

CHAPTER IV

RESULTS AND DISCUSSION

The chapter provides the statistical analysis of the results and considers them in relation to the hypothesis formulated in Chapter I on the effect of monetary incentive and the timing of such incentive on transfer of learning.

Descriptive Statistics

The observed combined means and standard deviations for pre-test, post-test, IQ, and sex are given in Table 1. Included also in Table 1 are the estimated combined means with the covariates: pre-test, IQ, and sex removed. The estimated combined means are the predicted scores that all students in a particular group would be expected to receive. Figure 1 provides the observed combined means for the pre-test and post-test and for the low and high practice. Figure 2 provides the estimated combined means, under the three treatments, for the post-test.

Tests of Hypotheses

To test the hypotheses that there were significant effects of treatment, type of practice and an interactive effect of these two independent variables, an analysis of covariance was used with post-test as the dependent variable and pre-test, IQ, and sex as independent variables. When

TABLE 1
Descriptive Statistics*

Variable,	HIGH									LOW								
	Controls			Treatment I			Treatment II			Controls			Treatment I			Treatment II		
	n	\bar{X}	SD	n	\bar{X}	SD	n	\bar{X}	SD	n	\bar{X}	SD	n	\bar{X}	SD	n	\bar{X}	SD
Observed																		
Post	18	11.06	7.32	18	15.39	7.24	18	18.56	8.38	18	12.22	7.20	18	13.00	6.07	18	15.50	8.62
Pre	18	5.17	6.30	18	6.39	5.10	18	7.17	5.46	18	6.72	5.02	18	6.78	4.05	18	5.44	5.09
IQ	18	94.78	12.84	18	95.72	10.71	18	94.00	8.54	18	95.83	11.03	18	91.72	9.30	18	90.94	10.38
Sex	18	1.56	.51	18	1.50	.51	18	1.72	.46	18	1.39	.50	18	1.61	.50	18	1.44	.51
Estimated																		
Post	12.05			15.10			17.20			11.81			12.60			16.96		

*Observed combined means, standard deviations, and estimated combined means for subjects in high and low practice sets and three treatment conditions.

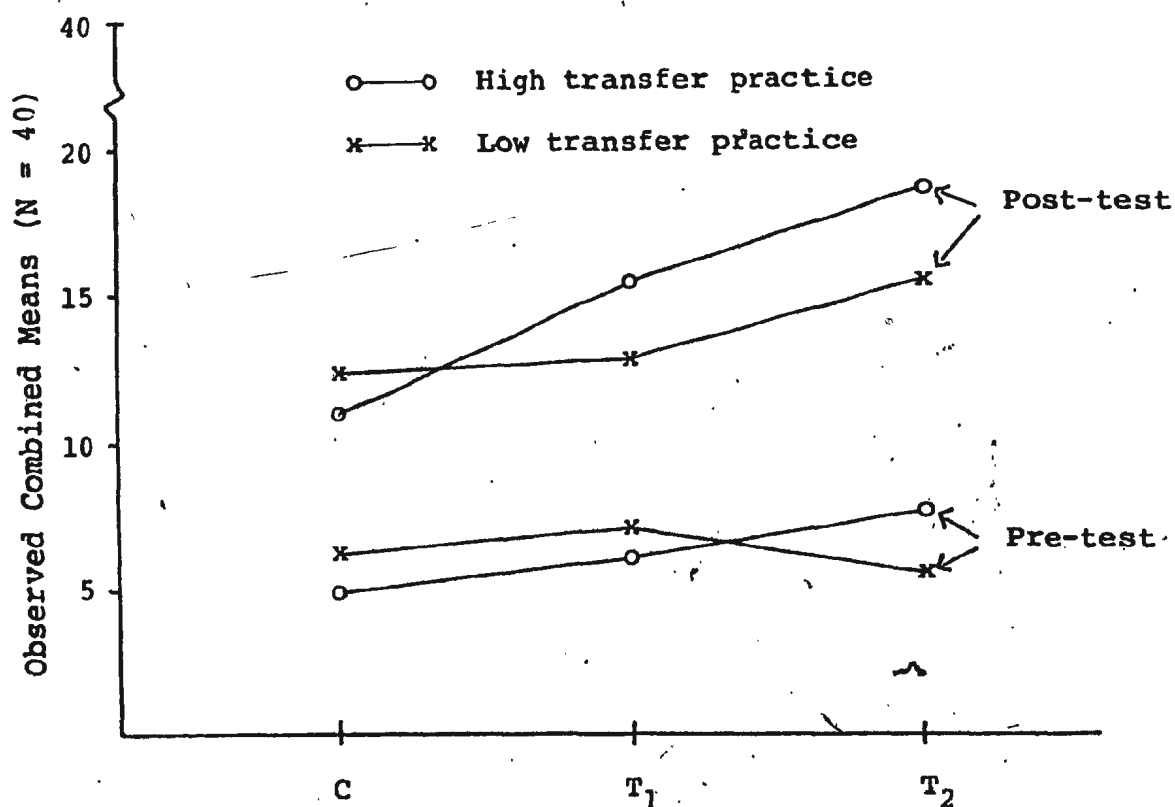


FIGURE 1. Observed Combined Means for Three Treatment Conditions and Two Types of Practice

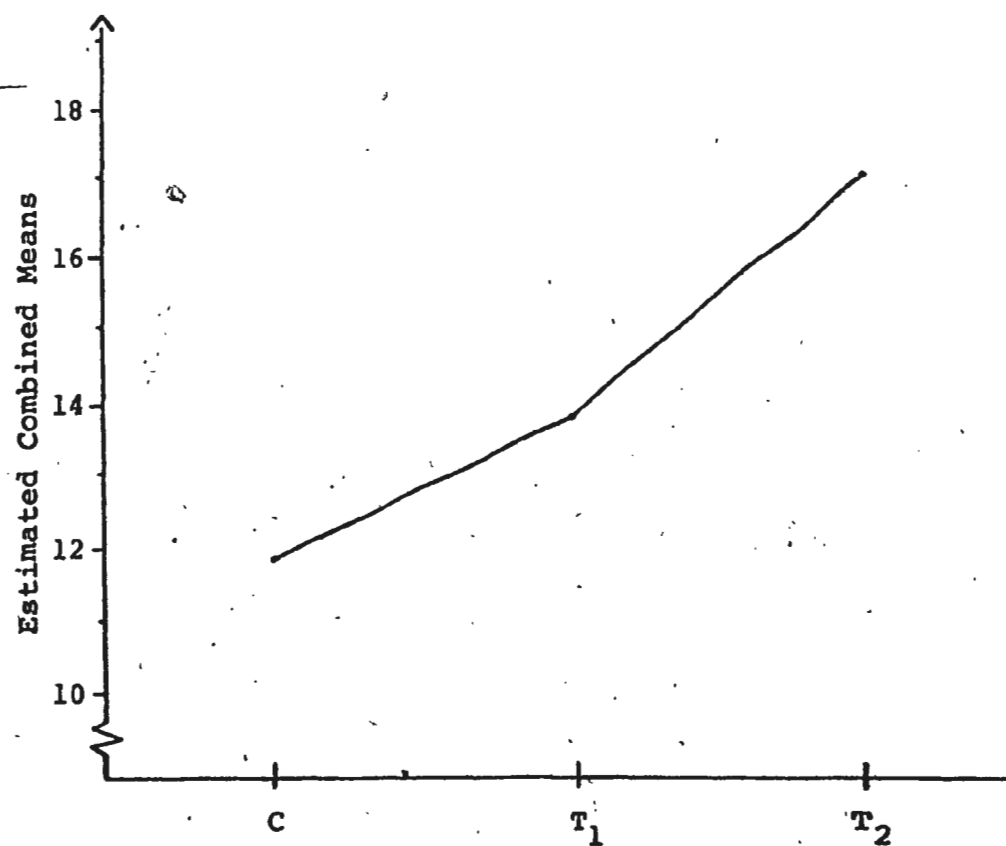


FIGURE 2. Estimated Combined Means for Post-test
Under the Three Treatments

the ANCOVA showed a level of significance, the Scheffé method of multiple comparison was used to determine which cells had significant differences. For both the ANCOVA and Scheffé the alpha .05 level of significance was used as the basis for acceptance or rejection of the hypothesis.

The first hypothesis was retained because statistically significant positive differences existed between the scores obtained by students who received a monetary incentive and those who did not receive a monetary incentive. The analysis of variance F ratio of 13.84 for Hypothesis I was significant at the alpha .0001 level of significance (see Table 2). Therefore, it was concluded that introduction of a monetary incentive had a positive effect on the scores in the letter series learning task.

The second hypothesis postulated that there would be significant gain scores regardless of the timing of the monetary incentive and irrespective of the type of practice. The Scheffé method of multiple comparison showed no significant difference at the alpha .05 level of significance between the Control group and Treatment I group. There was, however, a significant difference between the Control group and Treatment II group and between Treatment I group and Treatment II group at the alpha .01 level of significance (see Table 3). Thus it was concluded that the time of receiving knowledge of the monetary incentive affected significant changes in gain scores but the type of practice did not significantly affect these scores. The earlier the

TABLE 2
Analysis of Variance (3 covariates eliminated)*

Source	MS	df	F	Probability Level
Treatment (T)	237.65	2	13.84	p < .0001
Practice (P)	25.85	1	1.51	p < .2228
T x P	14.83	2	.864	p < .4249
Within Cells	17.17	99		

*The covariates pre-test, IQ and sex eliminated

TABLE 3

Scheffé Method of Multiple Comparisons

Comparison	F*
C, T ₁	1.932
C, T ₂	13.901**
T ₁ , T ₂	5.468**

$$*F = \frac{(\bar{X}_1 - \bar{X}_2)^2}{MSw(\frac{1}{n_1} + \frac{1}{n_2})(k - 1)} \quad \text{with } df = k - 1, N - k$$

**p < .01

knowledge of monetary incentive is given the greater the gain scores.

The third hypothesis that a significant difference existed between the scores for students in the high transfer of learning practice set over those in the low transfer of learning practice set was rejected. The analysis of variance F ratio of 1.51 for Hypothesis III was not significant at the alpha .05 level of significance (see Table 2). Therefore, it was concluded that, while the change was in the hypothesized direction, the type of practice had no significant effect on the scores in the letter series learning task.

Because of the lack of significant effect of practice, Hypothesis IV and Hypothesis V were considered as one hypothesis. Thus, the hypothesis, that scores for the students receiving knowledge of the monetary incentive prior to practice would be significantly greater than scores for students receiving this knowledge after practice, was retained. The Scheffé method of multiple comparison showed a significant difference in the hypothesized direction at the alpha .01 level of significance between Treatment I group and Treatment II group (see Table 3).

The sixth hypothesis postulated that there would be a significant interaction between the time at which students were aware of the monetary incentive and the type of practice. This hypothesis was rejected. The analysis of variance F ratio of .864 was not significant at the alpha

.05 level of significance (see Table 2).

Discussion of Results

The results outlined in the previous section lend further support to the effectiveness of material incentives as another tool in the classroom.

Regression analysis of the data provided the following information. The pre-test ($df = 1$, 183.92 , $p < .0001$) accounted for 64.55% of the variance (see Table 4). This is understandable in that both the pre-test and post-test were highly similar in design and content. The variable Raven IQ ($df = 1$, $F = 12.36$, $p < .0007$) accounted for only 3.90% of the variance (see Table 4). The variable sex ($df = 1$, $F = 6.96$, $p < .0097$) accounted for only 2.07% of the variance (see Table 4). This would indicate that both IQ and sex differences had significant effect on achievement on the task used in this study, even though the percentages of variance were considerably lower than for pre-test.

The results of the study would indicate that the type of practice has no significant effect on the learning task. Rather, the most significant factor to be considered in instituting monetary incentive programs is the timing of the incentive.

Pre-test. As mentioned, pre-test accounted for approximately 65% of the variance in results. This would indicate that the pre-tests are a significant factor in learning in a monetary incentive program.

TABLE 4

Regression Analysis of the Data

Variable	Variance	df	F	Probability Level
Pre-test	64.55%	1	183.92	$p < .0001$
Raven IQ	3.90%	1	12.36	$p < .0007$
Sex	2.07%	1	6.96	$p < .0097$

Treatment. These results provide significant indication that in such a model monetary incentive is effective. Monetary incentive after practice, while not significant, was in the hypothesized direction. The significance of the findings is not so much that monetary incentives effect increased learning, but rather the significant difference in the effect of the timing of the incentive.

Many studies in behavior modification have been concerned with performance change. Generally, no attempt is made to delineate between what portion of the change was due directly to the effect of the incentive in causing subjects to show a greater performance output and how much of the change was due to actual learning taking place.

The results of this study indicated that performance in itself need not change significantly when a monetary incentive is provided. It would appear that if we are to expect an improvement in learning tasks, then it is essential that we provide the incentive early in the students' learning experiences.

One possible reason why the group receiving the monetary incentive after practice did not show significant change might have been the difficulty of the task. They might have been highly motivated by the money, but found the task too difficult. This probably often happens in school in that a student would keenly desire to pass an examination but not have sufficient knowledge. If this were the case,

and with the results indicating that monetary incentive prior to practice is effective, it would appear that motivation to learn and perform must be instilled early in the child's introduction to new subject matter.

Practice. The results indicated that the type of practice had no significant effect on the scores obtained by the students. It can only be postulated from the present study why type of practice was not significant. The most significant aspect is that monetary incentive paired with either high or low transfer of learning practice results in significant increase in scores on learning tasks.

Interaction

There was no significant interaction between type of practice and the timing of the monetary incentive. This lends further support to the concept that the important aspect of incentives is not so much the type and difficulty of material to be learned but whether the student is motivated when this material is presented.

Summary

It is apparent from the results that monetary incentive has a significant effect on learning transfer. Particularly significant is the timing of this incentive, with incentive given prior to practice being important. The type of practice had no significant effect nor was there an interactive effect between treatment and practice.

CHAPTER V

LIMITATIONS, RECOMMENDATIONS

IMPLICATIONS AND SUMMARY

This chapter outlines the major limitations of the study, the recommendations to be made, the implications for further research and summarizes the significant findings.

Limitations and Recommendations

1. The subjects used in the study were students from only three central high schools. Because of the similarity of the rural settings, little social class distinction was obvious. As a result one must be careful in generalizing to students of upper or lower-class extremes. No attempt was made to control for social class because of the sample size and lack of obvious social class distinctions in rural Newfoundland communities. It is recommended that future research use a larger, broader population and investigate the effects, if any, of social class on incentive systems.

2. A second limitation of the study was the time when the experiment was conducted. While the IQ testing was done in February, the data for the actual study was not collected until early June. This was very close to year-end school examinations. This could have had one of several effects. Students might have been more motivated as a result of examination pressure. A second possible effect might be

the opposite. Students might have been more concerned with preparation for examinations. Future research, should if possible, take this factor into consideration and schedule data collection in mid-year or mid-semester.

3. While it is the investigator's belief that '10¢ per point' was significant to all students in the sample, a number of researchers (O'Leary & Drakman, 1971) have raised the question of the relevance of a particular type of material incentive to all students. If research is to be conducted on a more diverse population, it is recommended that the relevance of the particular incentive used be tested. It might be necessary to use several types of incentives to be effective with all subjects.

Implications

1. The use of monetary incentives in the school setting could have beneficial results for students who are not achieving to their full potential.

2. The use of monetary incentives in addition to helping a student perform better, aids, if given early, the student in learning. This is particularly valuable for students who have developed a low self-concept regarding their ability to succeed with new work.

Summary

In spite of the limitations and recommendations the study accomplished its initial task. That was to

investigate the effect of monetary incentive and particularly the timing of this incentive on transfer of learning tasks. It was found that such incentive increases learning; more particularly, to get best results the incentive system should be introduced early in the learning experience.

In conclusion, it appears that monetary incentive systems can be introduced relatively easily into school systems with positive results.

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APPENDICES

APPENDIX A

LETTER SERIES TEST

FORM A

NAME: _____

- | | | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. | A | T | U | B | U | V | C | V | W | D | _____ | _____ | | | | | |
| 2. | E | T | E | F | S | F | G | R | G | H | Q | H | I | _____ | _____ | | |
| 3. | H | I | J | G | H | I | J | F | G | H | I | J | _____ | _____ | | | |
| 4. | V | X | Z | B | D | F | H | _____ | _____ | | | | | | | | |
| 5. | A | M | N | C | N | O | E | O | P | G | P | Q | _____ | _____ | | | |
| 6. | E | F | E | F | S | T | G | H | G | H | S | T | _____ | _____ | | | |
| 7. | C | D | F | G | I | J | L | M | O | P | _____ | _____ | | | | | |
| 8. | A | B | D | G | K | P | _____ | _____ | | | | | | | | | |
| 9. | D | E | E | F | F | F | G | G | G | _____ | _____ | | | | | | |
| 10. | X | Y | Z | X | X | Y | Z | Y | X | Y | Z | _____ | _____ | | | | |
| 11. | P | A | O | P | A | N | O | P | A | M | N | O | P | A | _____ | _____ | |
| 12. | F | E | D | C | B | A | E | D | C | B | A | D | C | B | A | _____ | _____ |
| 13. | L | M | O | R | V | Z | C | _____ | _____ | | | | | | | | |
| 14. | T | T | T | T | T | S | S | S | S | R | R | R | Q | _____ | _____ | | |
| 15. | G | H | I | R | S | T | J | K | L | R | S | T | M | N | O | _____ | _____ |
| 16. | A | X | A | B | X | A | B | C | X | A | B | C | D | X | _____ | _____ | |
| 17. | L | M | N | N | M | L | O | P | Q | Q | P | O | R | S | T | _____ | _____ |
| 18. | W | X | V | W | X | U | V | W | X | _____ | _____ | | | | | | |
| 19. | D | E | F | D | G | H | I | G | J | K | L | M | N | O | _____ | _____ | |
| 20. | T | R | P | P | N | L | J | J | H | _____ | _____ | | | | | | |

LETTER SERIES TEST

FORM B

NAME : _____

- | | | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. | G | A | B | H | B | C | I | C | D | J | _____ | _____ | | | | | |
| 2. | C | Q | C | D | P | D | E | O | E | F | N | F | G | _____ | _____ | | |
| 3. | R | S | T | Q | R | S | T | P | Q | R | S | T | _____ | _____ | | | |
| 4. | R | T | V | X | Z | B | D | _____ | _____ | | | | | | | | |
| 5. | H | A | B | J | B | C | L | C | D | N | D | E | _____ | _____ | | | |
| 6. | A | B | A | B | X | Y | C | D | C | D | X | Y | _____ | _____ | | | |
| 7. | G | H | J | K | M | N | P | Q | S | T | _____ | _____ | | | | | |
| 8. | B | C | E | H | L | Q | _____ | _____ | | | | | | | | | |
| 9. | P | Q | Q | R | R | R | S | S | S | _____ | _____ | | | | | | |
| 10. | A | B | C | A | A | B | C | B | A | B | C | _____ | _____ | | | | |
| 11. | H | Z | G | H | Z | F | G | H | Z | E | F | G | H | Z | _____ | _____ | |
| 12. | Z | Y | X | W | V | U | Y | X | W | V | U | X | W | V | U | _____ | _____ |
| 13. | Z | A | C | F | J | N | Q | _____ | _____ | | | | | | | | |
| 14. | L | L | L | L | L | K | K | K | K | J | J | J | I | _____ | _____ | | |
| 15. | R | S | T | C | D | E | U | V | W | C | D | E | X | Y | Z | _____ | _____ |
| 16. | R | Z | R | S | Z | R | S | T | Z | R | S | T | U | Z | _____ | _____ | |
| 17. | D | E | F | F | E | D | G | H | I | I | H | G | J | K | L | _____ | _____ |
| 18. | N | O | M | N | O | L | M | N | O | _____ | _____ | | | | | | |
| 19. | L | M | N | L | O | P | Q | O | R | S | T | R | U | V | W | _____ | _____ |
| 20. | S | Q | O | O | M | K | I | I | G | _____ | _____ | | | | | | |

APPENDIX B

HIGH TRANSFER OF LEARNING PRACTICE SET

NAME: _____

- | | | | | | | | | | |
|-----|----|----|----|---|---|----|----|----|----|
| A. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| B. | 9 | 8 | 7 | 6 | 5 | 4 | | | |
| | | | | | | | | | |
| 1. | 1 | 3 | 5 | 7 | 9 | 11 | | | |
| 2. | A | C | E | G | I | K | | | |
| 3. | 14 | 12 | 10 | 8 | 6 | | | | |
| 4. | Z | X | V | T | R | | | | |
| 5. | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 6 | 7 |
| 6. | A | B | B | C | D | D | E | F | G |
| 7. | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 6 | 7 |
| 8. | A | B | C | C | D | E | F | F | G |
| 9. | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 |
| 10. | A | B | B | C | C | C | D | D | D |
| 11. | 9 | 8 | 8 | 7 | 7 | 7 | 6 | 6 | 6 |
| 12. | T | S | S | R | R | R | Q | Q | Q |
| 13. | 1 | 2 | 4 | 5 | 7 | 8 | 10 | 11 | 13 |
| 14. | A | B | D | E | G | H | J | K | M |
| 15. | 1 | 2 | 3 | 5 | 6 | 7 | 9 | 10 | 11 |
| 16. | A | B | C | E | F | G | I | J | K |
| 17. | 7 | 8 | 9 | 6 | 7 | 8 | 9 | 5 | 6 |
| 18. | X | Y | Z | W | X | Y | Z | V | W |
| 19. | 1 | 9 | 2 | 1 | 8 | 2 | 1 | 7 | 2 |
| 20. | A | Y | B | A | X | B | A | W | B |

(2)

21.	1	100	2	100	3	100	4	100		
22.	A	X	B	X	C	X	D	X		
23.	1	101	2	102	3	103	4	104		
24.	A	M	B	N	C	O	D	P		
25.	4	5	1	6	7	1	8	9	1	10
26.	A	B	X	C	D	X	E	F	X	G
27.	1	2	3	3	2	1	4	5	6	6
									5	4
									7	8
										9
28.	A	B	C	C	B	A	D	E	F	F
									E	D
									G	H
										I
29.	1	2	1	3	4	3	5	6	5	7
										8
30.	A	B	A	C	D	C	E	F	E	G
										H
31.	1	2	3	1	4	5	6	4	7	8
										9
32.	A	B	C	A	D	E	F	D	G	H
										I
33.	1	100	1	2	100	1	2	3	100	1
										2
										3
										4
										100
34.	A	X	A	B	X	A	B	C	X	A
										B
										C
										D
										X
35.	9	50	8	9	50	7	8	9	50	6
										7
										8
										9
										50
36.	F	Y	E	F	Y	D	E	F	Y	C
										D
										E
										F
										Y
37.	20	1	19	2	18	3	17	4	16	5
38.	Z	A	Y	B	X	C	W	D	V	E
39.	90	1	85	3	80	5	75	7	70	
40.	Y	A	X	C	W	E	V	G	U	

LOW TRANSFER OF LEARNING PRACTICE SET

NAME: _____

A. 1 2 3 4 5 6 7

B. 9 8 7 6 5 4

1. 1 3 5 7 9 11

2. 2 4 6 8 10 12

3. 14 12 10 8 6

4. 15 13 11 9 7

5. 1 2 2 3 4 4 5 6 6 7

6. 1 2 2 3 3 4 5 5 6 6 7 8 8

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

8. 1 2 3 4 4 5 6 7 8 8 9 10 11

9. 1 2 2 3 3 3 4 4 4 4 5 5 5 5

10. 5 6 6 7 7 7 8 8 8 8 9 9 9 9

11. 9 8 8 7 7 7 6 6 6 6

12. 8 7 7 6 6 6 5 5 5 5

13. 1 2 4 5 7 8 10 11 13 14

14. 5 6 8 9 11 12 14 15 17 18

15. 1 2 3 5 6 7 9 10 11 13 14

16. 6 7 8 10 11 12 14 15 16 18 19

17. 7 8 9 6 7 8 9 5 6 7 8 9

18. 4 5 6 3 4 5 6 2 3 4 5 6

19. 1 9 2 1 8 2 1 7 2 1 6 2

20. 1 8 3 1 7 3 1 6 3 1 5 3

(2)

21.	1	100	2	100	3	100	4	100							
22.	1	50	2	50	3	50	4	50							
23.	1	101	2	102	3	103	4	104							
24.	1	51	2	52	3	53	4	54							
25.	4	5	1	6	7	1	8	9	1	10					
26.	7	8	2	9	10	2	11	12	2	13					
27.	1	2	3	3	2	1	4	5	6	6	5	4	7	8	9
28.	3	2	1	1	2	3	6	5	4	4	5	6	9	8	7
29.	1	2	1	3	4	3	5	6	5	7	8				
30.	4	5	4	6	7	6	8	9	8	10	11				
31.	1	2	3	1	4	5	6	4	7	8	9				
32.	3	4	5	3	6	7	8	6	9	10	11				
33.	1	100	1	2	100	1	2	3	100	1	2	3	4	100	
34.	5	100	5	6	100	5	6	7	100	5	6	7	8	100	
35.	9	50	8	9	50	7	8	9	50	6	7	8	9	50	
36.	9	100	8	9	100	7	8	9	100	6	7	8	9	50	
37.	20	1	19	2	18	3	17	4	16	5					
38.	100	1	95	2	90	3	85	4	80	5					
39.	90	1	85	3	80	5	75	7	70						
40.	20	2	19	4	18	6	17	8	16						

APPENDIX C

EXPERIMENTER'S INSTRUCTIONS

(Aloud) Each of the problems in this test contains letters which are arranged in a certain order. You have to find out what the order is and print the two letters that come next on the right.

For example:

1. J K L M N O P Q ____

These letters are arranged in the same order that we find in the alphabet. The next letter is the letter that comes after Q which is R and the letter which comes after R is S. Print R S in the blank spaces to the right for example 1.

Now do example 2. Print the two letters that come next.

2. I H G F E D C ____

These letters are in the same order as the alphabet except that they are going backwards. The next letters are B and A, so you should have printed B and A in the blank spaces.

Now do the next two examples.

3. X Y Z A B C D E ____

4. A A B B C C D D ____

Example 3 is almost the same as example 1 except that this time we started at X and when we reached Z we went on to A. The letters are still in the same order as the alphabet, so the correct answer is F G.

Example 4 is a little different. The letters are still in order but each letter is printed twice. E should be printed twice as well. The correct answer is E E.

There are 20 problems in the test. You should put a letter in each blank space on the right. You will have 10 minutes to finish. You may not be able to answer all of them but do the best you can. Do not spent too much time on any one question but be careful not to go so fast that you make mistakes. Make sure that you put one letter in each blank space. No questions about the test will be answered after you begin. Are these any questions now?

DO NOT TURN THE PAGE
UNTIL YOU ARE TOLD

After 10 minutes take 5 minute break (all treatments).

Treatment II only. Explain incentive. (Aloud)
I want to tell you now that you are to be rewarded for any gains that you make on Form B of the test over Form A. You will be given 10¢ for each point that you increase your score of Test B over Test A. For example, if you had 10 correct on Test A and get 15 correct on Test B, you will receive 50¢. Remember, each blank counts as one point. That means there are 40 points altogether on the test. Remember that you get 10¢ for each point that you increase your own score.

All treatments. At end of 5 minutes do the practice set.

(Aloud) Let us look at our practice sets. Some of you have even-numbered examples that are number series, the others have even-numbered examples that are letter series.

I will be doing the odd-numbered examples and will explain how each answer is found; you will write the given answers on your sheets. After I do one odd-numbered example, you will try the next example which is an even-numbered example.

First let us do examples A and B. Example A is our counting numbers from 1 to 7 in order, so the next two are 8 and 9. Put 8 9 in the blanks. Example B has the counting numbers starting at 9 written in reverse order; the next two after 4 are 3 and 2. Put 3 2 in the blanks.

Let us now do number 1. The odd numbers from 1 to 11 are shown, therefore the next two numbers are 13, 15. Write 13 15 in the blanks. Now you do number 2, put the correct letters or numbers in the blanks.

The experimenter continues to answer and explain the odd-numbered examples while the students attempt the even-numbered examples. When finished: (Aloud) Stop.

We will now take a 5 minute break.

Treatment I only. Give instructions on incentive system as per treatment II. After 5 minutes, all treatments: (Aloud) We will now do Form B of the test. This test is to be done as Form A. You have 10 minutes. Start. After 10 minutes: (Aloud) Stop.



