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Lariene Moffett Treat

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DIFFERENTIATION OF REINFORCEMENT AT SIXTH GRADE LEVEL

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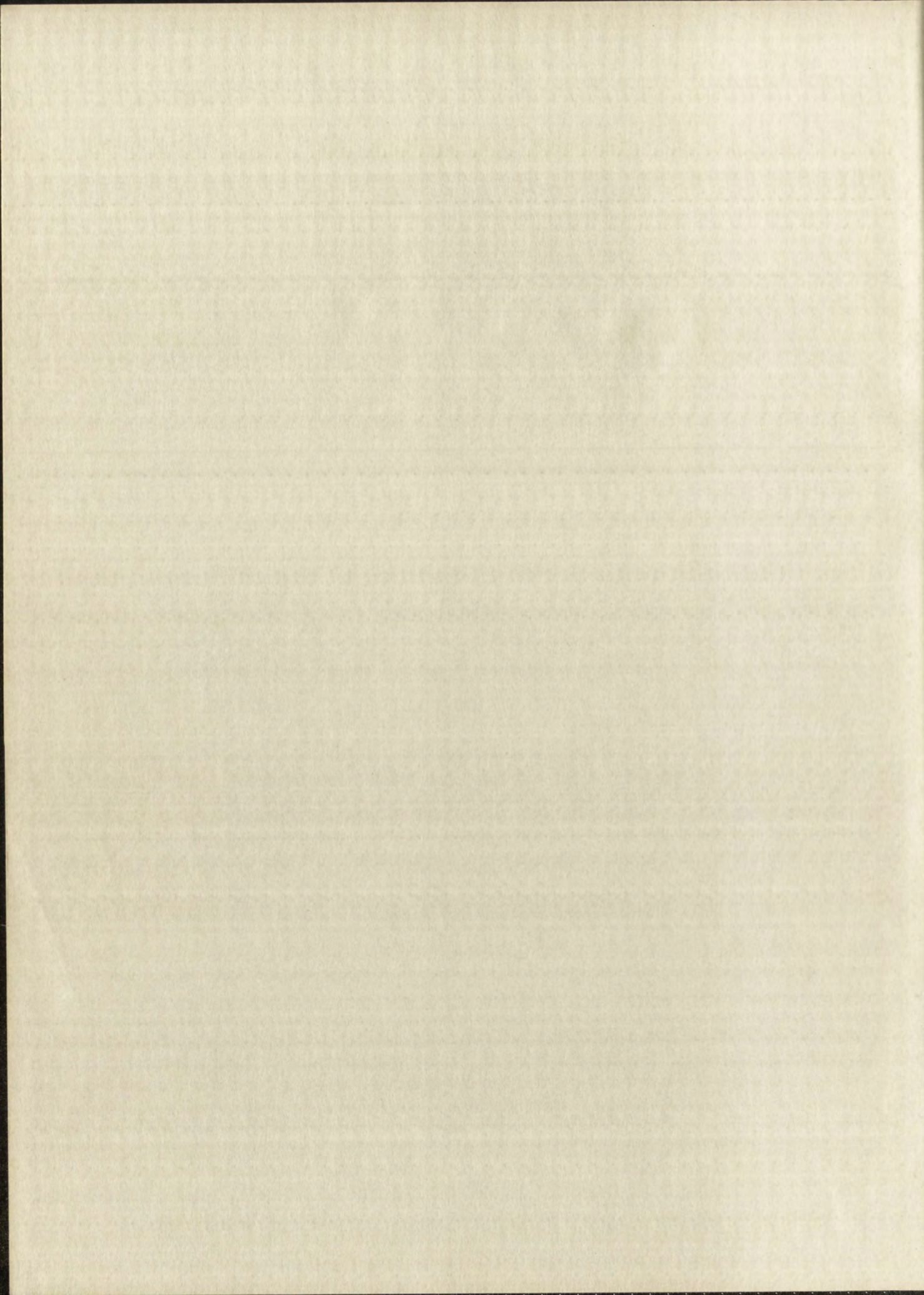
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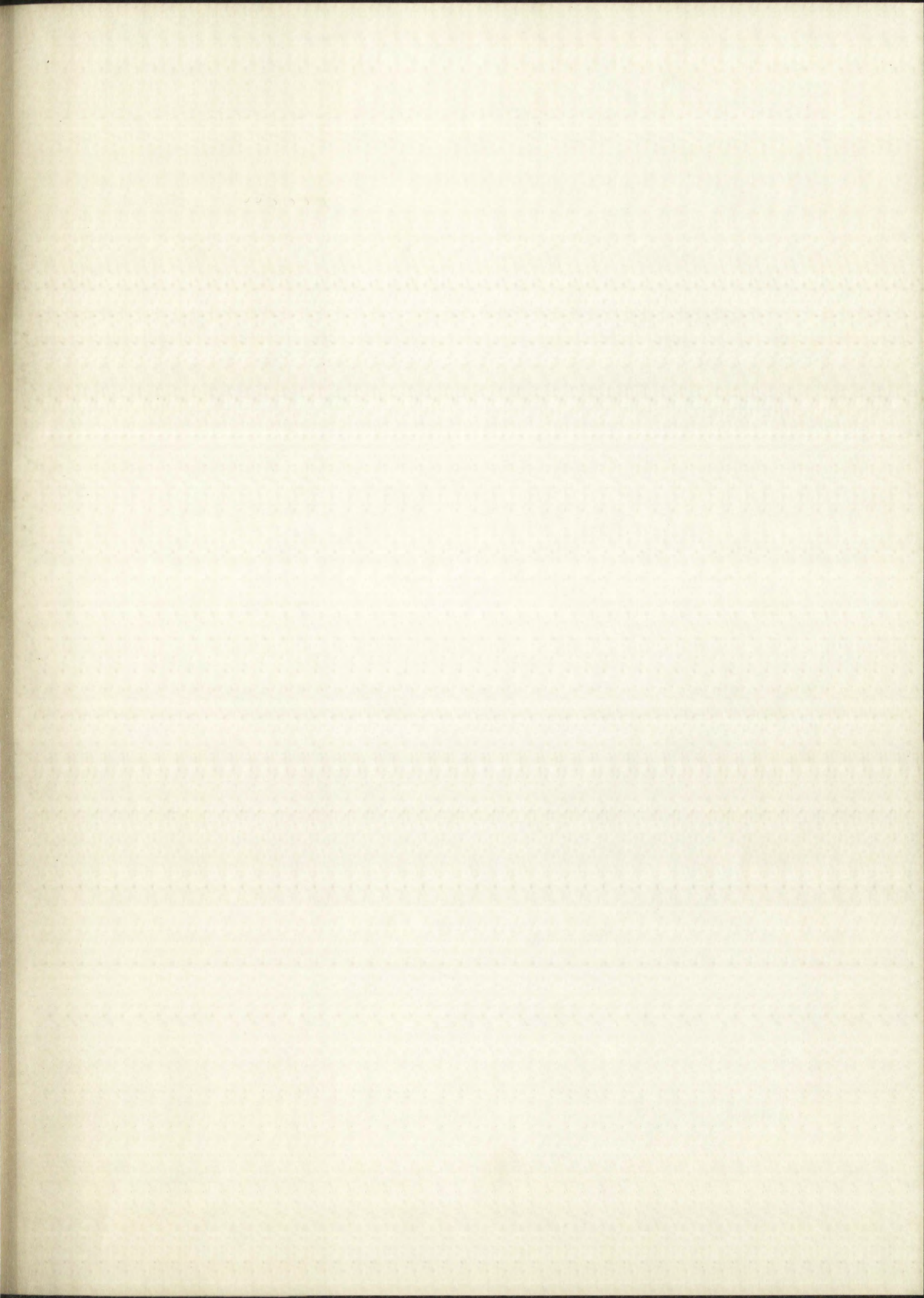
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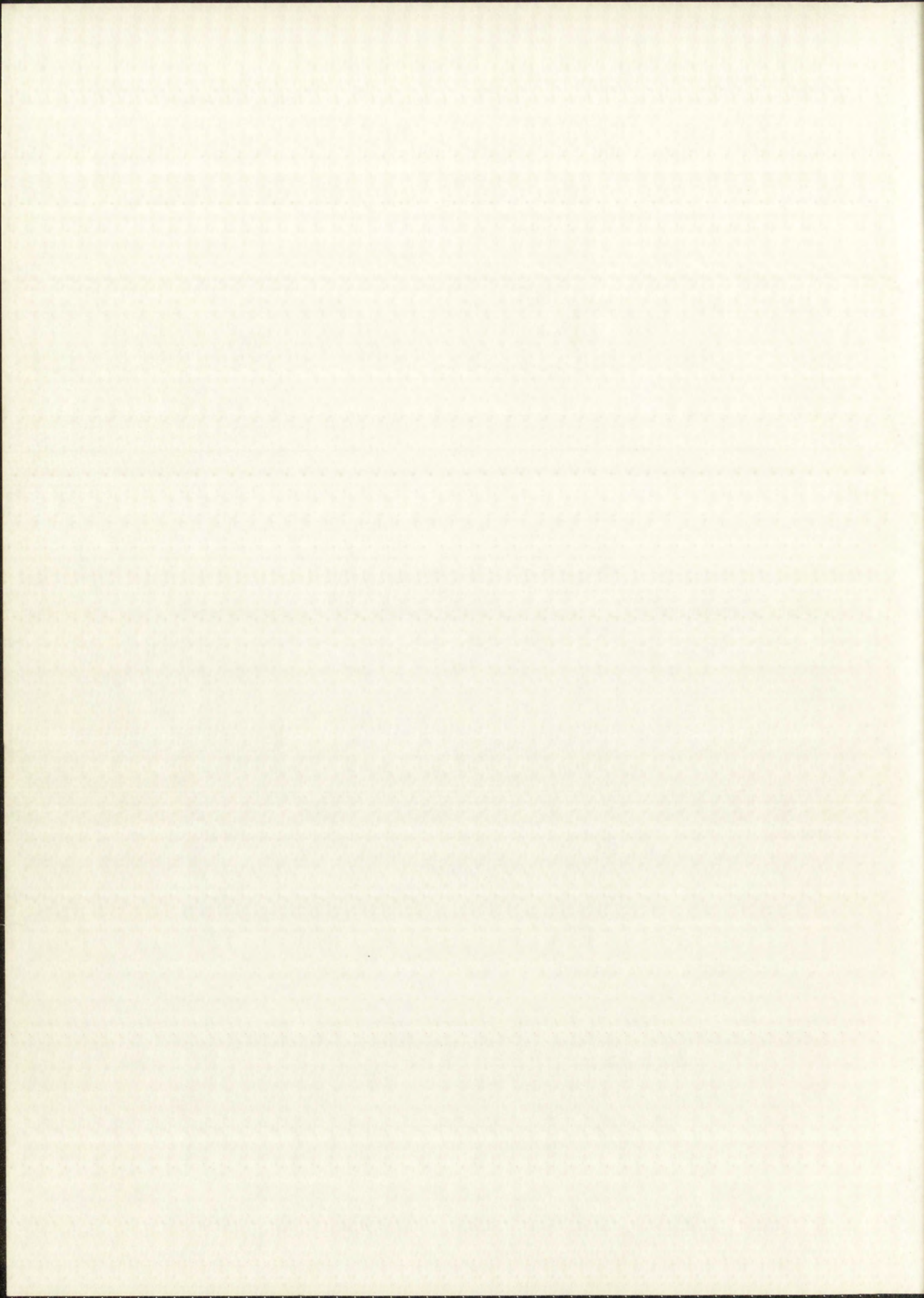
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GAYLORD

PRINTED IN U.S.A.







ACQUISITION REPORT

1. Author _____

2. Title _____

3. Editor _____

4. Publisher _____

5. Place of publication _____

6. Date of publication _____

7. Number of pages _____

8. Number of volumes _____

9. Price _____

10. Notes _____

11. Reviewed by _____

12. Reviewed on _____

13. Reviewed at _____

14. Reviewed by _____

15. Reviewed on _____

16. Reviewed at _____

17. Reviewed by _____

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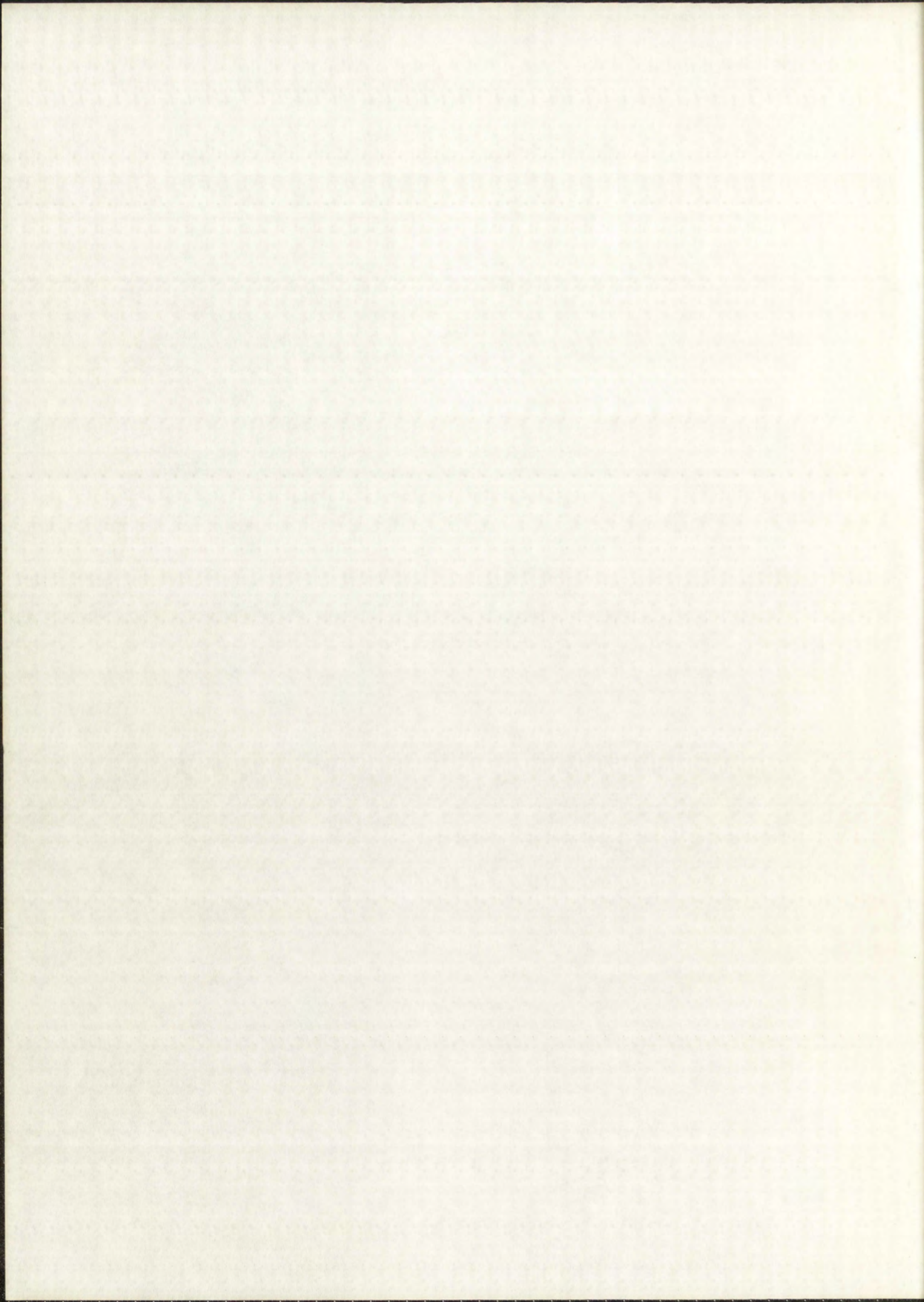
42. Reviewed on _____

43. Reviewed at _____

44. Reviewed by _____

45. Reviewed on _____

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AN OBSERVATIONAL STUDY OF DIFFERENTIATION
OF REINFORCEMENT AT THE SIXTH GRADE LEVEL

By

Lariene Moffett Treat

A Thesis

Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts in Education

The University of New Mexico

1964

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MASTER OF ARTS

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MASTER OF ARTS

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Thesis committee

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Summary

IV. RESULTS

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Reinforcement

Sex of subjects

Verbal and nonverbal

Summary

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Conclusions

Reflections

Suggestions for further research

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- V. Immediate Positive Reinforcement given by each sex
- VI. Computation of Pearson Product Moment Coefficient for Immediate Positive Reinforcement given by each sex

CHAPTER I

THE PROBLEM

A. STATEMENT OF THE PROBLEM

Purpose

The purpose of this study was to determine the effects of pupil IQ and sex upon the number of some immediate verbal and nonverbal reinforcements given by the teacher to the students in the regular classroom. Studies have been done which indicate some differentiation on the bases of socio-economic status and behavior. This study determined, by actual classroom observation, what differentiation in reinforcements was found on the bases of (a) pupil IQ, (b) sex of pupils, (c) sex of teachers. The relationship between verbal and nonverbal reinforcements was also investigated.

Hypotheses

Five hypotheses were investigated (stated in null form):

1. No significant relationship exists between the number of immediate verbal and nonverbal reinforcements given by the teacher and IQ scores of the pupils as measured by the California Test of Mental Maturity (CTMM).
2. No significant relationship exists between the number of immediate verbal and nonverbal reinforcements

given by the teacher and sex of the pupils.

3. No significant difference exists between the number of immediate verbal and nonverbal reinforcements given by male teachers and the number of such reinforcements given by female teachers.

4. No significant relationship exists between the sex of the teacher and the number of reinforcements given to male and to female pupils.

5. No significant correlation exists between the number of immediate verbal reinforcements given by the teachers and the number of immediate nonverbal reinforcements given.

Location, Grade Level, and Duration of Study

To test these hypotheses, systematic observations were conducted in eight sixth-grade classrooms. These classes were in four elementary schools in the Albuquerque, New Mexico, public school system, one from each quadrant of the city. Two classrooms in each school were assigned by the principal for the observations.

The first observation was made on October 7, 1963, and the last on November 21, 1963. Each class was observed for 30 minutes twice a week for a six-weeks' period.

Limitations of the Study

The presence of an observer acts to alter somewhat

given by the teacher and the number of students.

3. No significant difference was found in the number of immediate verbal responses given by male teachers and the number of responses given by female teachers.

4. No significant difference was found in the sex of the teacher and the number of responses given to male and to female pupils.

5. No significant difference was found in the number of immediate verbal responses given by male teachers and the number of responses given by female teachers.

Location, Grade Level, and Sex of Pupils

To test these hypotheses, a total of 1000 were conducted in eight different classrooms. The classrooms were in four different schools in New Mexico, public schools, and the principal for each school.

The first observation was made on the first and the last of November, 1961, and the last on November 15, 1961, for 30 minutes twice a week.

Limitations of the Study

The present study was limited to the following:

the usual student-teacher interaction. There is no way to compare observed and unobserved behavior in a meaningful way, but studying the behavior in an observed situation is better than knowing nothing at all about it. (Medley & Mitzel, 1963).

The use of one observer for all observations limited the number of observations available for analysis. The extensive amount of time necessary to make these observations as valid and reliable as possible limited the number of classes which could be observed. However, using a more limited number of subjects over a longer period of time will increase reliability in a manner similar to using more observers. The more numerous observations also serve to increase rapport between teacher and observer, and to decrease the attention given the observer by both students and teacher, thus allowing a more typical situation to be observed. (Selltiz, Jahoda, Deutsch, & Cook, 1962, pp. 133-134, 182).

The selective sampling of only one grade level precludes the generalization of these findings to another grade level. Growth and behavior patterns of children vary from year to year, and thus the teacher-pupil relationship might vary for each grade level. Also, the effects of reinforcement may vary with the age of the children. Experimental evidence, such as that of McCullers & Stevenson (1960),

supports this possibility.

An attempt to secure a fairly representative sampling of socio-economic status and ethnic and racial groups within the city was made by using one school in each quadrant of the city. However, generalization to other schools in other cities should be made with caution because of this limited sampling.

Redl & Wattenberg (1951, pp. 367-368) suggest that good teachers take into account individual differences and needs when praising students. This study did not try to determine the reasons for the particular patterns of reinforcement which the teachers followed. It simply recorded those patterns, and analyzed them for relationship to pupil and teacher sex and pupil IQ.

Definition of Terms

For the purpose of clarity, the following definitions were used throughout this study:

1. Reinforcement: Hively (1959, p. 38) defines reinforcement, "In Skinner's terms, a reinforcement is an environmental event, which, when caused to follow closely upon an item of behavior, increases the frequency with which the organism engages in that behavior." This investigation used Hively's definition, but included in it such vague terms found in the literature as "reward" and "incentive". Hilgard (1950, p. 39) asserts that incentive and reward can

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determine the reasons for . . .
reinforcement which the teachers follow . . .
those patterns, and analyze . . .
and teacher ask and reply . . .

Definition of Terms

For the purposes of this study, the following definitions
were used throughout this research:
1. Reinforcement - . . .
reinforcement, "In Skinner's . . .
environmental events, which . . .
upon an item of behavior, it increases . . .
the organism engaged in . . .
used Skiner's definition, and . . .
terms found in the literature . . .
Elizard (1950, p. 22) who . . .

be used interchangeably, and his definition of incentive as something which can be manipulated by the teacher in a direct manner would place it in the category of reinforcement.

In this study, only positive reinforcements are considered, such as praise and encouragement, as opposed to negative reinforcements such as punishment and blame.

2. Motivation: Motivation may be of two types, extrinsic and intrinsic. This study was concerned only with extrinsic motivations such as praise and encouragement, which are thought positively to reinforce pupils' behavior.

3. Immediate verbal reinforcements: Those words which the teacher uses immediately following a pupil's behavior which tend to increase the frequency of that behavior. Because in this study immediate verbal reinforcements were limited to positive expressions, they generally occurred subsequent to desirable classroom behavior, as perceived by the teacher.

4. Immediate nonverbal reinforcements: Those behaviors of the teacher which function as positive reinforcers, such as pats, nods, and smiles, all indicating approval.

A list of the specific reinforcements which were recorded is provided in the Appendix, p. 61.

B. THE THEORETICAL BACKGROUND

Recent learning theory developments have emphasized

be used in the same manner as the other two, but in a different manner. In this sense, the two are not identical, but they are similar.

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approval. The two are not identical, but they are similar. The two are not identical, but they are similar.

A list of the subjects is provided in the appendix. The two are not identical, but they are similar. The two are not identical, but they are similar.

the use of reinforcement as a vital part of the learning process. Many studies have confirmed the desirability of immediate reinforcement, and there has been much interest in the application of reinforcement psychology to the classroom situation. The increasing use and acceptance of the teaching machine, which utilizes this theory, gives ample evidence of this application. (Krumboltz, 1961).

Hull (1943) assigned an important role to reinforcement in his theory of learning. Skinner, with his behavior theory of learning, relies heavily on the concept of reinforcement in learning. (Stephens, 1960). Marx (1960, p. 896) concluded, "The necessity of adequate rewarding is recognized by almost all authorities, independently of their theoretical interpretation of the reinforcement function."

The proper use of reinforcement plays an important part in the mental hygiene of a classroom. The feelings of success and accomplishment which are engendered by the teacher's acceptance and encouragement of the student are essential to good mental health of the pupil. The child's self-concept must be positive and adequate for maximum learning to take place. This self-concept affects his aspiration level, his opinion of others, and his whole outlook toward his world. A warm, accepting, positively reinforcing teacher is an important part of the environment which aids a child in developing an adequate self-concept.

Kelley (1962, p. 16) states this well:

The parent or teacher who depends upon threats or other techniques of fear will not be able to open the self of one who is in his power....

For the development of a fully functioning self, a person needs to have opportunity to live the life good to live. This life, or his world, needs to be populated by people whom he can view as facilitating. It is almost entirely a matter of people, not things.

C. IMPORTANCE OF THE STUDY

The rapidly accumulating body of psychological findings concerning conditions for optimum learning have not yet been fully implemented in the classrooms of the world. Reluctance on the part of administrators and parents to accept innovations and experimentation and a lack of real communication between psychologists and educators have contributed to a gap between experimental results and classroom implementation. Melton (1959) deplores this lack of communication between the science of learning (experimental psychologists) and the science of teaching (educators).

More studies done in the actual learning situation, the classroom, instead of in an artificial situation, the laboratory, will lessen this gap, and provide evidence to support the learning theories.

With the current emphasis on developing the full potential of each child there are many arguments concerning administrative provisions for the gifted child and the slow learner in the public schools. Some authorities believe a

heterogenous classroom with reciprocal stimulation and increased opportunity for better social adjustment is advantageous. Others believe that in this situation either the rapid learner is neglected because of the many demands of the slow learner, or that the slower learner does not receive all the attention he needs because the rapid learners so challenge and stimulate the teacher that he devotes most of his time to them. Those who share this opinion advocate homogeneous grouping on the basis of intellectual achievement and/or ability.

The issue will remain undecided until empirical research is done in the classroom to determine just how children of varying abilities actually fare in the classroom. This study investigated whether, in actual practice, equal immediate positive reinforcements are, or are not, given in the classroom. This study, and others which identify classroom behaviors as they occur, will help provide bases for further curriculum developments and administrative decisions regarding such factors as individual differences in intellectual ability.

D. ORGANIZATION OF REMAINDER OF THE THESIS

Chapter II will summarize pertinent literature in four major areas: the use of IQ scores as indicators of intellectual ability, administrative provisions for

heterogeneous distribution of the population. The
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increase. The population is heterogeneous.
rapid learner is more likely to be a rapid learner
the slow learner, the slow learner is more likely to be a slow learner.
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challenges and stimulates the slow learner. The slow learner is more likely to be a slow learner.
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four major areas. The slow learner is more likely to be a slow learner.
intellectual ability. The slow learner is more likely to be a slow learner.

individual intellectual differences, the importance of reinforcement, and observation as a data-collecting technique.

Chapter III will present the design of the study and the provisions which were made to secure maximum reliability and validity.

In Chapter IV the data which were obtained are given. Statistical procedures are described and the computed values are compared with statistical table values to determine significance.

A summary of the study is presented in Chapter V. Conclusions which can be drawn from the data are given and possible causes and results are discussed. Suggestions are made for future research which can be done in this area.

Individuals involved in the process of the

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the provisions which were made for the process of the

and validity.

In Chapter III the process of the process of the

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made for future research which can be drawn from the process of the

CHAPTER II

REVIEW OF RELATED LITERATURE

In this chapter the pertinent literature in four areas will be reviewed. The use of IQ scores as indicators of intellectual ability will be discussed, the debate about administrative provisions for individual intellectual differences will be examined, the importance of reinforcement will be explored, and observation as a data-collecting technique for this type of study will be discussed.

A. USE OF IQ SCORES

The use of IQ scores, reflected in standardized tests, as indicators of intellectual ability has many foundations in the literature of education and psychology. (Witty, 1958; Terman, et. al., 1925; Hollingworth, 1929; Terman, 1954). The majority of the studies reported have used the individual Revised Stanford Binet Test of Intelligence to determine IQ scores. However, with the current emphasis on individual differences and their role in education, these individual tests have proven too time-consuming and expensive to use for identification purposes. Several recent studies have confirmed the value of using the group IQ tests as a preliminary screening measure for this identification. (Pegnato & Birch, 1959; Klausmeier, 1959;

Chambers, 1959).

Although not all studies recommending the use of group tests report the CTMM as the instrument of choice, it was used in this study because it is the test used by the Albuquerque public school system in their annual testing procedures for the sixth-grades. Therefore the scores as measured by this test were readily available.

In the test manual for the CTMM, correlations between it and the Stanford-Binet are given. (Coleman, 1956). The correlation coefficient approximates $+.88$. Sheldon and Manolakes (1954) did an intensive study in which they concluded that the correlation would range from $+.63$ to $+.73$. No significant differences were established between the means in analyzing the IQ distribution for the two tests, and the distribution for both tests was not significantly different from normal. Therefore it would appear that there is a valid comparison between the two tests.

B. ADMINISTRATIVE PROVISIONS FOR INDIVIDUAL IQ DIFFERENCES

Arguments concerning administrative provisions appear in educational and psychological publications and have become a popular subject in the lay press. (Bell, 1951; Griswold, 1954; Rickover, 1957; Whitman, 1954; R. C. Wilson, 1955). Those who maintain that heterogenous grouping is better assert that because the gifted child is generally

better adjusted (Hollingworth, 1929; Terman, 1925; Terman & Oden, 1947), he can compensate for any possible lack of individual attention and direct motivation from the teacher. (Brown, 1955; Kough, 1960; Passow, 1956; Slocum, 1955; Tonsor, 1953, Van Til, 1957).

Those who argue for segregation of the gifted child in special classes maintain that the overburdened teacher cannot take time to give each child the attention he needs, and because the average or slow learner seems to need so much help, the teacher neglects the more capable child to such a degree that he cannot possibly learn to the best of his ability. (Gray & Hollingworth, 1931; Kough, 1960; Passow, 1956; Van Til, 1957; Whittenberg, 1954).

Most school systems cannot provide special classes for the gifted children because of limited physical plants and financial and personnel problems. (Kough, 1960; H. T. Wilson, 1955).

Many educators oppose ability grouping, especially in the elementary schools, on the grounds that it is contrary to our democratic ideals. (Bettleheim, 1958; Kough, 1960; Tonsor, 1953). Eash (1961, p. 431) generalized from research when he wrote:

Ability grouping as an organizational structure may accentuate the attainment of goals and symbols for goals of narrow academic achievement to the extent that other broader desirable behavioral goals and objectives are attenuated and jeopardized. The

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organizational structure of ability grouping may promote group norms which are antithetical to norms that foster societal cohesion and individual societal responsibility.

Because of these controversies and problems, it is important to find better ways for gifted children to learn in the regular class setting. Positive, practical suggestions for change will come only after research has identified the real needs of the gifted child in the regular classroom. (Gallagher, 1957; Passow, 1956).

C. IMPORTANCE OF REINFORCEMENT

The importance of reinforcement as a factor in effective learning has been adequately demonstrated. The improvement in adjustment and attitudes, which characterizes mental hygiene in the classroom, is affected in part by the type and distribution of reinforcement given by the teacher.

Reinforcement and learning

Gage (1963) develops Mowrer's two-factor theory of conditioning and gives 12 kinds of reinforcements which are important. He contends that teachers, by manipulating various kinds of reinforcements, can teach pupils to have fear, disappointment, relief, and hope attached to proper stimulus-response connections. Wallen and Travers (1963, p. 494) list six principles of learning which have relationship to teaching methods. Their first principle is,

"Behavior which represents the achievement or partial achievement of an educational objective should be reinforced." They emphasize that many of the common reinforcers are at least partially under the control of the teacher.

Ryans (1942) suggests that reward and praise may be effective incentives for some students in learning situations and that these rewards may be material or symbolic. Praise, personal attention, and group recognition may serve as rewards in the same way as money or some other desirable object. Bryan and Sherter (1960) suggest four items for consideration in the development of approach behavior as contrasted with withdrawal behavior. Their second item emphasizes the importance of immediate, frequent rewards in the initial stages of development of desirable intellectual behavior. Spence (1956) indicates that learning is more effective with immediate reinforcement than with delayed reinforcement.

Auble and Mech (1953) demonstrated that immediate verbal reinforcement has the property of reducing variability of performance in routine tasks. Terrell & Ware (1963) recently reported that in the early phase of learning the galvanic skin responses of their subjects were significantly greater under delayed reinforcements than under immediate reinforcements. This would suggest that less emotionality was induced by immediate reinforcement. Since both decreased

variability of response and decreased emotionality facilitate learning of routine tasks, immediate reinforcement would seem to serve this purpose. Lipsitt and Casteneda (1958) demonstrated, in an experimental learning situation which recorded response speeds and choice behaviors, that young children show a preference for, and respond more quickly to, a stimulus which has been associated with immediate reinforcement as opposed to another stimulus which is associated with a reinforcement delay.

Animal studies in reinforcement theory have used both continuous and partial reinforcement for experimental purposes. Since the classroom situation would not meet the requirements of continuous reinforcement which has been proven most effective in initial learning of desired responses, the value of partial reinforcement has been investigated. Auble and Mech (1953) and Mech (1953) used partial verbal reinforcement with distributed practice in a classroom situation and found the difference in extinction of stimulus-response learning between continuous and partial reinforcement was not significant. In another study, in which reinforcement was defined as verbal approbation or praise, it was found that for satisfactory acquisition of correct responses, reinforcement need not always be carried out on a continuous basis. (Mech, Hurst, Auble, Donovan, & Fattu, 1953).

Other experimental studies which affirm the importance of immediate verbal reinforcement to certain types of learning include those of Chase, Rock, Thorndyke, and Forlano as cited in Forlano (1936), Dollins, Angelino, & Mech (1960), Hurlock (1925), Johannesson (1962), Thompson & Hunnicutt (1944), Woods (1934).

Marx (1960) summarized the studies in this area when he stressed, as an important general principle in utilizing reward, the necessity of always having frequent and regular experiences of success (reinforcement) through all phases of academic learning, but more specifically in the early phases. He indicated the importance of positive reinforcement when he said,

A major difficulty in our educational efforts seems to be the progressive loss of interest by students in academic learning activities. More attention to the prevention of extinction of desired classroom behaviors by a continuing program of appropriate incentives would seem to be a most important educational need. Extinction of such interests may be inhibited by carefully planned systems of interpolating secondary motivators and reinforcers and by the offering of a variety of incentives and rewards. (Marx, 1960, p. 898).

Studies which suggest differentiated immediate reinforcements in the classroom indicate one possible explanation of learning difficulties. If immediate reinforcement is so important to effective learning of skills and concepts, and a child does not get this necessary reinforcement, he will be less able to learn; the teacher reacts to this lack of learning by increased negative verbal and nonverbal

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reinforcement and thus sets up a cycle which would tend to block effective learning. (Mussen & Conger, 1956). Reissmann (1963) maintains that the culturally deprived child is a victim of this cycle, by which a negative attitude toward school is caused by the treatment he receives, and this negative attitude in turn partially precipitates the treatment.

Reinforcement and Mental Hygiene

A classroom atmosphere which facilitates learning and adjustment is achieved in part by proper use of immediate, positive reinforcement. Flanders (1959) classifies encouragement and praise student behavior as one of 12 categories which are inclusive of all communication acts which occur in a classroom. In his study on integrative-dominative patterns based on these 12 categories he concluded that teacher behaviors which increase the freedom of students, such as praising and encouraging them, are associated with more positive attitudes and better work habits. He suggests that praise and acceptance, used adroitly, make the general classroom functioning smoother.

Lantz (1945) found that success experiences increased average ratings for willingness, self-confidence, social confidence, cooperation, alertness, friendliness, boldness, talkativeness, cheerfulness, quietness, persistence, confidence, and effort, while failure acts as a depressant

causing negative effects on these attitudes. Sears (1940) demonstrated that success experiences result in smaller discrepancies between levels of aspiration and achievement. The smaller discrepancy would indicate better adjustment. H. T. Wilson (1957) discusses the negative aspects of continued disappointment and lack of encouragement.

Child (1954) explores the role of rewarding in the socialization of the child, and concludes that it is a significant variable in the formation of the child's personality.

Differentiation of Reinforcement

The importance of fair distribution of positive verbal reinforcements such as praise has been emphasized by many authors. Marx (1960) warned of the harm resulting from too much competition, with the resultant unequal distribution of recognition, and says there must be wide distribution over the entire class. Dinkmeyer (1963) pointed out that over-praise of one child may increase the antagonism of his peers and destroy the good effects of the praise. Flanders and Havumaki (1960) demonstrated experimentally that praise, given by a prestige figure, increased the choice value of a student by his peers. This combination of praise and prestige figure would appear to work in the opposite direction as well: lack of praise from a prestige figure such as a teacher could decrease the acceptance of a child by his peers.

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Scheifele (1953) cited a case study in which over-rewarding a gifted child lead to resentment of the gifted child on the part of the other students. Such resentment could conceivably result in social isolation of the child. The social implications of "teacher's pet" was explored by Redl and Wattenberg (1951). The reward of behavior which is not acceptable to the peer group may lead to isolation of the rewarded child. They warned that overpraising may make children dependent upon adult interpretation or rob them of spontaneity.

In Jersild's study (1940) of characteristics of teachers who are liked and disliked by the pupils, he found that the pupils mentioned favorably such things as consistency in discipline, fairness, and impartiality.

The unequal distribution of positive and negative classroom reinforcements based on socio-economic status has been investigated by Abrahamson (1952). Lippitt and Gold (1959) cited observations of classroom behavior which found differential positive and negative verbal reinforcement on the basis of social behavior rather than scholastic performance.

A common, though not often admitted, situation is described by Reissmann (1963, p. 339),

In my own teaching, I easily fall into the habit of rewarding pupils whose faces light up when I talk, who are quick to respond to me, and I respond to them. I generally do not pick up, select, or

respond to the slower pupil. He has to make it on his own.

Mussen and Conger (1956) describe the frequently occurring situation in which it is apparent to the child that some children are favored by their teachers. They discuss the idea that lower class children do not respond to the middle class needs in the way the usual middle class teacher expects. Therefore the teacher may become hurt, bewildered, or angry. This factor, plus other general patterns of pupil behavior toward which most teachers will have positive or negative attitudes, causes the teacher to react in different ways toward different children. They sum up their discussion by saying,

Most teachers, since they are human beings, are likely to prefer students who either make their jobs easier or who give them a sense of accomplishment. The child who disturbs the smooth functioning of the class, or the child who gives the teacher a sense of failure, apparently either by refusing to learn, or by demonstrating inability to learn, is often likely to receive little consideration from the teacher. (Mussen & Conger, 1956, p. 400).

Carter (1953) demonstrated that girls get higher marks from teachers than would have been predicted from the results of standard achievement tests, while boys get lower marks from teachers than suggested by such tests. It is conceivable that in some instances immediate verbal and nonverbal reinforcement may follow this pattern.

Several authors caution that the use of extrinsic rewards such as grades and praise, while of some immediate

value, must be only a step to developing intrinsic motivation. (Bruner, 1961; Ryans, 1942).

D. OBSERVATION AS A DATA-GATHERING TECHNIQUE

Observation as a data-collecting technique has previously been shown to be well suited for a problem of this nature. Medley and Mitzel (1963, p. 247) emphasize, "Certainly there is no more obvious approach to research in teaching than direct observation of the behavior of teachers while they teach and pupils while they learn." Barr's study (1929) of characteristic differences in teaching performance was based on the assumption that in the classroom there exist observable activities and conditions which can describe teaching performance. Wrightstone (1934) pointed out three advantages of controlled observation techniques in studies of teachers: (a) they provide a direct method of sampling behaviors in actual classroom situations; (b) such observations can be made without disturbing normal group activities; (c) data can be treated with conventional statistical formulas.

The importance of identifying and measuring such major variables in the teaching-learning process as the teacher, the learner, and their interaction is emphasized by Withall (1960) in his discussion of observation as a research tool. He stated further that indefinite and meaningless

concepts must be broken down into discrete and describable operations and behaviors. Therefore it is necessary to specify, describe, and quantify behaviors under definite and fully-described conditions. Ackerman (1954) also emphasized the importance of measuring teacher competence by concrete, definitely-described behaviors which can be concisely recorded. Medley and Mitzel (1958), working toward the goal of making classroom observations accurate measurements of classroom behaviors, developed a technique called the OScAR (Observation Schedule and Record), which can be used by a single observer to record many aspects of classroom behavior.

As indicated above, Flanders (1959) developed 12 categories of classroom communication which could be observed and recorded. He related these to the mental hygiene in the classroom by writing:

A good deal can be learned about mental hygiene in the classroom by analyzing the endless sequences of teacher-pupil contacts that occur in spontaneous interaction. Most of the teacher's behavior, for example, can be recorded as a series of acts over a time scale and the reactions of students to these acts can also be recorded. (Flanders, 1959, p. 30).

Gordon (1962) reviewed recent work on observational methods used to study teachers and teaching. He asserted that these studies show the desirability of this technique and that it is being used increasingly for this purpose. Brown (1962) outlined some possibilities for systematic

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observation and diagramed representative patterns of interactions which may be studied with respect to direction, quantity, quality, and content. He classified student responses, in relation to content of teacher's actions, in categories, one of which is "supporting, reinforcing, praising, etc." (Brown, 1962, p. 39).

E. SUMMARY

The use of IQ scores as indicators of intellectual ability was discussed. Reasons for using the California Test of Mental Maturity in this study were cited.

The various controversies concerning ability grouping in the schools were examined. The desirability of identifying behaviors and needs of children of varying intellectual abilities in the regular classroom was explored.

The importance of positive reinforcement as a factor in effective learning of various kinds, and in improving and maintaining a facilitating classroom atmosphere was outlined. Fair distribution of positive reinforcements was emphasized.

The reasons for using direct classroom observation in this study were explained.

CHAPTER III

DESIGN OF THE STUDY

In this chapter the procedure followed in planning and executing the study will be described. Efforts which were made to secure maximum reliability and validity are explained.

A. PROCEDURE

The sample for this study consisted of eight sixth-grade classes in the Albuquerque public school system. Four schools were assigned as sample schools, one in each quadrant of the city. Two sixth-grade classrooms in each school were assigned for the observations by the principal.

One school, not used for the actual data collection, was selected for pretesting of the observational procedure. The observer went into one sixth-grade class in this school for 30 minutes once a day for five days and recorded observable positive reinforcements given by the teacher to the pupils during each 30 minute period. The time of the observation varied each day. From the results of this pretest, some changes were made in the reinforcements which were to be recorded.

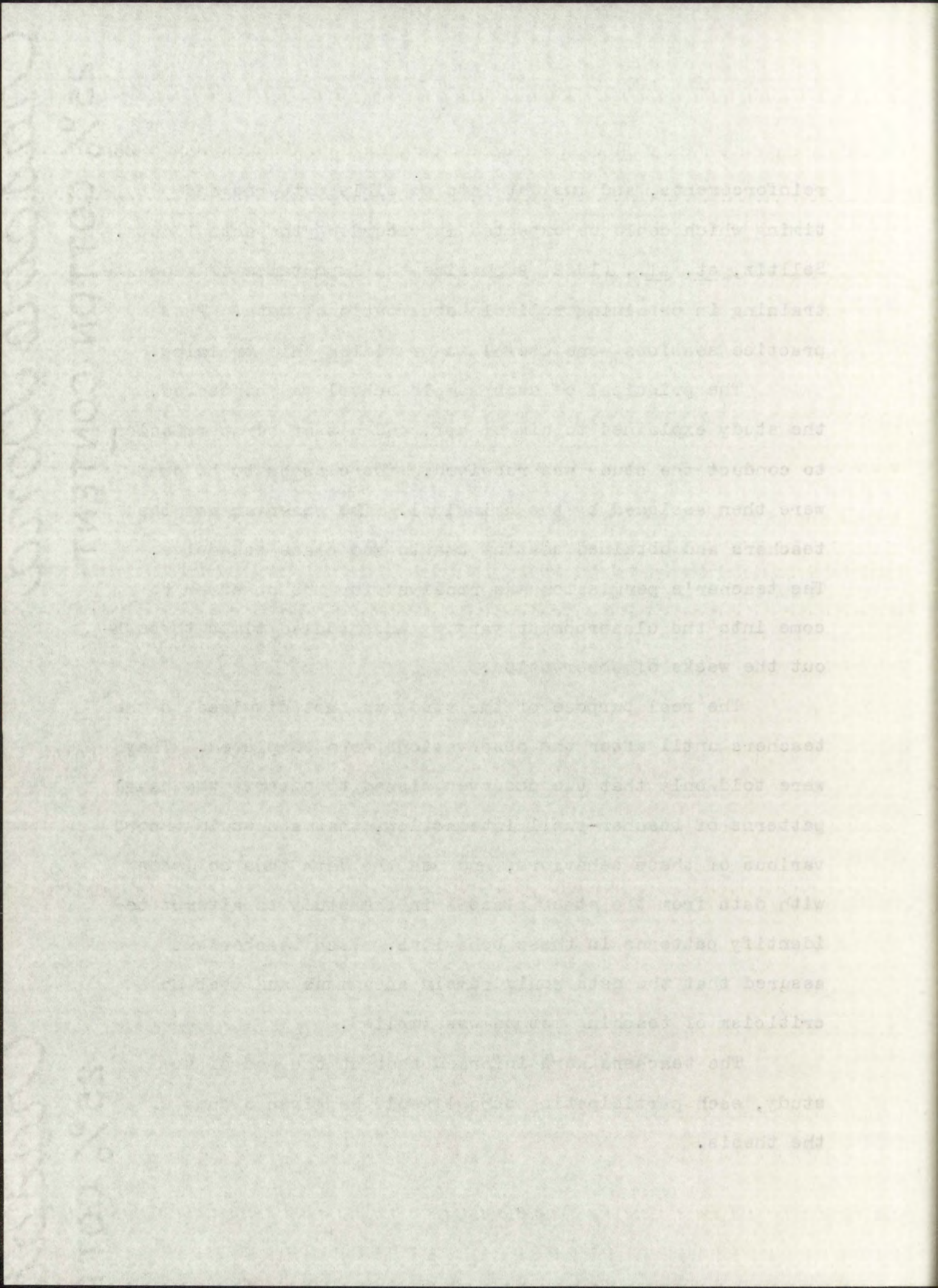
This prestudy observation enabled the observer to gain some skill in recording the observable positive

reinforcements, and insight into possible patterns and timing which could be expected in recording the actual data. Selltitz, et. al., (1962) emphasize the importance of adequate training in obtaining reliable observational data. These practice sessions were useful in providing this training.

The principal of each sample school was contacted, the study explained to him or her, and his or her permission to conduct the study was received. The classes to be used were then assigned by the principal. The observer met the teachers and obtained seating charts and class schedules. The teacher's permission was received for the observer to come into the classroom at varying unscheduled times throughout the weeks of observation.

The real purpose of the study was not divulged to the teachers until after the observations were completed. They were told only that the observer wished to observe the usual patterns of teacher-pupil interaction, that she would record various of these behaviors, and use the data thus collected with data from the other classes in the study to attempt to identify patterns in these behaviors. Each teacher was assured that the data would remain anonymous and that no criticism of teaching method was implied.

The teachers were informed that at the end of the study, each participating school would be given a copy of the thesis.



The observer spent 30 minutes a day, twice a week, for a period of six weeks, in each classroom. Six of these observational periods for each class were in the morning, and six were in the afternoon. The exact time was not identical for each classroom, because of the occurrence of such activities as band, orchestra, special music, physical education, and television and radio programs. Data were recorded only when the entire class was being taught by the regular teacher. Any pupil absences were recorded on the day of the absence, and if a teacher was absent, another observational period was scheduled.

The number and kind of selected observable reinforcements given each pupil were recorded in code on previously prepared seating charts of the room. A separate seating chart form was used for each observation. A list of reinforcements which were recorded, and the code used in recording them, are included in the Appendix, p. 61.

After all data had been collected from the observations, the IQ score for each pupil, as measured by the CTMM, was obtained. The total number of recorded reinforcements given by the teacher to each child was computed. The data were analyzed for significant findings by the use of the chi square test, the Mann-Whitney U Test of Rank Order, and the Pearson Product Moment Coefficient. The results of these analyses are found in Chapter IV.

The present study was designed to determine the effect of a period of six weeks of physical training on the cardiovascular and respiratory systems of normal subjects.

Observations were made on the following factors: heart rate, blood pressure, respiratory volume, and oxygen consumption.

Subjects were divided into two groups: a control group and an experimental group. The experimental group was subjected to a physical training program.

Measurements were taken at the beginning and at the end of the six-week period. The results showed that the experimental group had a significant increase in heart rate and oxygen consumption.

It was concluded that a period of six weeks of physical training had a beneficial effect on the cardiovascular and respiratory systems of normal subjects.

The results of this study are in agreement with those of other studies which have shown that physical training improves cardiovascular and respiratory function.

Further studies are needed to determine the long-term effects of physical training on the cardiovascular and respiratory systems.

It is recommended that normal subjects engage in regular physical training to maintain good cardiovascular and respiratory health.

The authors wish to thank the following individuals for their assistance in the conduct of this study: Dr. J. H. Smith, Dr. R. L. Jones, and Dr. M. K. Brown.

The authors also wish to thank the following individuals for their assistance in the conduct of this study: Mr. J. A. White, Mr. B. C. Black, and Mr. D. E. Green.

The authors are indebted to the following organizations for their generous contribution to the conduct of this study: The National Heart Institute, the National Cancer Institute, and the National Institutes of Health.

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B. RELIABILITY AND VALIDITY

In the design of this study every effort was made to follow the suggestions for reliable and valid observational studies as made by Medley and Mitzel (1963), Selltiz, et. al., (1962), and Wrightstone (1960).

Medley and Mitzel state (1962, p. 253), "The ideal is to make the classification act as easy as the purpose of the study will permit." The teacher behaviors to be recorded in this study were carefully defined before the observations were begun. On several occasions the observer noted that a teacher would use a certain reinforcing phrase which was unique to that teacher. This was written in full at that time, and then coded and included in the list of behaviors to be recorded. Observer discrimination was required to identify a verbal reinforcement which was specific for one occasion. This type of reinforcement was included in the coded list as "approving comment--ac."

Medley and Mitzel (1962, p. 250) suggest that the validity of a study depends on the fulfillment of three conditions: (a) a representative sample is obtained; (b) an accurate record is obtained; (c) records are scored accurately to reflect real differences.

A random sampling of schools or classes was impossible to obtain for this study, but the sampling of a fairly large population ($N = 233$) in four widely separated areas of the

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city partially compensated for this.

The immediate recording of explicit, discrete teacher behaviors enabled the observer to keep an accurate record of these behaviors. Because of the exact definition of the behaviors which were to be recorded, the observer was able to record these behaviors precisely; few problems in discrimination appeared and the observer was able to record without having to make innumerable judgments as to whether or not a behavior was to be recorded. Thus condition number two identified by Medley and Mitzel was adequately fulfilled.

Since these data required no further scoring or scaling, except simple tabulation, condition number three was not applicable.

No attempt was made to compute the various reliability coefficients mentioned by Medley and Mitzel (1962, pp. 253-254). With only one observer no reliability coefficient (correlation between scores based on observations made by different observers at different times) could be computed. For the same reason there was no computation of a coefficient of observer agreement (correlation between scores based on observations made by different observers at the same time). The wide variety of activities which took place in the classrooms precluded accurate measure of consistency of behavior, which would

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acquire means of comparison. The subjects did not

be calculated as a stability coefficient (correlation between scores based on observations made by the same observer at different times). For example, some observations were made when the class was doing individual work at their seats and the teacher would interact with only a few individuals. This pattern of reinforcement surely would not be comparable to that used by a teacher during a class discussion period or an art or other activity period.

Suggestions made by Medley and Mitzel (1962, p. 305-307) which were followed in this study were training of observer, coded recording of data, separate data sheet for each observation, 30 minutes observational periods, and the scheduling of at least 10 or 12 visits to each teacher.

C. SUMMARY

The details of the design of this study were outlined in this chapter. The procedure used in collecting the data was described. Sources of suggestions for obtaining reliability and validity were given, and the methods used for this purpose in this study were noted.

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CHAPTER IV

RESULTS

The data secured by the observations described in Chapter III were tabulated and analyzed statistically for significance. In this chapter the statistical methods used in these analyses are presented. Tables showing data computations are given. Computed values are compared with appropriate statistical table values to determine their significance for acceptance or rejection of the hypotheses.

A. RAW DATA

Data from only those students who met the following requirements were included in the calculations: (a) the student was enrolled in the class throughout the entire observational period; (b) the IQ score was available from the group testing done by the teacher prior to the beginning of the observations; (c) the student was present in the classroom during more than half of the observations. Using these criteria, data from 233 students were used in the analysis.

Data collection was done in the classrooms of eight teachers; four of these were male and four were female. No record was made of very brief (1-5 minutes) absences of the teacher from the classroom, but the observation period was

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The first section of the report deals with the general background of the study. It discusses the importance of the problem and the objectives of the research. The second section describes the methods used in the study, including the selection of subjects and the procedures for data collection. The third section presents the results of the study, which are discussed in detail in the following paragraphs.

Data from this study indicate that the results of the study are consistent with the findings of previous research. The study was conducted in a controlled environment, and the results were obtained from a large sample of subjects. The study was designed to test the hypothesis that the results of the study would be consistent with the findings of previous research. The study was conducted in a controlled environment, and the results were obtained from a large sample of subjects. The study was designed to test the hypothesis that the results of the study would be consistent with the findings of previous research.

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lengthened by that amount to make a total of 30 minutes observation of actual teacher-pupil interaction.

A total of 1909 positive reinforcements were recorded. Of these, 1621 were classified as verbal and 288 as non-verbal. The four male teachers gave a total of 941 reinforcements and the four female teachers gave a total of 967 reinforcements. The 108 male students received a total of 978 reinforcements from the teachers and the 125 female students received a total of 931 reinforcements.

The 233 IQ scores ranged from 59 to 147, with a mean of 106.5 and a median of 107. This mean is within the commonly accepted average range of 90-110.

B. REINFORCEMENTS AND IQ

For this analysis the chi square test of significance was used. The following formula, derived from Introduction to the Statistical Method (Hammond & Householder, 1962, p. 370), was used for this and the other chi square analyses in this thesis:

$$\chi^2 = \sum_{i=1}^k \frac{(o_i - e_i)^2}{e_i}$$

The IQ scores were divided into quartiles: the first quartile included scores from 59-96, the second, scores from 97-107, the third, scores from 108-116, and the fourth, scores from 117-147. The number of reinforcements given to

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each student was grouped into intervals of five: 0-4, 5-9, 10-14, 15-19, 20-24. A four by five chi square table was used. Table I shows the computation of chi square for the relationship between reinforcement and IQ scores.

For the 12 degrees of freedom in this distribution, chi square is significant at the .05 level if it has a value of 21.026. The computed chi square is 12.969. Since this is less than the significant value the null hypothesis, for which chi square always tests, must be accepted. Therefore, in this study there was no significant relationship between the number of immediate positive verbal and nonverbal reinforcements given to the pupils by the teachers and the IQ scores of the pupils.

C. REINFORCEMENT AND SEX OF PUPILS

The chi square test was chosen to analyze the data for significant relationship between number of reinforcements and the sex of the pupils. The number of reinforcements given each pupil were grouped into intervals of five: 0-4, 5-9, 10-14, 15-19, 20-24. A two by five chi square table was prepared. Table II shows the computation of the chi square for this relationship.

With the four degrees of freedom allowed by this distribution, chi square is significant at the .05 level with a value of 9.488. The computed chi square for this

each element was 100. The results are shown in Table I. The results show that the relationship between the number of elements and the number of combinations is not linear. The number of combinations increases more rapidly than the number of elements. The number of combinations is given by the formula 2^n , where n is the number of elements. The number of combinations is 2 for 1 element, 4 for 2 elements, 8 for 3 elements, 16 for 4 elements, 32 for 5 elements, 64 for 6 elements, 128 for 7 elements, 256 for 8 elements, 512 for 9 elements, 1024 for 10 elements, 2048 for 11 elements, 4096 for 12 elements, 8192 for 13 elements, 16384 for 14 elements, 32768 for 15 elements, 65536 for 16 elements, 131072 for 17 elements, 262144 for 18 elements, 524288 for 19 elements, 1048576 for 20 elements, 2097152 for 21 elements, 4194304 for 22 elements, 8388608 for 23 elements, 16777216 for 24 elements, 33554432 for 25 elements, 67108864 for 26 elements, 134217728 for 27 elements, 268435456 for 28 elements, 536870912 for 29 elements, 1073741824 for 30 elements, 2147483648 for 31 elements, 4294967296 for 32 elements, 8589934592 for 33 elements, 17179869184 for 34 elements, 34359738368 for 35 elements, 68719476736 for 36 elements, 137438953472 for 37 elements, 274877906944 for 38 elements, 549755813888 for 39 elements, 1099511627776 for 40 elements, 2199023255552 for 41 elements, 4398046511104 for 42 elements, 8796093022208 for 43 elements, 17592186044416 for 44 elements, 35184372088832 for 45 elements, 70368744177664 for 46 elements, 140737488355328 for 47 elements, 281474976710656 for 48 elements, 562949953421312 for 49 elements, 1125899906842624 for 50 elements, 2251799813685248 for 51 elements, 4503599627370496 for 52 elements, 9007199254740992 for 53 elements, 18014398509481984 for 54 elements, 36028797018963968 for 55 elements, 72057594037927936 for 56 elements, 144115188075855872 for 57 elements, 288230376151711744 for 58 elements, 576460752303423488 for 59 elements, 1152921504606846976 for 60 elements, 2305843009213693952 for 61 elements, 4611686018427387904 for 62 elements, 9223372036854775808 for 63 elements, 18446744073709551616 for 64 elements, 36893488147419103232 for 65 elements, 73786976294838206464 for 66 elements, 147573952589676412928 for 67 elements, 295147905179352825856 for 68 elements, 590295810358705651712 for 69 elements, 1180591620717411303424 for 70 elements, 2361183241434822606848 for 71 elements, 4722366482869645213696 for 72 elements, 9444732965739290427392 for 73 elements, 18889465931478580854784 for 74 elements, 37778931862957161709568 for 75 elements, 75557863725914323419136 for 76 elements, 151115727451828646838272 for 77 elements, 302231454903657293676544 for 78 elements, 604462909807314587353088 for 79 elements, 1208925819614629174706176 for 80 elements, 2417851639229258349412352 for 81 elements, 4835703278458516698824704 for 82 elements, 9671406556917033397649408 for 83 elements, 19342813113834066795298816 for 84 elements, 38685626227668133590597632 for 85 elements, 77371252455336267181195264 for 86 elements, 154742504910672534362390528 for 87 elements, 309485009821345068724781056 for 88 elements, 618970019642690137449562112 for 89 elements, 1237940039285380274899124224 for 90 elements, 2475880078570760549798248448 for 91 elements, 4951760157141521099596496896 for 92 elements, 9903520314283042199192993792 for 93 elements, 19807040628566084398385987584 for 94 elements, 39614081257132168796771975168 for 95 elements, 79228162514264337593543950336 for 96 elements, 158456325028528675187087900672 for 97 elements, 316912650057057350374175801344 for 98 elements, 633825300114114700748351602688 for 99 elements, 1267650600228229401496703205376 for 100 elements.

The number of combinations is given by the formula 2^n , where n is the number of elements. The number of combinations is 2 for 1 element, 4 for 2 elements, 8 for 3 elements, 16 for 4 elements, 32 for 5 elements, 64 for 6 elements, 128 for 7 elements, 256 for 8 elements, 512 for 9 elements, 1024 for 10 elements, 2048 for 11 elements, 4096 for 12 elements, 8192 for 13 elements, 16384 for 14 elements, 32768 for 15 elements, 65536 for 16 elements, 131072 for 17 elements, 262144 for 18 elements, 524288 for 19 elements, 1048576 for 20 elements, 2097152 for 21 elements, 4194304 for 22 elements, 8388608 for 23 elements, 16777216 for 24 elements, 33554432 for 25 elements, 67108864 for 26 elements, 134217728 for 27 elements, 268435456 for 28 elements, 536870912 for 29 elements, 1073741824 for 30 elements, 2147483648 for 31 elements, 4294967296 for 32 elements, 8589934592 for 33 elements, 17179869184 for 34 elements, 34359738368 for 35 elements, 68719476736 for 36 elements, 137438953472 for 37 elements, 274877906944 for 38 elements, 549755813888 for 39 elements, 1099511627776 for 40 elements, 2199023255552 for 41 elements, 4398046511104 for 42 elements, 8796093022208 for 43 elements, 17592186044416 for 44 elements, 35184372088832 for 45 elements, 70368744177664 for 46 elements, 140737488355328 for 47 elements, 281474976710656 for 48 elements, 562949953421312 for 49 elements, 1125899906842624 for 50 elements, 2251799813685248 for 51 elements, 4503599627370496 for 52 elements, 9007199254740992 for 53 elements, 18014398509481984 for 54 elements, 36028797018963968 for 55 elements, 72057594037927936 for 56 elements, 144115188075855872 for 57 elements, 288230376151711744 for 58 elements, 576460752303423488 for 59 elements, 1152921504606846976 for 60 elements, 2305843009213693952 for 61 elements, 4611686018427387904 for 62 elements, 9223372036854775808 for 63 elements, 18446744073709551616 for 64 elements, 36893488147419103232 for 65 elements, 73786976294838206464 for 66 elements, 147573952589676412928 for 67 elements, 295147905179352825856 for 68 elements, 590295810358705651712 for 69 elements, 1180591620717411303424 for 70 elements, 2361183241434822606848 for 71 elements, 4722366482869645213696 for 72 elements, 9444732965739290427392 for 73 elements, 18889465931478580854784 for 74 elements, 37778931862957161709568 for 75 elements, 75557863725914323419136 for 76 elements, 151115727451828646838272 for 77 elements, 302231454903657293676544 for 78 elements, 604462909807314587353088 for 79 elements, 1208925819614629174706176 for 80 elements, 2417851639229258349412352 for 81 elements, 4835703278458516698824704 for 82 elements, 9671406556917033397649408 for 83 elements, 19342813113834066795298816 for 84 elements, 38685626227668133590597632 for 85 elements, 77371252455336267181195264 for 86 elements, 154742504910672534362390528 for 87 elements, 309485009821345068724781056 for 88 elements, 618970019642690137449562112 for 89 elements, 1237940039285380274899124224 for 90 elements, 2475880078570760549798248448 for 91 elements, 4951760157141521099596496896 for 92 elements, 9903520314283042199192993792 for 93 elements, 19807040628566084398385987584 for 94 elements, 39614081257132168796771975168 for 95 elements, 79228162514264337593543950336 for 96 elements, 158456325028528675187087900672 for 97 elements, 316912650057057350374175801344 for 98 elements, 633825300114114700748351602688 for 99 elements, 1267650600228229401496703205376 for 100 elements.

TABLE I

CHI SQUARE COMPUTATION OF RELATIONSHIP BETWEEN
IMMEDIATE POSITIVE REINFORCEMENTS GIVEN BY
TEACHERS AND IQ OF PUPILS

o	e	o-e	$(o-e)^2$	$\frac{(o-e)^2}{e}$
				e
19	17.679	1.321	1.745	0.099
21	19.920	1.080	1.166	.059
10	11.454	-1.454	2.114	.185
7	6.723	0.277	0.077	.011
1	2.241	-1.241	1.540	.687
19	17.963	1.037	1.075	.060
18	20.240	-2.240	5.018	.248
11	11.638	-0.638	0.407	.035
7	6.831	0.169	0.029	.004
4	2.277	1.723	2.969	1.304
22	17.963	4.037	16.297	.907
20	20.240	-0.240	0.058	.003
9	11.638	-2.638	6.959	.598
8	6.831	1.169	1.367	.200
0	2.277	-2.277	5.185	2.277
11	17.395	-6.395	40.896	2.351
21	19.600	1.400	1.960	.100
16	11.270	4.730	22.372	1.985
5	6.615	-1.615	2.608	.394
4	2.205	1.795	3.222	1.461
<hr/>				
Total	233	233	0	12.969

Note: Chi square = 12.97. Lacks significance @ 5%.

TABLE II

CHI SQUARE COMPUTATION OF RELATIONSHIP BETWEEN
IMMEDIATE POSITIVE REINFORCEMENTS GIVEN BY
TEACHERS AND SEX OF PUPILS

o	e	o-e	$(o-e)^2$	$\frac{(o-e)^2}{e}$
25	33.408	-8.408	70.694	2.116
42	36.656	5.344	28.558	0.779
20	21.344	-1.344	1.806	0.085
11	10.208	0.792	0.627	0.061
10	6.496	3.504	12.278	1.890
47	38.592	8.408	70.694	1.832
37	42.344	-5.344	28.558	0.674
26	24.656	1.344	1.806	0.073
11	11.792	-0.792	0.627	0.052
4	7.504	-3.504	12.278	1.636
Total 233	233	0		9.198

Note: Chi square = 9.20. Lacks significance @ 5%.

distribution is 9.198. This is less than the significant value, and therefore the null hypothesis must be accepted. In this study, there was no significant relationship between the number of immediate positive verbal and nonverbal reinforcements given by the teacher and the sex of the pupils.

D. REINFORCEMENT AND SEX OF TEACHERS

The Mann-Whitney U Test of Rank Order (Wilcoxon T Test) was chosen to determine possible significance in the difference between the number of reinforcements given by the male teachers and the number of reinforcements given by the female teachers. The formulas below were derived from Tate and Clelland (1957, p. 89) and were used in this calculation:

$$T_f = N_f (N_f + N_m + 1) - T'$$

$$T_m = N_m (N_m + N_f + 1) - T'$$

If the T computed by this formula is equal to or less than the table value for the distribution, the null hypothesis is rejected. At the .05 level of significance the T must be equal to or less than 13. The computed T 's for this distribution are $T_{\text{female}} = 16$ and $T_{\text{male}} = 20$. Since both of these T values are more than 13, the null hypothesis must be accepted. In this study, there was no significant difference between the number of immediate verbal and nonverbal positive reinforcements given by the male teachers and the

number of such reinforcements given by the female teachers.

Table III shows the rank order of the teachers which was used in this computation.

E. REINFORCEMENT RELATED TO SEX OF TEACHERS AND SEX OF PUPILS

Chi square was computed to determine whether there was a significant relationship between the sex of the teacher and the number of reinforcements given to pupils of each sex. A two by two table, using the number of reinforcements given by male and female teachers to male and to female pupils, was used. Table IV shows this chi square computation.

For the one degree of freedom allowed by this distribution the null hypothesis must be rejected at the .05 level if the value is equal to 3.841. The computed chi square for this distribution equals 1.989. This is less than the significant value, so the null hypothesis cannot be rejected. In this study, there was no significant relationship between the sex of the teacher and the number of reinforcements given to male and to female pupils.

F. VERBAL AND NONVERBAL REINFORCEMENT

The number of verbal and nonverbal reinforcements given by each teacher was correlated by the use of the

2.2
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1.2
1.0
0.8
0.6
0.4
0.2
0.0

TABLE III

RANK ORDER OF TEACHERS BASED ON NUMBER OF IMMEDIATE
POSITIVE REINFORCEMENTS GIVEN TO PUPILS

Sex of Teacher	Number of Reinforcements	Rank
Female	183	1
Male	195	2
Male	201	3
Male	202	4
Female	226	5
Female	284	6
Male	344	7
Female	374	8
Total	1909	

Note: $T_f = 16$ $T_m = 20$. Lacks significance @ 5%.

MARK CHECKED FOR POSITIVE RESULTS

Box of 1000

Female	10
Male	10
Male	10
Male	10
Female	10
Female	10
Male	10
Female	10

Total

Note: 1 = 10

TABLE IV

CHI SQUARE COMPUTATION OF RELATIONSHIP BETWEEN SEX
OF TEACHER AND NUMBER OF IMMEDIATE POSITIVE
REINFORCEMENTS GIVEN BY THE TEACHER
TO PUPILS OF EACH SEX

	o	e	$o-e$	$(o-e)^2$	$\frac{(o-e)^2}{e}$
	498	482.597	15.403	237.252	0.491
	444	459.403	-15.403	237.252	0.516
	480	495.403	-15.403	237.252	0.479
	487	471.597	15.403	237.252	0.503
Total	1909	1908.99	0		1.989

Note: Chi square = 1.99. Lacks significance @ 5%.

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4. 10

6. 10

1. 10

3. 10

2. 10

Q. 2. 3

9. 10

4. 10

6. 10

1. 10

3. 10

2. 10

100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00

Total 100.00

Notes: All figures are in US dollars.

Q. 2. 3

9. 10

4. 10

6. 10

1. 10

Pearson Product Moment Coefficient. The formula used was found in Hammond & Householder (1962, p. 209):

$$r_p = \frac{n \sum XY - (\sum X)(\sum Y)}{\sqrt{[n \sum X^2 - (\sum X)^2] [n \sum Y^2 - (\sum Y)^2]}}$$

Table V shows the number of verbal and nonverbal reinforcements given by each teacher. Table VI shows the computation of r_p for this distribution. At the .05 level of significance for this distribution, r_p must be equal to or more than .71. The computed r_p was +.46. Since this was not equal to or more than the significant value, the null hypothesis must be accepted. In this study, there was no significant relationship between the number of verbal reinforcements and the number of nonverbal reinforcements given by the teachers. The obtained correlation was, however, in the predicted direction.

The significance of these computed statistical values will be discussed in Chapter V.

G. SUMMARY

In this chapter raw data were recorded and the statistical treatments of the data were described. The chi square test, the Mann-Whitney U Test of Rank Order, and the Pearson Product Moment Coefficient were used to test the data for significance. The computed values were compared with statistical table values to determine significance. All

100%
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 50%
 40%
 30%
 20%
 10%
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$$r = \frac{\sum XY}{\sqrt{\sum X^2 \sum Y^2}}$$

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TABLE V
IMMEDIATE POSITIVE VERBAL AND NONVERBAL REINFORCEMENTS
GIVEN BY EACH TEACHER TO PUPILS

Teacher	Verbal Reinforcements	Nonverbal Reinforcements	Total
1	64	19	83
2	190	5	195
3	195	6	201
4	161	41	202
5	313	31	344
6	171	55	226
7	233	51	284
8	294	80	374
Total	1621	288	1909

TABLE VI

COMPUTATION OF PEARSON PRODUCT MOMENT COEFFICIENT FOR
IMMEDIATE POSITIVE VERBAL AND NONVERBAL REINFORCEMENTS
GIVEN BY EACH TEACHER TO PUPILS

Verbal Reinforcements X	Nonverbal Reinforcements Y	XY	X ²	Y ²
64	19	1216	4096	361
190	5	950	36100	25
195	6	1170	38025	36
161	41	6601	25921	1681
313	31	9703	97969	961
171	55	9405	29241	3025
233	51	11883	54289	2601
294	80	23520	86436	6400
Total 1621	288	64448	372077	15090

Note: $r_p = +.46$

Lacks significance @ 5%.

COMPUTATION OF REINFORCEMENT REQUIRED FOR
IMMEDIATE POSITIVE MOMENT
SLOPE OF 1:1

Reinforcement	Vapor	Reinforcement
1		
24		
100		
100		
101		
813		
171		
233		
204		
Total 1021		

Robot $r_p = +.40$

computed values were found to lack significance at the .05 level and in each case the null hypothesis was not rejected. Tables showing the calculations were included in the chapter.

Table showing the relative values of the
layers and the total value of the
computed values of the layers.

Table 1

CHAPTER V

SUMMARY, CONCLUSIONS, AND REFLECTIONS

A. SUMMARY

Before valid decisions can be made in our schools concerning such provisions as ability grouping, optimum learning conditions, and teacher effectiveness, studies must be completed to determine more exactly what is happening now in the classrooms. The present study determined, by actual classroom observation, what differentiation of positive reinforcement was present in eight sixth-grade classes in four schools. Data from the interaction of four male and four female teachers and their 233 pupils were recorded, tabulated, and statistically analyzed.

These data were tested for five possible relationships: (a) teacher-given reinforcement and pupil IQ, (b) teacher-given reinforcement and pupil sex, (c) number of reinforcements given by male teachers and the number of reinforcements given by female teachers, (d) sex of teacher and number of reinforcements given to male and to female pupils, (e) verbal and nonverbal reinforcement given by the teachers. In each case, no significant relationship was found.

B. CONCLUSIONS

The lack of significant relationships which was found

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

1. SUMMARY

Before this decision was made in our schools concerning such provisions as ability grouping, learning conditions, and teacher effectiveness, studies must be completed to determine more exactly what is happening now in the classroom. The present study, determined by actual classroom observation, what differentiation of positive reinforcement was present in eight sixth-grade classes in four schools. Data from the interaction of four male and four female teachers and their 325 pupils were recorded, tabulated, and statistically analyzed. These data were tested for five possible relationships: (a) teacher-pupil reinforcement and pupil IQ, (b) teacher-pupil reinforcement and pupil sex, (c) number of reinforcements given by male teachers and the number of reinforcements given by female teachers, (d) sex of teacher and number of reinforcements given to male and to female pupils, (e) verbal and non-verbal reinforcement given by the teachers. In each case, no significant relationship was found.

2. CONCLUSIONS

The lack of significant relationships which was found

in this study reflects positively on the skill of the teachers who were observed. Although the range of number of reinforcements per child was large (0-24), it cannot be attributed to IQ of the pupils or to sex of pupils or teachers. These teachers were neither neglecting the brighter pupils nor showing them undue partiality as far as immediate positive reinforcement was concerned.

The finding that there is no significant relationship between the sex of a pupil and teacher reinforcement is in contrast to other research studies, which found that girls are favored in the classroom. Although there were more girls (125) than boys (108) in this study, the boys received a larger total number of reinforcements (978) than the girls (931). The chi square value for this distribution approached significance at the .05 level.

Neither male nor female teachers in this study reinforced pupils of their own sex significantly more; neither did they reinforce pupils of the opposite sex more frequently. This finding is contrary to the widely-held opinion that teachers show partiality to pupils of the opposite sex.

The rank order test for significance of difference in the number of reinforcements given by male and female teachers shows no significance at the .05 level. However, the total number of reinforcements given by each teacher varied greatly (Range = 83-374).

The number of verbal reinforcements (1621) was far greater than the number of nonverbal reinforcements (288). This finding is to be expected at this grade level in our highly verbal school programs. Statistical analysis showed a positive but not significant correlation between the number of verbal reinforcements and the number of nonverbal reinforcements given by the teachers. Therefore, we cannot conclude that those teachers who give a high number of verbal reinforcements give a comparatively high number of nonverbal reinforcements. The number of verbal reinforcements given by each teacher ranged from 64-294, and the number of nonverbal reinforcements given by each teacher ranged from 4-80.

In summary, the results of this study seem to indicate that the differentiation of reinforcement which was observed has some bases other than pupil IQ and sex. Other possible bases will be discussed in Section C which follows.

C. REFLECTIONS

In seeking an explanation for the finding that in this study boys were given more reinforcements than girls, the grade level must be considered. At the usual age for sixth-grade--11--girls are frequently entering puberty, with its resultant mood changes and emotional and physiological uncertainties. Boys of this age are usually pre-pubertal, and consequently are not yet experiencing these

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reactions. Teachers of this grade level frequently express displeasure and annoyance with the actions and attitudes of the girls in their classes. Perhaps these teachers unconsciously tend to reinforce the 'uncomplicated' boys more than the 'troublesome' girls.

The number of positive reinforcements given by each teacher varied greatly. Individual differences in teaching and personality would seem to be of more importance in this area than the sex of the teacher. These individual differences may also account for the wide range in the number of verbal and nonverbal reinforcements given by the teachers.

These consistent and encouraging lacks of significant differentiation of reinforcements on the bases of sex and IQ may have several explanations. The principals were given no criteria for assignment of teachers to the study except that no student teacher be working with the teacher. It is possible that, if the school had more than two sixth-grades, the principal assigned to the study those teachers he or she considered most capable.

The presence of an observer in the classroom may have influenced the teachers to make an effort to be more impartial in their relationships with the pupils. The observer felt, however, that by the time one-fourth of the observations had been completed, the teachers and the pupils relaxed and normal teacher-pupil interaction was resumed as

Cranab

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far as is possible with an observer in the classroom.

Although the analyses of the data showed no differentiation of reinforcement on the bases of IQ or sex, there was real differentiation of reinforcement in these classrooms. The range of 0-20 reinforcements per child is too great to ignore. Definite patterns of reinforcement, unique for each teacher, were noted. Some reasons for these differences must have been present.

Personality characteristics of the pupils may well be a major factor in the observed differentiation. It seemed during the observations that those children who were most frequently reinforced were the more outgoing, extroverted pupils in most cases. They were the ones who volunteered information and services more often, who responded more frequently and easily, and who thus gave the teachers more behaviors to reinforce.

One teacher made a pertinent comment in the post-observation discussion with the observer. She said that she purposely refrained from calling on the very shy pupils of any IQ or either sex because they became so uneasy when she did so. She said that she called on them quickly every time they volunteered, but seldom did so otherwise. Such recognition of individual differences and needs was suggested as desirable by Redl and Wattenberg (1951, p. 267-368).

The teacher's personality characteristics may be

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another aspect which can be considered relevant. A teacher who tends to have introvertive tendencies may either resent the extroverted child and thus give more negative reinforcement to that child, or she may approve of the child's outgoing personality so much that she gives the child a large amount of positive reinforcement. This same pattern may be found to a lesser degree and in the opposite direction with an extroverted teacher.

The fact that there were seven children who received no immediate reinforcement and 41 other children who received less than four reinforcements during the entire 12 observations was of concern. It is difficult to believe that during this length of time there were so few responses from these children which warranted immediate positive reinforcement. It would have been interesting to have observed how much negative reinforcement the teachers gave these children, but the research design did not include a recording of those data. Although any attention from a teacher or other prestige figure is better than ignoring the child, praise and encouragement are vital to the child's optimum growth and learning. If these children have gone through the previous years of school with a similar lack of reinforcement, their self-concept surely must have been affected in a negative manner.

Child psychologists increasingly emphasize that it is

another report... who tends to... the... need to... going... amount of... found to... an... The... no... less... films... this... children... It... relative... but... date... the... and... learning... years of... self-conscious... manner.

Child... ..

the very passive, the withdrawn, the least responsive child who needs more help from the adults in his world rather than the aggressive, noisy child. (Stephens, 1960, p. 688; Bower, 1962). It may be possible that these children, who have varying intellectual abilities, received few or no reinforcements from the teacher because of introvertive personality characteristics. They may be the truly neglected children in the classroom rather than the children of exceptional intellectual abilities.

The finding that the teachers in this study were not giving differential positive reinforcement on the basis of IQ would imply a weakness in the argument of those lay and professional people who insist that the intellectually gifted children must be segregated to insure them of enough attention from the teacher, or that the slower learners are being "rejected" in a heterogeneous group. In view of the results of this study, the controversy over ability grouping may be overemphasized. The capable teachers in these and other classrooms of the nation are surely conscious of the need to educate every child to his fullest potential, and they work to fulfill this need. More and better methods of enrichment and increasing acceptance of moderate acceleration aid the teacher in meeting the needs of the children of high intellectual ability. If school systems work to provide adequate facilities and assistance to the teachers in this

enrichment program the heterogeneous grouping with its social advantages may prove to be the best administrative arrangement. Surely more studies of actual classroom situations must be made to aid the schools in making such decisions.

D. SUGGESTIONS FOR FURTHER RESEARCH

The number of observational periods required for the children to become accustomed to the observer's presence in the classroom was more than had been anticipated. Other similar studies should be done allowing more time for this. During the first one or two observations, the children turned frequently to see what the observer was doing and some of them tried in various ways to get the attention of the observer. This occurrence was disruptive to class routine and undoubtedly annoying to the teacher. After the second or third observation, however, most of the children accepted the presence of the observer, and her arrivals and departures caused little disruption.

Observational studies which record both positive and negative reinforcements would add much information about the pattern of reinforcement in the classroom. The kinds of positive and negative reinforcement which are most effective in motivating children of different levels of intellectual ability should be determined. Experimental studies in learning laboratories have been done in this area, but actual

Q2
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entirely new and different from the old
advantages of the new system of
page 2. The new system of
must be made to the new system of

the new system of
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children to become accustomed to the new system of
in the classroom and the new system of
similar studies should be made similar to the old
During the first and second years of the new system
turned frequently to the new system of
some of them tried in various respects to make use of
the observer. This was the first time that the
routine and methodical work of the observer. The
second or third observation, however, was in the
accepted the present system of the new system of
depression ceased in the new system of

Observational studies were made in the new system of
negative reinforcement and the new system of
pattern of reinforcement in the new system of
positive and negative reinforcement in the new system of
in positive reinforcement of the new system of
ability should be observed in the new system of
positive reinforcement in the new system of

classroom observations and experimental situations are infrequently reported in the literature. Studies concerning the actual measurable relationship between various types of learning in the classroom and immediate reinforcement should be made to test the data secured from laboratory experiments of this nature.

Longitudinal studies of the pattern of teacher reinforcement also would give valuable information for use in teacher preparation. Does the reinforcement pattern of a teacher change after she has had advanced study in psychology and education? What types of courses or experiences most influence a teacher's attitude toward positive reinforcement? It is assumed that experience and maturity improve teaching ability in the use of positive reinforcement as well as in other areas. Can this be empirically ascertained?

A study of the relationship between teacher-given reinforcement and the personality characteristics of the pupils would be extremely interesting. The personality characteristics of the teacher as related to reinforcement patterns could be determined, and this would provide useful information for selection and guidance of teachers.

The variables of teacher socioeconomic level, age, experience, education, and IQ could be controlled to determine if these have any effect on reinforcement patterns in the classroom. Also, more research is needed into other

pupil variables which might affect the reinforcement patterns.

The effect of the group composition on the reinforcement pattern should be explored. If a frequently rewarded pupil is absent, how does the teacher change his pattern of reinforcement?

Almost all authors who have reported on observational studies emphasize the continued use of the technique as a valuable tool in studying teacher effectiveness. It should prove productive to use this technique in future studies to determine just which immediate reinforcements (extrinsic motivators) are successful in increasing intrinsic motivation of students.

Such studies can be utilized to help teachers become better teachers. Both in preservice education and in inservice education, teachers can gain insight and awareness of some of the problems with which they are faced in reinforcing desirable behavior in the classroom. Then perhaps the reinforcement theories which can be so readily documented in animal experiments will prove of greater value in human learning situations.

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APPENDIX

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REINFORCEMENTS WHICH WERE RECORDED AND THEIR CODED SYMBOLS

<u>Verbal</u>	
1. You did well	ydw
2. Good question	gq
3. Very nice	vn
4. Very good	vg
5. You're right	yr
6. Good point	gp
7. That's interesting	ti
8. Good for you	gfy
9. Pretty good	pg
10. Uh-huh	uh
11. Good	g
12. All right	al
13. Yes	y
14. O.K.	ok
15. Right	r
16. Good idea	gi
17. That's fine	tf
18. Good answer	ga
19. Good try	gt
20. Repeats with approval	ra
21. Sure	s
22. That's right	tr
23. Wonderful	w
24. Certainly	c
25. Excellent	ex
26. Good boy	gb
27. Good girl	gg
28. Approving comment	ac

<u>Nonverbal</u>	
1. Smile	sm
2. Nod of approval	na
3. Pat on shoulder	pa



1. For the first time
2. Good
3. Very good
4. Very good
5. For the first time
6. Good
7. For the first time
8. Good
9. For the first time
10. Good
11. Good
12. For the first time
13. Yes
14. Yes

1. Billie
2. Not at all
3. Not at all

