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# A Comparison of Third Grade Reading Practices, Objectives, and Achievment Test Results Between a Conventional Program and a Behavioral Objective Approach Program

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# A COMPARISON OF THIRD GRADE READING PRACTICES, OBJECTIVES, AND ACHIEVEMENT TEST RESULTS BETWEEN A CONVENTIONAL PROGRAM AND A BEHAVIORAL OBJECTIVE APPROACH PROGRAM

by

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# A B S T R A C T

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The study was concerned with investigating student achievement testing results, age and sex differences, and teaching practices between a behavioral objective type program and a conventional type program (arbitrarily defined) for the teaching of reading to third grade children as measured by standardized test instruments.

Thirty-one third grade students (16 boys and 15 girls) in the experimental class, with a median age of eight years, were compared with a control class of 33 students (19 boys and 14 girls), with a median age of nine years, as available small samples. Both groups were taught by one teacher.

The instructional materials selected were Houghton Mifflin's Panorama and workbook for the behavioral or experimental class. Follett's New Faces, New Places was used by the conventional group. Lippincott's Reading in Phonics lessons were used by both groups twice weekly. The Stanford Achievement Reading Test--Form W, Primary II was administered as pre- and post-test instruments.

Testing procedures for both groups with respect to time allotment, administration, and administrator for each test were consistent.

All pre- and post-test measures were collected and translated into appropriate numerical equivalents. From these data, means and standard deviations were established for both groups as well as within age and sex groupings. The Fisher t-test of significant differences between independent group means was used in handling the data. "z" scores were applied to all data to equate any uncontrolled group variances.

Teaching methodologies of two audio-recorded lessons were coded with an interaction analysis system measuring teacher verbalism.

The variables of age and sex revealed no significant differences appearing in the measured results of the study.

Teaching methodologies by the same teacher of both groups were proven to be significantly consistent based on types of teacher verbalism.

Although the experimental group exhibited pre-test superiority by age, rated cognitive abilities, vocabulary and paragraph meaning, and composite test means, the control group showed significant pre- to post-test gains in both paragraph meaning and composite means. Observational reports by the teacher, however, indicated superior affective attitudes and interests in reading for the experimental group.

Consistent with Gerhard's study, the findings, based on standard achievement tests, ". . . indicated no significant differences between the experimental and control groups." In the present study, the experimental group showed no significant gains from pre- to post-test. Thus, a conventional-factual approach was congruent with the achievement measures of the control group employed in this study.

Test exercises, in view of word choices for young children, seem not to be consistent with children's oral or written language. It seems logical to assume that such test construction may not enhance the reader's comprehension.

According to Chall, ". . . low IQ pupils achieved best results with phonic approaches." The lower achieving control group excelled at a significant level in pre- to post-test measures. Since both groups were exposed to bi-weekly phonics instruction, such impact may have been greater on the control group.

ACKNOWLEDGMENTS

So many persons have shared their ideas about teaching and particularly the third grade level of reading that naming all of them is impossible. However, a few have worked so diligently with me on this project that I would like to again say "Many thanks."

In the above category, I would like to place the following:

Miss Mary Stinson, the participating teacher, who approved the idea and accepted the challenge through many conferences and work sessions (included are the students of both classes).

Mrs. Ann Sutton, the Principal, for arranging schedules in order for the project to progress without too many major changes.

Mr. Ben Chinitz, Region 2 Superintendent, who gave permission for conducting the project in the region and also approved a visitation of region principals to observe the experimental class.

Dr. Ferdinand Galante, Department of Research and Development--Detroit Public Schools--who approved and gave the green light for the project.

Dr. Virginia B. Morrison, my advisor, with whom I have had many outstanding graduate classes.

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Mrs. Laura Freeman, my mother-in-law, who came and lived with us in order for me to study.

Mrs. Sallie Massey, my wife, for helping me research the literature, run errands, and save pennies in order for each student in the experimental class to have adequate materials to work with.

To the above and many others, I am deeply grateful.

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# INTRODUCTION

## General Significance

In today's world of unlimited technological and scientific advancements, coupled with overnight economic, political, and social changes, there is an evident and increasing necessity for more individuals to read with understanding and discrimination than ever has been necessary in the past. The increasing complexities of urbanization and of our society in general demand reading skills which, heretofore, have not been needed on such a broad scale. It is becoming increasingly clear that our citizens need to know about nutritional needs, for example, in order to insure the preservation of good health. The gravity of ecological problems confronting us dictates a literate society. Additionally, our citizenry are paying close attention to life, accident, and hospitalization insurance plans with still more desiring knowledge about assembly, operating instructions, and guarantee data for purchase of appliances, equipment, vehicles, and machinery.

With the available wide radio and television news and entertainment dissemination, which many consider adequate, one still has to read multiviewpointed articles for fine details with comprehension in order to stay abreast with the acceleration and diversity of events in our

time. In fact, basic reading skills are vital for survival in a world which now has at its grasp a greater wealth of knowledge and information than that of any previous generation in history.

Unfortunately, too many of our present day adults are left in a semi-literate state because they lack basic reading skills. On the other hand, there are many who are seeking to overcome this handicap through enrollment in home study correspondence and adult basic education classes.

## Specific Significance

Studies in education reveal that there are significant numbers of students who are not acquiring basic skills in reading as they "advance" through the graded structure. This is supported by the editors of Education U.S.A., Special Report,[1] who cite that because of reading difficulties, masses of American students are coming out of public schools unable to function effectively. The most publicized failure in education is the reading issue.

Other facets of the reading problem are as follows:

> One of four students nationwide has significant reading deficiencies; more than three million illiterates are in the nation's adult population; about one-half of the unemployed youth, ages sixteen to twenty-one, are functionally illiterate; three-quarters of the juvenile offenders in New York City are two or more years retarded in reading.
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> Achievement tests given to 84,000 third graders in New York City show that sixty percent are reading below the third grade level.
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> Recent studies indicate that the number of boys who either read

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[1]Education U.S.A. Special Report, Reading Crisis: The Problem and Suggested Solutions (Washington: National School Public Relations Association, 1970), p. 1.

> poorly or not at all exceeds the number of girls by ten to one. A USOE report estimates that from one to five percent of a school's population could have severe reading disability requiring technical diagnosis and treatment in a reading clinic. This may seem small, but in a city the size of Detroit, with some 300,000 children in the public schools, it means that 15,000 children probably need some kind of clinical help.[1]

Contemporary research indicates that these massive deficiencies in reading competence among students are completely out of phase for today's modern pace of civilized advancement. Students must be assisted to acquire competence in and reach levels of achievement commensurate with their abilities and their basic needs in order to exist in our technological society.

Based on the writer's observation and work in Detroit Public Schools reading program, from first through ninth grades, the third grade is selected by the author for study since it is seen as a pivotal level in the child's educational development. This judgment and final decision were based on such factors as the variety of reading programs, materials, and teaching strategies in use at this level. In addition, family mobility, student attendance patterns, school interests, attainment and lack of general progress were seen as particularly crucial factors in grade three. Further, this level is viewed by the author as an important plateau at which to insure that all students have mastered a prescribed volume of basic decoding and comprehension skills before advancing to higher grades. Most basic decoding skills (phonic, structural syllabification, and other word attack areas) are introduced in primary grades (one and two) and need reinforcement with added

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[1] Ibid.

progressive steps in all upper grades. Many reading and writing comprehension skills follow and are based on a similar pattern of progression. All current as well as many obsolete reading series for the third grade stress the reinforcement of such skills and corresponding knowledges. On the basis of an established foundation of these essentials, as well as effectual interests, motivations, and attendance regularities, third grade students should be able to meet the demands of readiness for upper grade prerequisites adequately. Often, however, students without this foundation are added to the ever-increasing volume of academically deficient readers.

## Definition of Terms

The term "homeroom class" in this study refers to a third grade academic classroom in which the teacher receives a group of thirty-five students from home and directs their learning activities in reading, English, spelling, and social studies. This activity is conducted during the morning half of the school day. The teacher has another group of afternoon third graders. They are taught similar subject matter, however, the specific materials and objectives may vary slightly depending on child needs. Each group is taught by three special subject teachers when away from the homeroom period of the day. The school defines special subjects to be mathematics, science, auditorium, art, and health education. Each of these classes is approximately fifty minutes in duration and are popularly and traditionally labeled as elements of the platoon system.

The teacher is defined as a regular contract and Michigan licensed professional who is certified to teach language arts and

the other academic specialties at the elementary level.

The school is classified and organized as an elementary unit essential to the platoon system--kindergarten through sixth grade. It has a student population of approximately four hundred thirty students. The school setting is in an older low socio-economic section of the city which has begun to decay. Thus since many homes are not the most desirable locations, families move in and out regularly. The problem of transiency then is one which constantly plagues the schools.

The behavioral approach is a program designed to improve the proficiency and quality of instruction. It centers on specific knowledges and skills (behavioral) that students should possess at the end of each class session as measured by the teacher. This program, using the Houghton Mifflin Series (see Chapter III, also Exhibits are in the Appendix), with its emphasis, materials, and teacher direction, is intended to serve as a medium of influence and control over the students' learnings. It is basically child centered. The learnings also include the mastery of skills and knowledges with progressive expressions of interests and attitudes in terms of observable outcomes which measure student advancement or lack of it. Inherent is goal specificity which assists the teacher in instruction as well as evaluation. The workbook is a comprehensive skill and comprehension reinforcement.

The conventional approach is also a program designed to improve the proficiency and quality of instruction. In this study, it will refer to materials which have been in use for several years (see Chapter III and Appendix). Lesson aims or goals are stated in broad global

terms which often add considerable difficulty in evaluations. There are no specific outcomes expected from each student as in the behavioral approach.

## Statement of the Problem

This study will focus on two third grade homeroom classes chosen non-randomly because of the small representation of third graders in the school. The morning group is the experimental group and the afternoon group is the control class. In this small school setting, the participating teacher is the regular third grade teacher. The situation very seldom warrants another complete third grade homeroom unless enrollments increase significantly and/or complete reorganizations occur. Consequently, the problem of universe selection is nil.

The lack of multiple groups within a given level is a limitation of the study. Such a limitation was felt to be minimal in terms of this study because of the very unique problems found in the school and its population.

By using one teacher, the investigator has lessened the problem of teacher variability. If two teachers were used, the author felt that the Hawthorne Effect might be a factor which could skew the results thus lessening the objective nature of the research.

The intent of the study is to investigate teaching practices, age and sex differences in and among groups, and student achievement testing results (pre and post) between a behavioral objective type program and a conventional type program for the teaching of reading to third graders in one school. It is the writer's opinion that the

factors to be investigated are relevant in attempting to seek solutions to the problem of reading inabilities and to enhance the teaching of reading as well. As a result of the investigation, it is assumed that testing results would be higher than at present.

This study was initially accepted and approved by the participating teacher and the Regional Superintendent of Region two. The Department of Research and Development reviewed and approved the project assigning it a number. That department requested and received approvals from the Divisional and Elementary Directors of Language Arts and the School Principal. These procedures were transacted during June, 1971 with expectations for the project to begin in September 1971. With these approvals, the researcher secured sufficient teacher manuals, materials, and supportive items for planning and establishing preparations for the participating teacher. Since the behavioral (Houghton Mifflin Series) material were not part of regularly ordered materials, the researcher was responsible for the acquisition of same. A full supply of student editions and workbooks arrived during the summer in time for the new school year.

With the beginning of September, 1971, the experimental group was introduced to the new series. The control group was introduced to New Faces, New Places which this study refers to as the conventional approach. This series is a continuation of the second grade series by the Follett Company.

An OScAR 4 (Modified) Verbal Lesson Strategy[1] was administered

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[1]Donald M. Medley, University of Virginia and Virginia R. Morrison, Oakland University, Rochester, Michigan: The ROScAR (Revised Observer Schedule and Record-Lesson Strategy Schedule), 1966.

with the experimental group for the purpose of reflecting consistencies or inconsistencies in the teaching methodologies. This strategy contained factors of verbal behaviors which were considered important "links" to what really occurs in the teaching-learning environment. Such statements as affective (considerate or rebuking), procedural (directing or describing), and substantive (informing establishing a problem to be solved) were included. Also, the teacher's evaluative responses to student responses in terms of being supporting, approving, neutral rejecting, and disapproving were recorded. Together, these recordings supported a positive teacher's verbal pattern which reflects a healthy attitude toward helping students with their learnings. One of the most important factors in the classroom is the teacher. The writer believes that data which reflect positive attitudes as well as a healthy classroom environment will produce improvements in the ability of students to learn any concepts and skills being taught. An analysis of the verbal lesson strategy is shown in Table 8, Chapter IV. Comparative analyses are shown in numerous charts throughout Chapter IV pertaining to pre and post-test data.

## Limitations of the Study

There are many limitations in the study which must be recognized but are beyond the obvious control of the researcher. Such considerations as family mobility patterns and conditions resulting in the fairly irregular attendance patterns are two potent factors which are common to many schools in this and similar settings.

The use of standardized tests for measuring achievements in reading has become a questionable policy nationwide. However, in the

absence of a better methodology and testing instrumentation, standardized tests were used. It is assumed that this limitation is not serious enough to warrant the development of special instrumentation for this study.

The use of one teacher versus two eliminates the problem of teacher variables. Although this reduces the pupil sample universe which is relatively small, it suffices for the investigative purposes of this study.

Student behaviors as results of conditioning against reading in the previous two years' experiences are unknown factors. Although the traditional or conventional reading approaches are based on comprehensive sequential programming supported by materials such as workbooks, study cards, special accompanying testing materials in addition to textbooks, many students are unable to function adequately as they enter the third grade.

Since this is the teacher's first attempt at teaching within a behavioral approach model, this lack of experience may be considered a limitation. However, this is minimized considerably because of the extensive preparations made prior to the beginning of the school year. Extensive preparations for any teaching phase is necessary in order to remain conversant with the contemporary methodologies and research findings. The administrator(s) of the school consider the teacher to be highly experienced, creative, innovative, and motivating.

## CHAPTER II

## REVIEW OF THE LITERATURE

According to Bernabei and Leles,[1] the movement of stating objectives in behavioral terms has come at a time when the objectives and effectiveness of public school curriculum and instruction are being challenged severely. Educators in the past have enjoyed a sanctuary in which the child has been held accountable for failure while the school has not. Behavioral objectives offer challenges to the school as well as the possibility of improved instruction and wiser curriculum decisions to educators and to the public. With clearly stated, short, intermediate, and long range objectives, the educational system is able to judge its degree of effectiveness. In a sense, then, a school may enter a contract with a child and with his parents: "These are the things we expect to accomplish with your child."

A review of research findings on the topic of comparing third grade teaching practices and achievement test results between a behavioral objective program and a conventional program reveals a paucity of research reported in the available literature. In fact, the writer was able to locate only one study which contrasted the two programs. Some

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[1] Raymond Bernabei and Sam Leles, Behavioral Objectives in Curriculum and Evaluation (Dubuque, Iowa: Kendall Hunt Publishing Company, 1970), p. ix.

articles tend to contrast advantages and disadvantages of behavioral objectives; others probe the difficulty of establishing uniform terms. Still others analyze the rationale and validity of the behavioral approach as well as attempt to seek clear definitions. In some publications, citations are made to general objectives as points of reference.

Gerhard cites a pilot program involving 2,600 students utilizing experimental and control groups. The following findings were reported:

1. Pupils who had been taught by this (behavioral objective) approach demonstrated greater achievement on tests which called for the processing of information and the application of this information to new situations than did pupils who had been taught by conventional methods.
2. Pupils who had been taught by this (behavioral objective) approach demonstrated greater growth in the development of their thinking skills at the end of the year than did comparable pupils in the control groups.
3. There is no difference between the experimental and control groups on the standard achievement test. This is not surprising because the standard achievement tests measure one's recall of specific bits of information rather than one's ability to apply knowledge and understanding to unfamiliar situations.[1]

Shanner, et al.,[2] in their introduction, state the purpose of behavioral objectives as one of making clear to teachers, students, parents, and other community members exactly what students should be able to do as a result of the instructional program.

The foreword to Mager's writing cites three significant questions which should be answered sequentially before instructing effectively:

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[1]Muriel Gerhard, Effective Teaching Strategies with The Behavioral Outcomes Approach (West Nyack, New York: Parker Publishing Company, 1971), p. 23.

[2]William M. Shanner, John C. Flanagan, and Robert F. Mager, Behavioral Objectives: A Guide for Individualizing Learning (Palo Alto, California: Westinghouse Learning Corporation, 1971).

1. What is it that we must teach?
2. How do we know when we have taught it?
3. What materials and procedures will work best to teach what we wish to teach?[1]

Hernandez[2] states that perhaps the most important judgment which should be made concerning any objective is that of relevance. Research and reason inform us that people learn faster that which they perceive as being relevant. This is viewed as the final determinant in accepting or rejecting any objective.

The notion of relevance is enhanced by Kibler, et al.[3] when they say that the educational environment plays a significant role in determining whether objectives can be profitable, desirable, and useful. The objectives must be geared to a given class and teacher in the context of a particular school system in order to be of maximum value. In order to determine whether a set of rigid behavioral objectives would be useful, a teacher should analyze the socioeconomic and educational structure of the students in a class. Objectives must be tailored to individual needs. A set of blanket objectives could do more harm than good in some classes or types of educational programs.

Mager[1] strongly emphasizes the point that an instructor will function in a fog of his own making until he knows just what he wants

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[1]Robert F. Mager, Preparing Instructional Objectives (Palo Alto, California: Fearon Publishers, 1962).

[2]David E. Hernandez, Writing Behavioral Objectives (New York: Barnes and Noble, Inc., 1971), p. 1.

[3]Robert J. Kobler, Larry L. Barker, David T. Miles, Behavioral Objectives and Instruction (Boston: Allyn and Bacon, 1970), p. 110.

[4]Mager, op. cit., p. 3.

his students to be able to do at the end of the instruction. He views an objective as an intent which is communicated by a statement describing a change in the learner--what he is to be like after completing a learning experience. When clearly defined goals are lacking, it is impossible to evaluate a course or program efficiently. Also, there is no sound basis for selecting appropriate materials, content, or instructional methods.

Barnabei and Leles express their views concerning objectives in the following manner:

> Educators have long talked about the need for objectives in curriculum and instruction. In actual practice, however, we have often operated without objectives or with objectives so grandiose in scope or so imprecise in meaning that they have been ineffectual as an instructional tool. Historically, objectives in curriculum and instruction have been characterized more by good intentions than by clarity and specificity. The lack of specific objectives makes evaluation of student achievement a questionable exercise and makes it equally difficult for a teacher to feel a sense of achievement, since he has no way of discovering when, if ever, he has accomplished those things which he decided were important.[1]

Kibler, et al. believe that behavioral objectives will be most valuable if they contain three elements recommended by Mager, namely:

1. A description of the type of observable behavior which a student will be asked to employ in demonstrating mastery of the objective (e.g., "to write," "to solve," "to identify," "to orally describe"). Terms such as "to know," "to understand," and "to appreciate" must be avoided since they do not refer to observable behavior.
2. A description of the important conditions under which a student will be expected to demonstrate achievement of the objective (e.g., time limits, materials or equipment that will be available, or special instructions).
3. The criterion which will be used to evaluate the success of the student's performance (e.g., must get 70 percent correct, complete the task in 15 minutes, or correctly identify eight out of ten).[2]

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[1]Barnabei and Leles, op. cit., p. ix.

[2]Kibler, et al., op. cit., pp. 4-5.

The basic function of these behavioral objectives is planning for instruction, not for informing others of instructional intentions. Kibler, et al.[1] also state that when behavioral objectives are given directly to students, the exact behaviors desired and the conditions under which the behaviors are to be exhibited are specified. A value of giving the objectives, which is intangible, is the sense of security experienced by the student when he knows specifically what he is expected to do as well as the conditions under which he is to exhibit his competencies. These objectives can help students understand specific requirements of a course and also reduce the amount of anxiety about course requirements.

One of the most helpful guides, according to Gronlund,[2] in defining and identifying instructional objectives is the Taxonomy of Educational Objectives (Bloom, 1956; Krathwohl, 1964). A three domain scheme (cognitive, affective, psychomotor) for classifying all possible instructional objectives is presented. Some objectives are difficult to classify because they include all three domains, but these should not be discarded.

Barnebei and Leles[3] see these objectives as valuable tools for educators, especially in accountability. Such objectives enable educators to improve their activity by systematic accountable means which facilitate evaluations. They state that it is easy to get caught up in

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[1] Ibid., p. 106.

[2] Norman E. Gronlund, Stating Behavioral Objectives for Classroom Instruction (New York: The Macmillan Company, 1970), pp. 18-25.

[3] Bernabei and Leles, op. cit.

the fascination of this new way of stating objectives, but it is a methodological development. This is not to produce slick, ready-made, packaged sets of objectives but rather to increase the competencies and performances of teachers. They do not suggest that the objectives are a panacea for all the assorted ills of curriculum and instruction. A behavioral objective cannot "do" anything by itself; it has to be translated by a skilled human teacher into the variety of curriculum choices and instructional strategies that will enable children to reach the objectives.

Plowman[1] contrasts behavioral objectives with general objectives. Behavioral objectives deal with concrete, specific, measurable goals whereas nonbehavioral objectives deal with more abstract concepts --philosophic, ideological, attitudinal aspects--which cannot be measured easily. Behavioral objectives are tools that, if used with competence, can do much to improve teaching and learning. They are not in and of themselves better than nonbehavioral objectives any more than specific objectives are more important than general ones. Each type has its own place and contributes to the enhancement of learning.

Kibler, et al.[2] refer to eleven reasons representing many of the arguments used to resist the implementation of precise instructional objectives. In spite of the favorable overall reaction to explicit objectives, a small group of dissident educators raised opposition to the quest of goal specificity. Although there are elements of truth in

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[1]Paul D. Plowman, Behavioral Objectives (Chicago: Science Research Associates, 1971), p. xxv.

[2]Kibler, op. cit., pp. 115-123.

the reasons, there is also the danger that many instructors will use those comments and objections as excuses from thinking clearly about their goals at a time when attempts are being made to promote wide scale adoption of precision in the classroom.

The behaviorist view reported in the studies by Smith[1] is that all learning is habit forming. The only data of significance are the observable circumstances in which habits are established. He also states a cognitive view that learning involves an interesting unobservable manner of acquiring and organizing information by the brain. Neither of these views is better or more correct. They have coexisted for many years, he reports.

Gronlund mentions an important criteria phase for consideration in deciding on objectives. Are the objectives in harmony with basic principles of learning? The following are factors which should be considered:

1. Readiness. Are the students mature enough to attain these particular objectives? Do the students have the necessary experiences and educational background to proceed successfully? Is there another level at which some of the objectives might be attained more readily?
2. Motivation. Do these particular objectives reflect the needs and interests of the students? Can they be restated or modified to be more closely related to the students' concerns? Is there another stage of development where these objectives would more closely fit the students' emerging interests?
3. Retention. Do these particular objectives reflect learning outcomes that tend to be retained longest (e.g., understanding, application, etc.)? Are there other objectives that might be more lasting and that should be included?
4. Transfer value. Do these particular objectives reflect learning outcomes that are widely applicable to new situations? Do

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[1]Frank Smith, Understanding Reading (A Psycholinguistic Analysis of Reading and Learning to Read) (New York: Holt, Rinehart & Winston, Inc., 1971), p. 60.

> the objectives include methods of study and modes of thinking that are most likely to contribute to future learning in the area?
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> These questions are not always easily answered, but they highlight the importance of considering the learning process when you formulate and select instructional objectives. Most general textbooks on educational psychology will provide extended discussions of the basic learning principles. It is sufficient to point out here that the more complex learning outcomes tend to be retained longer and have greater transfer value.
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> When they are appropriate to the developmental level of the learner, the more complex outcomes have the greatest potential for arousing and maintaining student interest.[1]

Schnepf and Meyer[2] cite two crucial factors which are related to the cognitive growth of a child. These factors are a stimulating environment with a variety of experiences and an adult who can interpret these experiences with the child so that language is developed. Language provides concepts for the child which are the tools with which he gains control over his environment. Concepts enable the child to classify and categorize events and advance to see various relationships.

Bloom, et al.[3] view education as a process which helps a learner change in many ways--some intentional, others unintentional. School administrators and teachers decide how they want changes to occur and the part they can play in aiding in the process. Upon completion of instruction, the task becomes one of determining whether the learner has changed in the desired ways and whether any unanticipated results occurred.

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[1]Gronlund, op. cit., pp. 30-31.

[2]Virginia Schnepf and Odessa Meyer, Improving Your Reading Program (New York: The Macmillan Company, 1971), p. 47.

[3]Benjamin S. Bloom, J. Thomas Hastings, and George F. Madaus, Handbook on Formative and Summative Evaluation of Student Learning (New York: McGraw-Hill Book Company, 1971), p. 19.

A subset to the above view is offered by Chaffin[1] who states that it is the particular teacher and what that teacher does with a particular child which makes the difference in reading failures.

One of the more pervasive debates about teaching today, says Cummings,[2] is between those representing the structured classroom and those representing the unstructured classroom. The argument is that there is no such thing as an unstructured classroom. The traditional teacher endeavors to confine students within a two by four structure in which their bodies are enclosed within the four walls of a classroom and their minds imprisoned within textbooks, workbooks, tests, outlines, reading lists, and syllabi. These traditional classroom resources certainly influence the development of a structure. Such resources demand a rigid prefabricated structure. Knowing the material to be covered and the time allotted to cover it, the teacher must preplan precisely. Teacher and student behaviors become those intended to get the material covered. Prime criteria in the assessment of progress are the clock and calendar. Admitting that the description is overt, Cummings sees unstructured teaching resting on mutual expectations of the teacher and students. This should be a significant teacher consideration. Initially, effective rapport, and finally, effective learning depend on this. These expectations are perceptions which produce a flexible structure. Once they are mutually defined and cherished, they become descriptive factors in the teaching-learning process.

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[1]Lavor Chaffin, "How to Raise Reading Scores," American Education, Vol. 6, No. 10 (Dec. 1970), p. 12.

[2]Robert E. Cummings, "All Teaching Is Structured," Journal of Teacher Education, Vol. 22, No. 3 (Fall, 1971), pp. 291-293.

Roles become fluid in the flexibly structured classroom teachers teach and students learn; students teach and teachers learn. Resources of each one become available to all others. Fluid structure teaching does not shun content nor depreciate subject matter. It attempts to provide cogency and relevance. It defines the function of content as one of uniting the teacher and students at a point of departure for its interpretation, modification, rejection, extension, and qualification; all of which fuel the process of change within the teacher and student--the process of learning.

Olson's[1] research on ways to achieve quality in classrooms revealed some interesting factors relating to this present study. His research, including nearly 10,000 elementary school classrooms, indicated that the single strongest overall predictor of quality was the style of educational activity. The first three of fifteen activities relied heavily upon (1) seatwork, (2) question/answer, and (3) individual work. He suggested that school systems could improve their performance scores significantly by increasing the frequency or skill with which teachers use those highest scoring styles.

Gerhard labels the repertoire of teaching processes as process methodology. In all content areas at the elementary school level, all teaching styles are applicable. Consequently, teachers seek to apply as wide of a variety as possible.

> The most efficient method of insuring that a large number of processes is utilized is to plan two sections of a learning unit

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[1]Martin N. Olson, "Research Notes-Ways to Achieve Quality in School Classrooms: Some Definite Answers," Phi Delta Kappan, Vol. 53, No. 1 (September, 1971), p. 62.

> and screech to a halt. The table of specifications is then used, and the teacher examines the process profile which is emerging. If too much emphasis is being given to one process, methods and questioning patterns are restructured. Therefore, there is no need to revise a total unit; the teacher is able to diagnose her profile (process) as she plans the unit and makes the necessary adjustments to broaden the pattern.[1]

The notion that most students can master what we have to teach them is expressed by Bloom, et al.[2] when they indicate that it is the task of instruction to locate the means which will enable pupils to master the subject matter under consideration. A basic task is that of determining what is meant by "mastery of the subject." Then one has to search for methods and materials which will enable the largest portion of our students to attain that mastery. The task becomes one of finding strategies which will take individual differences into consideration in such a way as to promote the fullest development of the individual. If school learning is considered frustrating and even impossible for many students, little can be done at later levels to kindle genuine interest in further learning. In order for learning to continue throughout life as needed, school learnings must be successful and rewarding as a basis.

The preface to Johnson and Johnson's publication[3] states two significant points: (1) the individual instructor remains the key to

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[1]Muriel Gerhard, Effective Teaching Strategies with the Behavioral Outcomes Approach (West Nyack, N. Y.: Parker Publishing Company, 1971), p. 204.

[2]Bloom, op. cit., pp. 43-45.

[3]Stuart R. Johnson and Rita B. Johnson, Developing Individualized Instructional Material (New York: Westinghouse Learning Corporation, 1971).

any effective program and must be convinced that students can learn. While this is not an easy assignment, it must be accomplished, and (2) the whole system really depends on the instructor's wisdom to see his willingness communicate that which his students should learn and be able to do at the end of his efforts.

Gerhard's[1] strategy approach states that since the behavioral plan does not involve one method or technique, teachers see not only the reality of student individual differences, but also those within themselves. Items used are inductive-deductive, creative, and critical thinking approaches where pupils not only induce generalizations, but advance beyond to arrive at specific data. The teacher does not ignore so-called conventional methods such as the lecture, discussion, recitation, project, self-selection, and "discovery" approaches as vague as they may seem. She does not use them in the traditional sense. Lectures are followed-up by thought-provoking questions to encourage and stimulate interaction with the particular content.

The first step in Gerhard's[2] behavioral approach is diagnosis. It determines where the student is--his knowledge and skills in specific content areas and weaknesses. This data aids in deciding content, skills, resources, and methods to use. Then teaching proceeds. Evaluation is in order continuously to review pupils' and teachers' progress in terms of their goals. This continuous evaluation is referred to by Bloom, et al.[3] as formative because it occurs or intervenes during fluid

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[1] Gerhard, op. cit., p. 205.

[2] Ibid., p. 22.

[3] Bloom, op. cit., p. 7.

stages of the learning processes. Processes are susceptible to beneficial modifications at those periods. If evaluations are to aid the teaching and learning processes, they must be formative in nature.

Gronlund presents a list of questions illustrating some of the major instructional decisions teachers are likely to encounter. Types of evaluation data are included in parenthesis:

1. How realistic are my teaching plans for this particular group of pupils? (Mental ability tests, past record of achievement.)
2. How should the pupils be grouped for more effective learning? (Range of mental ability scores, past record of achievement.)
3. To what extent are the pupils ready for the next learning experience? (Readiness tests, pretests over needed skills, past record of achievement.)
4. To what extent are pupils attaining the minimum essentials of the course? (Mastery tests, observation.)
5. To what extent are pupils progressing beyond the minimum essentials? (Periodic quizzes, general achievement tests, observation.)
6. At what point would a review be most beneficial? (Periodic quizzes, observation.)
7. What type of learning difficulties are the pupils encountering? (Diagnostic tests, observation, pupil conferences.)
8. Which pupils are underachievers? (Mental ability tests, achievement tests.)
9. Which pupils should be referred to counseling, special classes or remedial programs? (Mental ability tests, achievement tests, diagnostic tests, observation.)
10. Which pupils have poor self-understanding? (Self ratings, pupil conferences.)
11. Which school mark should be assigned to each pupil? (Review of all evaluation data.)
12. How effective was my teaching? (Achievement tests, pupil ratings, supervisors' ratings.)

The main contention is that the effectiveness of the instruction depends to a large extent on the quality of the evaluation information on which decisions are made.[1]

A broad but concise view of evaluation and its place in education primarily focused on use to improve teaching and learning according to Bloom, et al. and includes the following items:

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[1]Norman E. Gronlund, Measurement and Evaluation in Teaching (New York: The Macmillan Company, 1971; 2nd ed.), pp. 6-7.

1. Evaluation as a method of acquiring and processing the evidence needed to improve the student's learning and the teaching.
2. Evaluation as including a great variety of evidence beyond the usual final paper and pencil examination.
3. Evaluation as an aid in clarifying the significant goals and objectives of education and as a process for determining the extent to which students are developing in these desired ways.
4. Evaluation as a system of quality control in which it may be determined at each step in the teaching-learning process whether the process is effective or not, and if not, what changes must be made to ensure its effectiveness before it is too late.
5. Finally, evaluation as a tool in education practice for ascertaining whether alternative procedures are equally effective or not in achieving a set of educational ends.[1]

They also view evaluation as playing a role in providing the teacher with data required for decision making about individual students or about entire groups. Consequently, they regard the professional growth of the teacher as being dependent upon his ability to secure the evaluation evidence and other information and materials he needs to constantly improve his teaching and the students' learning.[2] Often, evaluation has been entirely summative--occurring only at the end of a unit, chapter, course, or semester, when it is too late for improvements. Such assessments primarily serve purposes of grading, certifying students, judging teacher effectiveness, or for comparing curricula, according to Bloom, et al.[3]

Gronlund[4] mentions two major ways that this evaluation process can facilitate pupil motivation. These are (1) providing immediate attainable goals toward which to work, and (2) providing knowledge of

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[1] Bloom, op. cit., pp. 7-8.

[2] Ibid., p. 15.

[3] Ibid., p. 20.

[4] Gronlund, op. cit., p. 473.

learning progress. Working toward remote goals without the encouragement of immediate consequences has very little meaning for children and adolescents. Pupils need short-term goals to serve as guideposts.

Extrinsic motivation is educationally justifiable, says Heilman,[1] but teachers must remember its limitations. It can work only for a limited time. While it is being used and serves as an ego satisfaction for the child, the real aim is to have the child develop a love for reading which in time becomes the reward itself. When this happens, the child will no longer need the show of accomplishment in many of the techniques of motivation used. Teachers must be prepared to guide students in selecting books which they are capable of reading and which they will enjoy. Nothing kills interest in reading so quickly as material for which one has no interest nor an adequate background. Often, the teacher can supply these prerequisites. If the student is reading a biography, he should know something about the central character's background, accomplishments, and contributions. In dealing with historical works, etc., he should be aware of events and conditions which would make the story more meaningful.

The best test of a school's reading program, according to Russell,[2] may not be the scores on a reading achievement test, but in the realm of reading habits children have when they leave school. These are habits which may persist for the remainder of their lives. It is

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[1]Arthur W. Heilman, Principles and Practices of Teaching Reading (Columbus, Ohio: Charles E. Merrill Books, Inc., 1961), pp. 144-145.

[2]David Russell, Children Learn to Read (Boston: Ginn and Company, 1961), pp. 19-22.

not beneficial to anyone, even children themselves, if they score well on reading tests and never open a book on their own accord.

Chall's[1] analysis of research evidence concerning the influence of methods revealed some pertinent information. From Currier's 1923 triple divided third grade class study (no phonics, intensive phonics, easy reading program plus intensive phonics and word drills), all groups made good progress. That study concluded with the fact that not all students learn best from the same system. Mills' 1956 comparison of four word recognition teaching methods (kinesthetic, phonic, visual, and a combination of the three) to second and third graders who were six months retarded indicated that there were differences in effectiveness according to I.Q. Phonetic approaches were best for low I.Q. pupils. Visual and the combination were best for those in the 85 to 100 range. All approaches were effective for those in the 105 to 120 category.

According to Chall, the cases studied shared a common problem--extreme difficulty with decoding. There was no problem with comprehension. She cites the following description of a true reading disability pupil:

> He is intelligent enough to understand the stories that other children of his age and mental ability can read (when these are read to him), but he cannot read them himself--because he cannot identify the words. Even if he learns to read silently, he often does poorly with spelling and oral reading, both of which have stronger decoding components than silent reading.[2]

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[1]Jeanne Chall, Learning to Read--The Great Debate (New York: McGraw-Hill Book Company, 1970), pp. 173-175.

[2]Ibid., p. 176.

The authors of cases studied by Chall cited that lack of interest in reading and in school work were not causes, but results of reading difficulties.[1] Those reading problems such as poor comprehension and slow rate were listed as results of lack in decoding skills. Once students achieve success in decoding skills, they begin acquiring interest in reading and in school work. This enables students to overcome specific reading problems. Evidence cited in this study indicated that the initial reading method that stressed "word" or "natural" reading and failed to provide consistent sufficient training in decoding yielded more serious reading failures than one which emphasized the code.

Chall also refers to Fernald's viewpoint that the first step in learning to read is to master the printed code for the spoken language. She concluded with the point that:

> At least some children need to learn the written code for the spoken language in a more systematic way and to be encouraged to use "low order" responses such as tracing, writing, pointing, sounding, etc.[2]

A code emphasis only as a beginning method is recommended by Chall.[3] Research available from 1912 to 1965 indicated that code emphasis produces better results by the end of the third grade. The better results are in terms of ultimate reading goals including comprehension and speed reading. The evidence does not cite or endorse one code or method over another.

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[1] Ibid.

[2] Ibid., p. 177.

[3] Ibid., p. 307.

Little has been done in the primary grades toward attempting to compare two different objective approaches in the teaching of reading at the third grade level. In order to build upon the work of Chall's analysis of methodologies, this study proposes to add to knowledge by such a comparison of objectives-based programs.

# CHAPTER III

## DESIGN OF THE STUDY

For many years the author has observed, with some concern, the procession of primary (second grade) students moving into the third grade. Such concerns are based primarily on the knowledge, albeit opinion, that the third grade program is not nearly as comprehensive as the second grade program. Workbooks, study guide cards, and specially prepared accompanying testing materials, for example, often terminate at the end of the second grade in many elementary schools. Consequently, many students encounter difficulties adjusting to the change in learning materials--especially those who are deficient in vital skills. On occasions, third grade teachers have to extend the use of second grade workbooks and supportive materials for a period of time in order to build in the areas of deficient skills and to serve as a bridge for some students. Even this fails to help many students who are unable to progress adequately on this level. Against such a background as well as the knowledge that reading difficulty compounds itself geometrically each successive school year, this investigation was originated.

The following is a description of students and materials utilized in the Behavioral Objective Approach (experimental) and the Conventional Approach (control) groups:

Behavioral Approach Group

There were 31 third graders consisting of 16 boys and 15 girls. The median age at the beginning of the school year was eight years (17 at 8 years; 7 at 9 years; 4 at 10 years; and 4 at 11 years).

Materials

Textbooks used by this group were Panorama[1] with its accompanying workbook (see Appendix) and Reading with Phonics.[2] The Stanford Achievement Test[3] was the pre- and post-test instrument.

Conventional Approach Group

There were 33 third graders consisting of 19 boys and 14 girls. The median age was nine years (15 at 8 years; 13 at 9 years; 5 at 10 years; and one at 12 years).

Materials

Textbooks used by this group were New Faces, New Places,[4] Friends Far and Near,[5] and Reading with Phonics.[6] The Stanford

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[1]William K. Durr, Jean M. LePere, Ruth Brown, Panorama (Boston: Houghton Mifflin Company, 1971).

[2]Julie Hay, Charles E. Wingo, Reading with Phonics (Philadelphia: J. B. Lippincott Company, 1968).

[3]Truman L. Kelley, Richard Madden, Eric F. Gardner, Herbert C. Rucman, Stanford Achievement Test--Form W, Primary II (New York: Harcourt, Brace and World, Inc., 1966).

[4]Writers' Committee of the Great Cities School Improvement Program of the Detroit Public Schools, New Faces, New Places (Chicago: Follett Educational Corporation, 1970).

[5]David H. Russell, Theodore Clymer, Gretchen Wulfing, Friends Far and Near (Boston: Ginn and Company, 1966).

[6]Hay and Wingo, op. cit.

Achievement Test was the pre- and post-test instrument for this group also.

## Procedures

The students' first grade rated Cognitive Abilities Test results were collected and tabulated with their ages in terms of months at the time of testing. The Stanford Achievement Pre-test was administered at the beginning of the school year. The results--vocabulary raw scores and grade equivalents, paragraph meaning raw scores and grade equivalents, and total composite scores--were collected and tabulated. These data were separated according to the two groups--experimental and control. Boys' data was separated from girls' data in order to observe the effects of any sex differences, if any, between or within these groups.

The Fisher t-test of significance was used to detect any significant differences between various factions of data presented.

Both groups were exposed to the same phonic lessons which were presented twice weekly. Since this treatment provided a consistent process of auditory and visual discrimination exercises, the teacher was able to progress sequentially through the texts without having to schedule related skills from different texts simultaneously. Any related text phonic lessons which paralleled those in the mutually utilized phonic text would thus serve as additional reinforcement for each student in either group.

Both groups were also exposed to related lessons on mastering multiple choice questions commonly used on standardized exercises. This

approach included emphasis on the process of elimination--rejecting or isolating irrelevant items and narrowing choices to one specific element in the most expedient time.

Examples of some of the numerous aims or objectives stressed in both approaches are included in the following:

--Converting the printed language into oral language through silent reading and being able to read aloud fluently with appropriate pronunciations and expressions.

--In comprehension and interpretation, one should be able to answer questions correctly and reflect wise critical thinking.

--Utilize reference skills as vehicles to good study procedures.

Examples of some of the many specific skills stressed in both approaches include numerous exercises leading to mastery of the following skills:

--Word recognition clues--consonants, blends, diagraphs, vowels--principles of syllabication and structural analysis procedures.

--Contextural clues and approaches . . .

--Interpretative skills including noting and remembering details and sequence, making inferences, generalizations, drawing conclusions and summarizing.

Examples of some of the consistent phonic treatment provided by the Lippincott Text (used by both classes) include:

--Long and short vowels

--Ten consonant sounds (s,m,f,r,n,g,b,t,p,d)-voiced/voiceless

--Short vowel blends (su-sun, se-set, sa-sat, so-sob)

--Consonant-consonant vowel blends (bla,ble,blo,blu)

--Consonant diagraphs (sh,ck,ch,th,ng,nk)

--Vowel diagraphs (ai,ay,ea,ie,ee,oa,ow,oe,y)

--Inflections (ed,ing)

--Triple consonant vowel blends (str, spr,spl,scr)

Resources included pictures, charts, teacher made word and phrase cards, collections of related poems and short stories, and numerous chalkboard exercises stressing pertinent lesson data to strengthen each lesson presented. Each text lesson was supported by at least three workbook activities.

A demonstration lesson was presented by the teacher for a group of administrators. The lesson was audio taped and then was coded by an observer trained in the Medley-Morrison OScAR technique of coding teacher classroom verbal statements. This report is included in Chapter IV in the analysis of the data.

The suggestions and format of the Behavioral lessons, planned by the teacher attempted to introduce sound associations (phonics) for new words in such a way that most students will be able to progress through their silent reading assignments with competence to perform most additional assignments which may be given by the teacher. Sample lesson plans are included in the Appendix. Teacher manuals for Panorama and New Faces, New Places also are included in the supplementary section of materials used in the study.

Testing procedures for both groups were the same with respect to time allotments, administration, and the person administering each test.

# CHAPTER IV

## PRESENTATION OF THE DATA

In the analysis of the data for the study, the author attempted, first, to deal with the factor of sex differences within, and among, the groups in this particular area of reading. The literature well documents findings that girls, generally, surpass boys in reading score means. Therefore, in order to negate differences presumed to be accountable due to sex differences in the experimental and control groups, pretest data are presented in Tables 1 through 4, by employment of the Fisher t-test of significant differences between independent group means, to indicate that no significant mean differences between boys and girls within each particular group existed.

Table 1 is a compilation of data concerned with the birthdates and ages, in months, of the experimental group and with the cognitive abilities ratings from the cumulative student records which have been translated into grade-numerical equivalents.

Means of 82.8 months for boys and 81.5 months for girls of the experimental group, with standard deviations of $\pm$ 4.7 and $\pm$ 3.3, respectively, resulted in a t-score of 1.26 or the establishment that there was no significant difference between sexes in the experimental group by age.

Rated cognitive abilities by grade means, translated into numerical scale, for the experimental boys' group of 4.9 (or C- to C), with a standard deviation of ± 3.8, and a grade mean for the girls' group of 3.6 (or D+ to C), with a standard deviation of ± 3.3, are shown. The Fisher t-score of .742 was not at a significant level of difference, between boys and girls of the experimental group, in cognitive abilities ratings. These two t-scores are presented to show equated sexes, by age and cognitive abilities ratings, within the experimental group. In all data, any lack of individual scores, shown as a -, are due to illness, absenteeism or family mobility on the test or test make-up, days.

In Table 2, similar data are offered to indicate equated sexes within the control group's age and rated cognitive abilities means. Age means for boys of the control group of 80.4 months are compared with an age mean of 79.6 months for girls. Standard deviations are ± 4.2 and ± 1.9, respectively. Application of the Fisher t-formula, resulting in a t - of .571 revealed no significant differences by sex, in age factors.

Boys in the control group, when compared with girls in the same group, attained a mean score of 3.5 (or D+ to C-) in rated cognitive abilities, with a standard deviation of ± 2.2. Girls, of the same control group, scored a grade mean of 2.6 (D to D+), with a standard deviation of ± 2.3. A t - of .841, based on sex, established that no significant difference was found in means for boys and girls of the control group for rated cognitive abilities.

TABLE 1

PRE-TEST DATA: AGES AND RATED COGNITIVE ABILITIES--
EXPERIMENTAL GROUP BY SEX

| Pupil No. | Sex | Birth-date | Age in Months | Age | Fisher t-test of Significance | Cognitive Ability Test-Gr.1 | $x^2$ | Fisher t-test of Significance |
|---|---|---|---|---|---|---|---|---|
| 1 | M | 1/27/63 | 86 | 7396 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} =$ | B = 8 | 64 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} =$ |
| 2 | M | 7/7/63 | 80 | 6400 | | C+ = 6 | 36 | |
| 3 | M | 4/23/63 | 83 | 6889 | | C- = 4 | 16 | |
| 4 | M | 3/8/61 | 84 | 7056 | $\frac{82.8 - 81.5}{\sqrt{\frac{4.7^2}{16} + \frac{3.3^2}{16}}} =$ | E- = -1 | 1 | $\frac{4.9 - 3.6}{\sqrt{\frac{3.7^2}{14} + \frac{3.3^2}{16}}} =$ |
| 5 | M | 3/8/62 | 84 | 7056 | | A** = 14 | 196 | |
| 6 | M | 10/19/60 | 89 | 7921 | $\frac{1.3}{\sqrt{\frac{22.09}{16} + \frac{10.89}{16}}} =$ | E- = -1 | 1 | $\frac{1.3}{\sqrt{\frac{13.69}{14} + \frac{10.09}{16}}} =$ |
| 7* | M | 1/8/63 | 86 | 7396 | | -- | -- | |
| 8 | M | 7/7/62 | 80 | 6400 | $\frac{1.3}{\sqrt{2.0612}} =$ | C = 5 | 25 | $\frac{1.3}{\sqrt{3.090}} =$ |
| 9 | M | 8/18/63 | 79 | 6241 | | B = 8 | 64 | |
| 10 | M | 7/19/61 | 80 | 6400 | $\frac{1.3}{1.03} =$ | C+ = 6 | 36 | $\frac{1.3}{1.75} =$ |
| 11 | M | 4/6/63 | 83 | 6889 | | B = 8 | 64 | |
| 12 | M | 4/28/63 | 83 | 6899 | 1.26 N.S. | C+ = 6 | 36 | .742 N.S. |
| 13 | M | 4/9/63 | 83 | 6889 | One-tailed test | C+ = 6 | 36 | One-tailed test |
| 14 | M | 11/1/62 | 76 | 5776 | df 16+16-2 = 30 | C+ = 6 | 36 | df 14 +16-2 = 28 |
| 15 | M | 3/31/62 | 84 | 7056 | $p > .05 = 1.69$* | C- = 4 | 16 | $p > .05 = 1.70$* |
| 16[a] | M | 1/20/60 | 86 | 7396 | $p > .01 = 2.45$** | -- | -- | $p > .01 = 2.46$** |
| N=16 | | Σ | 1326 | 110050 | | N=14 79 | 627 | |
| Range | | 89 - 76 = 13 months | | | | A** to E- | | |
| M | | = 82.8 | | | | | 4.9 | |
| S.D. | | = 4.7 | | | | | 3.8 | |

TABLE 1--(continued)

| Pupil No. | Sex | Birth-date | Age in Mon | Age | Fisher t-test of Significance | Cognitive Ability Test-Gr.1 | $x^2$ | Fisher t-test of Significance |
|---|---|---|---|---|---|---|---|---|
| 17 | F | 8/31/61 | 79 | 6241 | | EE = 0 | 0 | |
| 18 | F | 1/4/62 | 86 | 7396 | | C- = 4 | 16 | |
| 19 | F | 5/11/62 | 82 | 6724 | | E- = -1 | 1 | |
| 20 | F | 1/25/60 | 86 | 7396 | | E = 0 | 0 | |
| 21 | F | 3/24/62 | 84 | 7056 | | C = 5 | 25 | |
| 22 | F | 2/22/63 | 85 | 7225 | | C = 5 | 25 | |
| 23 | F | 8/6/63 | 79 | 6241 | | B = 8 | 64 | |
| 24 | F | 7/1/63 | 80 | 6400 | | C = 5 | 25 | |
| 25 | F | 1/23/63 | 86 | 7396 | | A = 11 | 121 | |
| 26 | F | 12/13/60 | 75 | 5625 | | E = 0 | 0 | |
| 27 | F | 8/18/63 | 79 | 6241 | | D = 2 | 4 | |
| 28 | F | 9/30/63 | 79 | 6241 | | C+ = 6 | 36 | |
| 29 | F | 8/2/63 | 79 | 6241 | | C = 5 | 25 | |
| 30 | F | 5/3/63 | 82 | 6724 | | C = 5 | 25 | |
| 31 | F | 7/12/63 | 80 | 6400 | | C- = 4 | 16 | |
| 32 | F | 4/17/60 | 83 | 6889 | | E = 0 | 0 | |
| N=16 | | Σ | 1304 | 106436 | | 59 | 383 | |
| Range 86 - 75 = 11 months | | | | | | A to E | | |
| M | | = 81.5 | | | | | 3.6 | |
| S.D. | | = 3.3 | | | | | 3.3 | |

[a]New student; out of stage.
-- No data (illness, absenteeism, family mobility, etc.)
* Significant @ the 5% level.
** Significant @ the 1% level.

TABLE 2

PRE-TEST DATA: AGES AND RATED COGNITIVE ABILITIES--
CONTROL GROUP BY SEX

| Pupil No. | Sex | Birth-date | Age in Months | $x^2$ Age | Fisher t-test of Significance | Cognitive Ability Test-Gr.1 | $x^2$ | Fisher t-test of Significance |
|---|---|---|---|---|---|---|---|---|
| 1 | M | 7/21/63 | 80 | 6400 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_1}}} =$ | C = 5 | 25 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} =$ |
| 2 | M | 12/10/62 | 75 | 5625 | | C = 5 | 25 | |
| 3 | M | 4/3/62 | -- | -- | | | -- | |
| 4 | M | 10/28/62 | 77 | 5929 | $\frac{80.4 - 79.6}{\sqrt{\frac{4.2}{12} + \frac{1.9}{7}}} =$ | C = 5 | 25 | $\frac{3.5 + 2.6}{\sqrt{\frac{2.2^2}{12} + \frac{2.3^2}{7}}} =$ |
| 5 | M | 9/16/62 | 78 | 6084 | | C = 5 | 25 | |
| 6 | M | 12/12/61 | -- | -- | $\frac{.8}{\sqrt{1.470 + .516}} =$ | -- | -- | $\frac{.9}{\sqrt{.403 + .755}} =$ |
| 7 | M | 2/21/63 | -- | -- | | -- | -- | |
| 8 | M | 5/25/63 | 82 | 6724 | $\frac{.8}{\sqrt{1.986}}$ | C = 5 | 25 | $\frac{.9}{\sqrt{1.159}} =$ |
| 9 | M | 4/1/62 | 83 | 6889 | | E = 0 | 0 | |
| 10 | M | 3/2/63 | -- | -- | $\frac{.8}{1.40} =$ | -- | -- | $\frac{.9}{1.07} =$ |
| 11 | M | 10/17/61 | -- | -- | .571 N.S. | -- | -- | .841 N.S. |
| 12 | M | 1/19/63 | 74 | 5476 | One-tailed test | C = 5 | 25 | One-tailed test |
| 13 | M | 9/29/63 | 78 | 6084 | df 12+7-2 = 17 | C = 5 | 25 | df 12+7-2 = 17 |
| 14 | M | 11/11/60 | 88 | 7744 | p > .05 = 1.74*<br>p > .01 = 2.56** | E = 0 | 0 | p > .05 = 1.74*<br>p > .01 = 2.56** |
| 15 | M | 2/14/62 | 85 | 7225 | | E = 0 | 0 | |
| 16 | M | 10/4/62 | -- | -- | | -- | -- | |
| 17 | M | 1/1/62 | -- | -- | | -- | -- | |
| 18 | M | 4/14/62 | 83 | 6889 | | C = 5 | 25 | |
| 19 | M | 5/27/62 | 82 | 6724 | | D = 2 | 4 | |
| 20 | M | 5/24/61 | -- | -- | | -- | -- | |
| N=20 | | (N=12) | 965 | 77783 | | (N=12) | 42 | 204 |
| Range 88 - 74 = 14 months | | | | | | C to E | 3.5 | |
| M = 80.4 | | | | | | | 2.2 | |
| S.D. = 4.2 | | | | | | | | |

TABLE 2--(continued)

| Pupil No. | Sex | Birth-date | Age in Months | $x^2$ Age | Fisher t-test of Significance | Cognitive Ability Test-Gr.1 | $x^2$ | Fisher t-test of Significance |
|---|---|---|---|---|---|---|---|---|
| 21 | F | 3/14/63 | 84 | 7056 | | D = 2 | 4 | |
| 22 | F | 5/17/63 | -- | -- | | -- | -- | |
| 23 | F | 9/6/62 | 78 | 6084 | | C = 5 | 25 | |
| 24 | F | 7/15/62 | 80 | 6400 | | C = 5 | 25 | |
| 25 | F | 8/10/63 | 79 | 6241 | | C = 5 | 25 | |
| 26 | F | 9/25/59 | 75 | 5625 | | E- = -1 | 1 | |
| 27 | F | 5/23/62 | -- | -- | | -- | -- | |
| 28 | F | 6/9/63 | -- | -- | | -- | -- | |
| 29 | F | 1/15/63 | -- | -- | | -- | -- | |
| 30 | F | 9/19/63 | 78 | 6084 | | D = 2 | 4 | |
| 31 | F | 4/17/63 | 83 | 6889 | | E = 0 | 0 | |
| 32 | F | 9/23/62 | -- | -- | | -- | -- | |
| 33 | F | 9/27/61 | -- | -- | | -- | -- | |
| 34 | F | 8/41/61 | -- | -- | | -- | -- | |
| N=14 | | (N=7) | 557 | 44379 | | (N=7) | 18 | 84 |
| Range 84 - 75 = 9 months | | | | | | C to E | | |
| M | | = 79.6 | | | | | 2.6 | |
| S.D. | | = 1.9 | | | | | 2.3 | |

-- No data (illness, absenteeism, family mobility, etc.)
* Significant @ the 5% level.
** Significant @ the 1% level.

It is concluded that, based on the variable of sex, that no significant differences were evidenced within this control group for either age or rated cognitive abilities; thus, the control group is also considered to be equated on these two variables.

Statistical data, in the form of raw scores from several portions of the Stanford Primary II, Form W Test, administered in September of 1971, were computed in Tables 3 and 4 to furnish further evidence of equatedness, by sex variables, within the experimental and within the control groups.

Pre-test Scores--Experimental Group

Mean scores of 17.2 for the boys' experimental group in the Primary II vocabulary section, as shown in Table 3 were comparable to girls' mean scores of 17.5 in this portion with standard deviations of 6.1 and 3.7, respectively. While the variability of the boys' group about the mean was more heterogeneous than that of the girls' group, a Fisher t- of .166 showed that no significant differences existed between these independent group means by sex.

Similarly, in Table 3, Primary II--Paragraph meaning mean scores of 22.3 and 23.0 for the experimental group--boys and girls, respectively, revealed no significant differences, by sex, in these independent group means although standard deviations of 12.0 and 10.7, respectively, showed an unlike spread about the means.

Composite, or average, grade equivalent scores for the Primary II Test were derived from individual averages of the two formerly mentioned test sections (Vocabulary and Paragraph Meaning). A mean of 2.46

TABLE 3

STANFORD ACHIEVEMENT PRE-TEST SCORES EXPERIMENTAL GROUP

| Pupil | Sex | Primary II Vocabulary Raw Scores | | Sept. 1971 Vocab. Gr. Equivalents | | Fisher t-test of Significance | Primary II Paragraph Meaning Raw Scores | | Sept. 1971 Paragraph Meaning Gr. Equivalents | | Fisher t-test of Significant Differences | Composite Primary II Gr. Equivalent Scores | | Fisher t-test of Significant Differences |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | x | $x^2$ | x | $x^2$ | | x | $x^2$ | x | $x^2$ | | x | $x^2$ | |
| 1 | M | 27 | 729 | 3.8 | 14.44 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} =$ | 35 | 1225 | 3.1 | 9.61 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} =$ | 3.4 | 11.56 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} =$ |
| 2 | M | 24 | 576 | 3.5 | 12.25 | | 38 | 1444 | 3.3 | 10.89 | | 3.4 | 11.56 | |
| 3 | M | 19 | 361 | 2.9 | 8.41 | | 27 | 729 | 2.6 | 6.76 | | 2.7 | 7.29 | |
| 4 | M | 15 | 225 | 2.6 | 6.76 | $\frac{17.5 - 17.2}{\sqrt{\frac{3.7^2}{15} + \frac{6.1^2}{16}}}$ | 15 | 225 | 1.9 | 3.61 | $\frac{23.0 - 22.3}{\sqrt{\frac{10.7^2}{15} + \frac{12.0^2}{14}}} =$ | 2.2 | 4.84 | $\frac{2.46 - 2.38}{\sqrt{\frac{.51^2}{15} + \frac{.86^2}{16}}} =$ |
| 5 | M | 20 | 400 | 3.0 | 9.00 | | 36 | 1296 | 2.5 | 6.25 | | 2.7 | 7.29 | |
| 6 | M | 22 | 484 | 3.2 | 10.24 | $\frac{.3}{\sqrt{.912 + 2.32}} =$ | 28 | 784 | 2.6 | 6.76 | $\frac{.7}{\sqrt{7.63 + 9.00}} =$ | 2.9 | 8.41 | $\frac{.08}{\sqrt{\frac{.2601}{15} + \frac{.7396}{16}}} =$ |
| 7 | M | 16 | 256 | 2.7 | 7.29 | | 16 | 256 | 1.9 | 3.61 | | 2.3 | 5.29 | |
| 8 | M | 7 | 49 | 1.7 | 2.89 | | 8 | 64 | 1.6 | 2.56 | | 1.6 | 2.56 | |
| 9 | M | 19 | 361 | 3.2 | 10.24 | $\frac{.3}{\sqrt{3.237}} =$ | 37 | 1369 | 3.2 | 10.24 | $\frac{.7}{\sqrt{16.63}} =$ | 3.2 | 10.24 | $\frac{.08}{\sqrt{.0173 + .0462}} =$ |
| 10 | M | 14 | 196 | 2.5 | 6.25 | | 15 | 225 | 1.9 | 3.61 | | 2.2 | 4.84 | |
| 11 | M | 10 | 100 | 1.9 | 3.61 | $\frac{.3}{1.8} =$ | 13 | 169 | 1.8 | 3.24 | $\frac{.7}{4.07} =$ | 1.8 | 3.24 | $\frac{.08}{.0635} =$ |
| 12 | M | 20 | 400 | 3.0 | 9.00 | .166 N.S. | 29 | 841 | 2.7 | 7.29 | .172 N.S. | 2.8 | 7.84 | .333 N.S. |
| 13 | M | 27 | 729 | 3.8 | 14.44 | One-tailed test | 36 | 1296 | 3.1 | 9.61 | One-tailed test | 3.4 | 11.56 | One-tailed test |
| 14 | M | 16 | 256 | 2.. | 7.29 | df 15+16-2 = 29 | 17 | 289 | 2.0 | 4.00 | df 15+16-2 = 29 | 2.3 | 5.29 | df 15+16-2 = 29 |
| 15 | M | 11 | 121 | 2.0 | 4.00 | p > .05 = 1.69 | 3 | 9 | 1.2 | 1.44 | p > .05 = 1.69 | .7 | .49 | p > .05 = 1.69 |
| 16 | M | 9 | 81 | 1.8 | 3.24 | p > .01 = 2.45 | 4 | 16 | 1.3 | 1.69 | p > .01 = 2.45 | .6 | .36 | p > .01 = 2.45 |
| N=16 | | 276 | 5324 | 44.3 | 129.35 | | 357 | 10237 | 36.7 | 91.17 | | 38.2 | 102.66 | |
| Mean | | 17.2 | | 2.76 | | | 22.3 | | 2.29 | | | 2.38 | | |
| S.D. | | 6.1 | | .68 | | | 12.0 | | .63 | | | .86 | | |

TABLE 3--(continued)

| Pupil | Sex | Primary II Vocabulary Raw Scores | | Sept. 1971 Vocab. Gr. Equivalents | | Fisher t-test of Significance | Primary II Paragraph Meaning Raw Scores | | Sept. 1971 Paragraph Meaning Gr. Equivalents | | Fisher t-test of Significaat Differences | Composite Primary II Gr. Equivalent Scores | | Fisher t-test of Significant Differences |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | x | $x^2$ | x | $x^2$ | | x | $x^2$ | x | $x^2$ | | x | $x^2$ | |
| 17 | F | 16 | 256 | 2.7 | 7.29 | | 15 | 225 | 1.9 | 3.61 | | 2.3 | 5.29 | |
| 18 | F | 23 | 529 | 3.3 | 10.89 | | 26 | 676 | 2.5 | 6.25 | | 2.9 | 8.41 | |
| 19 | F | 10 | 100 | 1.9 | 3.61 | | 1 | 1 | 1.0 | 1.00 | | 1.4 | 1.96 | |
| 20 | F | 11 | 121 | 2.0 | 4.00 | | 15 | 225 | 1.9 | 3.61 | | 1.9 | 3.61 | |
| 21 | F | 16 | 256 | 2.7 | 7.29 | | 3 | 9 | 1.2 | 1.44 | | 1.9 | 3.61 | |
| 22 | F | 15 | 225 | 2.6 | 6.76 | | 25 | 625 | 2.5 | 6.25 | | 2.5 | 6.25 | |
| 23 | F | 16 | 256 | 2.7 | 7.29 | | 32 | 1024 | 2.9 | 8.41 | | 2.8 | 7.84 | |
| 24 | F | 18 | 324 | 2.8 | 7.84 | | 38 | 1444 | 1.9 | 3.61 | | 2.8 | 7.84 | |
| 25 | F | 24 | 576 | 3.5 | 12.25 | | 35 | 1225 | 3.1 | 9.61 | | 3.3 | 10.89 | |
| 26 | F | 18 | 324 | 2.8 | 7.84 | | 31 | 961 | 2.9 | 8.41 | | 2.8 | 7.84 | |
| 27 | F | 18 | 324 | 3.2 | 10.24 | | 29 | 841 | 3.2 | 10.24 | | 2.7 | 7.29 | |
| 28 | F | -- | -- | -- | -- | | -- | -- | -- | -- | | -- | -- | |
| 29 | F | 17 | 289 | 2.7 | 7.29 | | 26 | 676 | 2.5 | 6.25 | | 2.1 | 4.41 | |
| 30 | F | 17 | 289 | 2.7 | 7.29 | | 14 | 196 | 1.8 | 3.24 | | 2.2 | 4.84 | |
| 31 | F | 19 | 361 | 2.9 | 8.41 | | 23 | 529 | 2.4 | 5.76 | | 2.1 | 4.41 | |
| 32 | F | 24 | 576 | 3.5 | 12.25 | | 32 | 1024 | 2.9 | 8.41 | | 3.2 | 10.24 | |
| N = 16 (N=15) | | 262 | 4806 | 42.0 | 120.54 | | 345 | 9681 | 34.6 | 86.10 | | 36.9 | 94.73 | |
| Mean | | 17.5 | | 2.8 | | | 23.0 | | 2.31 | | | 2.46 | | |
| S.D. | | 3.7 | | .44 | | | 10.7 | | .63 | | | .51 | | |

TABLE 4

STANFORD ACHIEVEMENT PRE-TEST SCORES CONTROL GROUP

| Pupil | Sex | Primary II Vocabulary Row Scores x | Primary II Vocabulary Row Scores $x^2$ | Sept. 1971 Vocab. Gr. Equivalents x | Sept. 1971 Vocab. Gr. Equivalents $x^2$ | Fisher t-test of Significance | Primary II Paragraph Meaning Raw Scores x | Primary II Paragraph Meaning Raw Scores $x^2$ | Sept. 1971 Paragraph Meaning Gr. Equivalents x | Sept. 1971 Paragraph Meaning Gr. Equivalents $x^2$ | Fisher t-test of Significant Differences | Composite Primary II Gr. Equivalent Scores x | Composite Primary II Gr. Equivalent Scores $x^2$ | Fisher t-test of Significant Differences |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M | 15 | 225 | 2.6 | 6.76 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} =$ | 8 | 64 | 1.6 | 2.56 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} =$ | 2.1 | 4.41 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} =$ |
| 2 | M | 11 | 121 | 2.0 | 4.00 | | 5 | 25 | 1.4 | 1.96 | | 1.7 | 2.89 | |
| 3 | M | 19 | 361 | 2.9 | 8.41 | | 12 | 144 | 1.7 | 2.89 | | 2.3 | 5.29 | |
| 4 | M | 19 | 361 | 2.9 | 0.41 | | 20 | 400 | 2.1 | 4.41 | | 2.5 | 6.25 | |
| 5 | M | 5 | 25 | 1.6 | 2.56 | $\frac{15.4 - 13.4}{\sqrt{\frac{2.8^2}{14} + \frac{5.14^2}{19}}} =$ | 1 | 1 | 1.0 | 1.00 | $\frac{12.6 - 11.0}{\sqrt{\frac{3.3^2}{14} + \frac{7.8^2}{19}}} =$ | 1.3 | 1.69 | $\frac{2.13 - 1.94}{\sqrt{\frac{.24^2}{14} + \frac{.60^2}{19}}} =$ |
| 6 | M | 10 | 100 | 1.9 | 3.61 | | 13 | 169 | 1.8 | 3.24 | | 1.8 | 3.24 | |
| 7 | M | 10 | 100 | 1.9 | 3.61 | $\frac{2.0}{\sqrt{.580 + 1.390}} =$ | 9 | 81 | 1.6 | 2.56 | $\frac{1.6}{\sqrt{.777 + 3.202}} =$ | 1.7 | 2.89 | $\frac{.19}{\sqrt{.0041 + .0189}} =$ |
| 8 | M | 11 | 121 | 2.0 | 4.00 | | 9 | 81 | 1.6 | 2.56 | | 1.8 | 3.24 | |
| 9 | M | 12 | 144 | 2.1 | 4.41 | $\frac{2.0}{\sqrt{1.970}} =$ | 15 | 225 | 1.9 | 3.61 | $\frac{1.6}{\sqrt{3.979}} =$ | 2.0 | 4.00 | $\frac{.19}{\sqrt{.0230}} =$ |
| 10 | M | 12 | 144 | 2.1 | 4.41 | | 1 | 1 | 1.0 | 1.00 | | 1.5 | 2.25 | |
| 11 | M | 15 | 225 | 2.6 | 6.76 | $\frac{2.0}{1.40} =$ | 9 | 81 | 1.6 | 2.56 | $\frac{1.6}{1.99} =$ | 2.1 | 4.41 | $\frac{.19}{.15} =$ |
| 12 | M | 24 | 576 | 3.5 | 12.25 | 1.43 N.S. | 36 | 1296 | 3.1 | 9.61 | .804 N.S. | 3.3 | 10.89 | 1.26 N.S. |
| 13 | M | 16 | 256 | 2.7 | 7.29 | One-tailed test | 10 | 100 | 1.7 | 2.89 | One-tailed test | 2.2 | 4.84 | One-tailed test |
| 14 | M | 16 | 256 | 2.7 | 7.29 | df 19+14-2 = 31 | 14 | 196 | 1.8 | 3.24 | df 19+14-2 = 31 | 2.2 | 4.84 | df 19+14-2 = 31 |
| 15 | M | 12 | 144 | 2.1 | 4.41 | $p > .05 = 1.69^*$ | 7 | 49 | 1.5 | 2.25 | $p > .05 = 1.69^*$ | 1.8 | 3.24 | $p > .05 = 1.69^*$ |
| 16 | M | 13 | 169 | 2.3 | 5.29 | $p > .01 = 2.45^{**}$ | 12 | 144 | 1.7 | 2.89 | $p > .01 = 2.45^{**}$ | 2.0 | 4.00 | $p > .01 = 2.45^{**}$ |
| 17 | M | -- | -- | -- | -- | | -- | -- | -- | -- | | -- | -- | |
| 18 | M | 15 | 225 | 2.6 | 6.76 | | 11 | 121 | 1.7 | 2.89 | | 2.1 | 4.41 | |
| 19 | M | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| 20 | M | 19 | 361 | 2.9 | 8.41 | | 17 | 289 | 2.0 | 4.00 | | 2.4 | 5.76 | |
| N = 20 (N=19) | | 254 | 3914 | 43.4 | 108.64 | | 209 | 3467 | 30.8 | 56.12 | | 36.8 | 78.54 | |
| M | | 13.4 | | 2.28 | | | 11.0 | | 1.6 | | | 1.94 | | |
| S.D. | | 5.1 | | .72 | | | 7.8 | | .62 | | | .60 | | |

TABLE 4--(continued)

| Pupil | Sex | Primary II Vocabulary Raw Scores | | Sept. 1971 Vocab. Gr. Equivalents | | Fisher t-test of Significance | Primary II Paragraph Meaning Raw Scores | | Sept. 1971 Paragraph Meaning Gr. Equivalents | | Fisher t-test of Significant Differences | Composite Primary II Gr. Equivalent Scores | | Fisher t-test of Significant Differences |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | x | $x^2$ | x | $x^2$ | | x | $x^2$ | x | $x^2$ | | x | $x^2$ | |
| 21 | F | 18 | 324 | 2.8 | 7.84 | | 17 | 289 | 2.0 | 4.00 | | 2.4 | 5.76 | |
| 22 | F | 12 | 144 | 2.1 | 4.41 | | 9 | 81 | 1.6 | 2.56 | | 1.8 | 3.24 | |
| 23 | F | 13 | 169 | 2.3 | 5.29 | | 8 | 64 | 1.6 | 2.56 | | 1.9 | 3.61 | |
| 24 | F | 15 | 225 | 2.6 | 6.76 | | 12 | 144 | 1.7 | 2.89 | | 2.2 | 4.84 | |
| 25 | F | 16 | 256 | 2.7 | 7.29 | | 14 | 196 | 1.8 | 3.24 | | 2.2 | 4.84 | |
| 26 | F | 15 | 225 | 2.6 | 6.76 | | 15 | 225 | 1.9 | 3.61 | | 2.2 | 4.84 | |
| 27 | F | 20 | 400 | 3.0 | 9.00 | | 10 | 100 | 1.7 | 2.89 | | 2.3 | 5.29 | |
| 28 | F | 15 | 225 | 2.6 | 6.76 | | 12 | 144 | 1.7 | 2.89 | | 2.1 | 4.41 | |
| 29 | F | 11 | 121 | 2.0 | 4.00 | | 8 | 64 | 1.6 | 2.56 | | 1.8 | 3.24 | |
| 30 | F | 18 | 324 | 2.8 | 7.84 | | 15 | 225 | 1.9 | 3.61 | | 2.3 | 5.29 | |
| 31 | F | 17 | 289 | 2.7 | 7.29 | | 20 | 400 | 2.1 | 4.41 | | 2.3 | 5.29 | |
| 32 | F | 17 | 289 | 2.7 | 7.29 | | 11 | 121 | 1.7 | 2.89 | | 2.2 | 4.84 | |
| 33 | F | 16 | 256 | 2.7 | 7.29 | | 14 | 196 | 1.8 | 3.24 | | 2.2 | 4.84 | |
| 34 | F | 13 | 169 | 2.3 | 5.29 | | 12 | 144 | 1.7 | 2.89 | | 2.0 | 4.00 | |
| N = 14 | | 216 | 3416 | 35.9 | 93.11 | | 177 | 2393 | 24.8 | 44.24 | | 29.9 | 64.33 | |
| M | | 15.4 | | 2.56 | | | 12.6 | | 1.77 | | | 2.13 | | |
| S.D. | | 2.8 | | .31 | | | 3.3 | | .09 | | | .24 | | |

for the experimental girls' group, with a standard deviations of ± .51, was compared with a mean of 2.38 with a standard deviation of ± .86 for the boys' group. The resultant t- of .333 was not at a significant level of difference as well as the indicated equated boy and girl groups within the experimental group which served as a check on the reliability of the two "averaged" test sections of Vocabulary and Paragraph Meaning.

Pre-test Scores--Control Group

Table 4 presents raw scores, means, standard deviations, and t-scores of the Primary II, Form W Test, also administered in September 1971 to the control group. Perusing the data, the reader will note comparable means of 15.4 and 13.4 for the two sexes of the control group in the Primary II--Vocabulary Test with standard deviations of ± 2.8 and ± 5.1 for girls and boys, respectively. As did the boys' experimental group, boys of the control group showed more variability from the group mean than did the girls of either the experimental or control groups. The t-test of significant differences between means in the control group for vocabulary scores resulted in a nonsignificant level of 1.43.

The Paragraph Meaning Test of the Primary II, Form W showed a similar pattern with the means for the boys' control group of 11.0 similar to that of the girls' control group of 12.6. Standard deviations of ± 7.8 and ± 3.3, respectively, also indicated heterogeneity of boys' scores as compared with more homogeneity of girls' scores clustered about the mean of these two sub-groups in the control group.

Composite scores, from the averaged vocabulary and paragraph meaning sections of the Primary II, Form W Test, for the control group

indicated a lower mean score for boys, 1.94, than for the girls' group, 2.13. Standard deviations of ± .60 and ± .24 were computed to reveal the greater variability of scores about the mean for the boys' sub-group. Means for the two sub-groups, by sex, in the control group were not sufficiently different to result in a t-score of more than 1.26. Since no significant differences resulted between sex groups in the Vocabulary and Paragraph Meaning means, such a t- is also considered as a reliability check on these "averaged" sub-scores.

## Summary of Pre-test Comparisons

With the boy and girl (sex) mean differences on all pre-test data shown to be equated, attention was then focused on comparisons between the total experimental and the total control groups.

Table 5 summarizes data concerned with differences between the total experimental and the control groups with respect to pre-test differences in ages, cognitive abilities ratings, and the Stanford Primary II, Form W Test results.

In age differences, means between the experimental and control groups were comparable. Such means of 82.2 and 80.1 and standard deviations of ± 4.2 and ± 3.6, respectively, resulted in a t- of 1.89. This level was of sufficient magnitude at the .05 level to indicate significant differences between age means of the two groups; thus, the age mean of the experimental group was higher.

Cognitive abilities ratings of the experimental and the control groups, also, showed a t- of 1.72 or a significant difference at the .05 level for 47 degrees of freedom. The mean of 4.6 (C- to C) and the

TABLE 5

SUMMARY DATA: AGES, COGNITIVE ABILITIES RATINGS AND STANFORD PRE-TEST TOTAL GROUP DIFFERENCES

| | Experimental Group | | Control Group | |
|---|---|---|---|---|
| | | Age Difference | | |
| Total N | 16 + 16 | = 32 | 12 + 7 | = 19 |
| Σ | 1326 + 1304 | = 2630 | 965 + 557 | = 1522 |
| Range | 89 - 75 | = 14 | 88 - 74 | = 14 |
| Mean | | = 82.2 | | = 80.1 |
| S.D. | | = 4.2 | | = 3.6 |

$$\text{Fisher t-} = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{82.2 - 80.1}{\sqrt{\frac{4.2^2}{32} + \frac{3.6^2}{19}}} = \frac{2.1}{\sqrt{.551 + .682}} = \frac{2.1}{1.111} = 1.89^{*}$$

| | | Cognitive Abilities Ratings Difference | | |
|---|---|---|---|---|
| Total N | 14 + 16 | = 30 | 12 + 7 | = 19 |
| Σ | 79 + 59 | = 138 | 42 + 18 | = 60 |
| Range A** to E- | | | C+ to E- | |
| Mean | | = 4.6 | | = 3.1 |
| S.D. | | = 3.5 | | = 2.6 |

$$\text{Fisher t-} = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{4.6 - 3.1}{\sqrt{\frac{3.5^2}{30} + \frac{2.6^2}{19}}} = \frac{1.5}{\sqrt{.408 + .355}} = \frac{1.5}{.87} = 1.72^{a}*$$

Significant @ .05 level

| | | Pre-test Vocabulary Difference (Raw Scores) | | |
|---|---|---|---|---|
| Total N | 16 + 15 | = 31 | 19 + 14 | = 33 |
| Σ | 276 + 262 | = 538 | 254 + 216 | = 470 |
| Range | 27 - 7 | = 20 | 35 - 0 | = 35 |
| Mean | | = 17.4 | | = 14.2 |
| S.D. | | = 4.9 | | = 4.5 |

$$\text{Fisher t-} = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{17.4 - 14.2}{\sqrt{\frac{4.9^2}{31} + \frac{4.5^2}{33}}} = \frac{3.2}{\sqrt{.774 + .614}} = \frac{3.2}{1.17} = 2.74^{b}**$$

Significant @ .01 level

TABLE 5--(continued)

| | Experimental Group | | | Control Group | | |
|---|---|---|---|---|---|---|
| | | | Paragraph Meaning Differences (Raw Scores) | | | |
| Total N | 16 + 15 | = | 31 | 19 + 14 | = | 33 |
| Σ | 357 + 345 | = | 702 | 209 + 177 | = | 386 |
| Range | 38 - 1 | = | 37 | 36 - 0 | = | 36 |
| Mean | | = | 22.6 | | = | 11.7 |
| S.D. | | = | 11.4 | | = | 6.4 |

$$\text{Fisher } t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{22.6 - 11.7}{\sqrt{\frac{11.4^2}{31} + \frac{6.4^2}{33}}} = \frac{10.9}{\sqrt{4.2 + 1.24}} = \frac{10.9}{2.34} = 4.66^{c}**$$

Significant @ .001 level

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Composite Primary II Differences (Grade Equivalent) | | | |
| Total N | 16 + 15 | = | 31 | 19 + 14 | = | 33 |
| Σ | 38.2 + 36.9 | = | 75.1 | 36.8 + 29.9 | = | 66.7 |
| Range | 3.4 - .6 | = | 2.8 | 3.3 - 0 | = | 3.3 |
| Mean | | = | 2.4 | | = | 2.02 |
| S.D. | | = | .77 | | = | .50 |

$$\text{Fisher } t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{2.40 - 2.02}{\sqrt{\frac{.77^2}{31} + \frac{.50^2}{33}}} = \frac{.38}{\sqrt{\frac{.5929}{31} + \frac{.2500}{33}}} = \frac{.38}{.16} = 2.38^{d}*$$

Significant @ .05 level

[a] df 30 + 19 - 2 = 47 *p > .05 = 1.67 **p > 2.41 @ .01

[b] df 31 + 33 - 2 = 62 *p > .05 = 1.66 **p > 2.39 @ .01

[c] df 31 + 33 - 2 = 62 *p > .05 = 1.66 **p > .01 = 2.39

[d] df 31 + 33 - 2 = 62 *p > .05 = 1.66 **p > .01 = 2.39

standard deviation of ± 3.5 for the experimental group, were both higher than for the control group whose mean of 3.1 (D-) rating and standard deviation of ± 2.6 influenced the discrepancy between means. It is thus that the experimental group is favored in ratings of cognitive abilities over the control group at a significant level.

Differences in pre-test Vocabulary means of 17.4 and the 14.2, respectively, for the experimental and control groups also resulted in a highly significant difference in means (2.74) with the experimental group scoring higher. Standard deviations of ± 4.9 and ± 4.5, respectively, however, showed both groups tending to cluster in a similar fashion about their own group means.

Table 5 shows further evidence of the pre-test superiority of the experimental group in Paragraph Meaning differences with means of 22.6 for the experimental group and 11.7 for the control group. The experimental group also shows the widest spread of scores about the mean with a standard deviation of ± 11.4 compared to a standard deviation of ± 6.4 for the control group. A t- of 4.66, indicated a highly significant level of difference between the two groups.

Composite Primary II mean scores, reflecting the averages of individual Vocabulary and Paragraph Meaning scores for the experimental and control groups, likewise showed that a significant difference existed between the two groups in favor of the experimental group and as a reliability measure for the two aforementioned sub-test means. Means of 2.4 and 2.0, with standard deviations of ± .77 and ± .50, respectively, for the experimental and control groups resulted in a t- of 2.38 or a figure significant at the .05 level in favor of the experimental group.

In conclusion, the pre-test data has been presented to establish a base for further comparisons through time and the influence of the behavioral approach program. The data revealed no significant sex differences, as an influencing variable, in any intra-group comparisons. Further, sex differences were shown not to be a factor in pre-test, age, cognitive abilities ratings, vocabulary, paragraph meaning, or composite mean differences within groups.

Comparisons, by Fisher t-test techniques, showed that significant age differences were apparent between the experimental and control groups at the .05 level of confidence. Significant differences favoring the experimental group did exist in pre-test cognitive abilities ratings at the .05 level; in pre-test vocabulary differences at the .01 level; in paragraph meaning differences at the .001 level; and in composite means at the .05 level.

Such differences, then, suggest that the experimental (behaviora approach) group and the control (conventional program approach) post-test data be dealt with on the basis of equating all scores on the basis of a "z" technique; i.e., computation of individual scores minus the mean of the group divided by the standard deviation of that particular group as an "equating" technique for independent methodologies and independent groups. By such statistical handling, it is hoped to adjudicate individual scores on a basis of within group variance, as discrete samples, to negate uncontrolled factors in the study. These data will be presented in pre- and post-test summary fashion at the conclusion of Chapter IV in Tables 13, 14, and 15. "z Scores Application: Total

Experimental and Control Groups: Pre- and Post-Test Achievement Data Summarization."

## Teaching Methodology Comparisons

In an attempt to provide evidence that the teaching methodologies, by the teacher employed with the experimental and the control groups, were significantly related, the author obtained an audio tape cassette recording of a complete reading lesson.

Based on the accompanying lesson plan, shown in Table 6, an observer trained in the Medley-Morrison OScAR technique[1] of coding teacher classroom verbal statements coded the audio taped lesson of the two groups of students.

Categories of verbal behaviors coded by frequency of occurrence included dimensions of verbal statements in the affective (Rebuking or Considerate statements), Procedural (Directing, or Describing state ments), and Substantive (Content) and Problem Solving areas. Levels of questioning were those of a Divergent, Elaborating or Convergent nature. The teacher Evaluative section dealt with the evaluative responses of the teacher in regard to pupils' responses to her questioning--Support-ive, Approving, Accepting or Rephrasing (Cue-ing) teacher evaluative remarks regarding content or problem solving answers; incidences of Repeating the same question; Not Evaluating the student's responses; Abandoning the student (by calling on another child) without evaluation of the former's response; Neutral Rejection of a student's answer; and

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[1]Virginia B. Morrison, Oakland University, Rochester, Michigan, The ROScAR (Revised Observer Schedule and Record-Lesson Strategy Schedule), 1966.

TABLE 6

LESSON PLAN
DECEMBER 17, 1971

Section 1, Grade 3

Behavioral Objectives

1. Given a selection to read, the pupil will correctly identify the main idea and recall specific factual details.

2. Given a word, the pupil will pronounce the word correctly by reading the phonetic spelling in the glossary.

3. Given a selection to read containing unknown words, the pupil will use the glossary for correct pronunciation and definition of the words.

4. Given a number of words containing the initial or final diagraph (ch, sh, th) the pupil will underline the diagraph in each word.

5. Given a number of pictures, the pupil will identify each picture, listen for the initial consonant diagraph and write the correct diagraph (ch, sh, wh) in the box next to the picture.

Teacher Directed Activity: Adding consonant diagraphs to vowels (Both groups)

Material: Reading with Phonics, p. 48
Panorama, Book 3
Finding New Neighbors

| Lynn's Group | Alice's Group |
|---|---|
| Independent Activity | Teacher Directed Activity |
| 1. Duplicated activity-- Initial and final consonant diagraph: ch, sh, wh, th.<br>2. Board work--"kn" sound. | 1. Introduce "Golden Boy" Panorama, pp. 143-148.<br>2. Guide silent reading.<br>3. Assign independent skill activity and reading. |
| Introduce Poem, "The Wind," Panorama, p. 95. | Independent Activity |
| 1. Re-read parts of "High, Wide and Handsome."<br>2. Interpretive thinking.<br>3. Check independent work. | 1. Recognizing word referents (duplicated)<br>2. Silent reading, "The Rodeo," Finding New Neighbors, pp. 190-197. |

Disapproving statements regarding the elicited answer.

Table 7 is a reproduction of the original coding schedule with talley marks representing the numbers of verbal statements by the teacher. The ..... symbols are assigned to Lynn's group with the //// symbols representing statements to Alice's group. Lesson methodology, as conducted by teacher statements, questions, and evaluation, with the two groups was the primary focus.

Table 8 presents computations of total statements in each classification. These were then translated into percentages of the total number of statements made by the teacher with each group. It will be noted that 201 statements were made to Lynn's group and 109 statements recorded for Alice's group. Specific percentage differences were revealed in comparing the amounts of affective statements, numbers of divergent questions and negative evaluative comments between groups. The "phonics" lesson (Lynn's group) obviously called for more convergent questioning with little opportunity for requesting divergent responses from the students.

However, the overall pattern gave evidence of a highly significant consistency, or agreement, in methodology as conducted through the medium of language. It is thus concluded that no significant differences in the verbal conduct of the lessons for the two groups appeared; that, indeed, a highly consistent agreement of beyond the .01 level of agreement in verbal patterns by the teacher existed. It is also assumed, based on this evidence, that the variation of teacher influence in language methodology was equated for both groups.

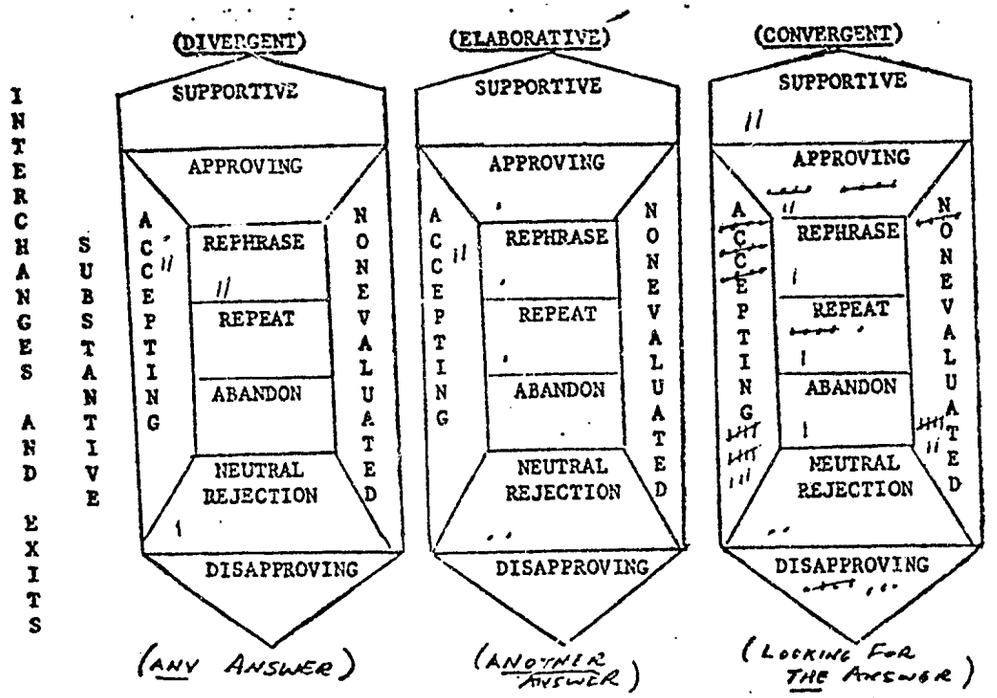
TABLE 7



THE MODIFIED OScAR 4 VERBAL LESSON STRATEGY FORM

| | (AFFECTIVE) | (PROCEDURAL) | (SUBSTANTIVE) |
|---|---|---|---|
| STATEMENTS OR ENTRIES | REBUKING | DIRECTING | INFORMATIVE |
| | CONSIDERATE | DESCRIBING | PROBLEM-SOLVING |

TEACHER REQUEST FOR- AND REACTION TO- PUPIL RESPONSE: SUBSTANTIVE




CODING DATA: TEACHER M. Stinson GRADE/ROOM 3rd/302

DATE 12/7/71 TIMES: _____ OBSERVER VBM

TYPE OF LESSON Reading with Phonic supplement

COMMENTS: .... Lynn's Group

//// Alice's Group

TABLE 8

DIFFERENCES IN PERCENTAGES OF CATEGORIZED VERBAL STATEMENTS BY TEACHER OF TWO SUBGROUPS OF THE EXPERIMENTAL CLASS

| Category | Alice's Group | | | | Lynne's Group | | | | d | $d^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | % Total Statements | | N | % | % Total Statements | | | |
| **Affective** | | | | | | | | | | |
| Rebuking | 3 | .50 | 1.5 | | 0 | .00 | 0.0 | | 1.5 | 2.25 |
| Considerate | 3 | .50 | 1.5 | | 3 | 1.00 | 3.0 | | 1.5 | 2.25 |
| **Procedural** | | | | | | | | | | |
| Directing | 34 | .70 | 16.9 | | 18 | .72 | 16.0 | | .9 | .81 |
| Describing | 14 | .30 | 7.0 | | 7 | .28 | 6.0 | | 1.0 | 1.00 |
| **Substantive** | | | | | | | | | | |
| Information | 24 | .56 | 11.9 | | 13 | .48 | 12.0 | | .1 | .01 |
| Prob. Solv. | 19 | .44 | 9.4 | | 14 | .52 | 13.0 | | 3.6 | 12.96 |
| **Questioning** | | | | | | | | | | |
| Divergent | 1 | .02 | .6 | | 5 | .24 | 5.0 | | 4.4 | 19.36 |
| Elaborating | 5 | .10 | 2.4 | 25.8 | 2 | .10 | 2.0 | 20.0 | .4 | .16 |
| Convergent | 46 | .88 | 22.8 | | 14 | .66 | 13.0 | | 9.8 | 96.04 |
| **Evaluative** | | | | | | | | | | |
| + Supportive | 0 | .00 | 0.0 | | 2 | .06 | 2.0 | | 2.0 | 4.00 |
| + Approving | 11 | .21 | 5.5 | | 2 | .06 | 2.0 | | 3.5 | 12.25 |
| + Accepting | 16 | .31 | 8.0 | 14.1 | 17 | .52 | 15.0 | 22.0 | 7.0 | 49.00 |
| + Rephrase | 1 | .01 | .6 | | 3 | .09 | 3.0 | | 2.4 | 5.76 |
| · Repeat | 7 | .14 | 3.5 | | 1 | .03 | 1.0 | | 2.5 | 6.25 |
| · Not Evaluate | 5 | .10 | 2.4 | 5.9 | 7 | .21 | 6.0 | 8.0 | 3.6 | 12.96 |
| · Abandon | 0 | .00 | 0.0 | | 1 | .03 | 1.0 | | 1.0 | 1.00 |
| − Neutral | | | | | | | | | | |
| − Rejection | 4 | .08 | 2.0 | 6.0 | 0 | .00 | 0.0 | 0.0 | 2.0 | 4.00 |
| − Disapprove | 8 | .15 | 4.0 | | 0 | .00 | 0.0 | | 4.0 | 6.00 |
| Total Statements | 201 | | 100.0 | | 109 | | 100.0 | | | 246.06 |

$$\text{rho} = 1. - \frac{6\,d^2}{N(N^2-1)} = 1. - \frac{6 \times 246.06}{18(323)} = 1. - \frac{1476.36}{58} = 1.-.2539 = .7461^{**}$$

Significance of r
$p > .05 = .444$; $.01 = .561^{**}$

$$\text{t of agreement: } r\sqrt{\frac{N-2}{1.-r^2}} = \frac{.7461\sqrt{18-2}}{\sqrt{1.-.5492}} = \frac{.7461 \times 4.000}{\sqrt{.4508}} = \frac{2.9844}{.6740} = 4.43^{**}$$

*df 18 + 18 - 2 = 34; $p > .05 = 2.04$
**df 18 + 18 - 2 = 34; $p > .01 = 2.75$

Inverse value; i.e., less rebuking = +; more rebuking = −
less considerate = − ; more consideration = +

Post-test Scores--Experimental Group

Post-test achievement scores for the experimental and control groups are shown in Tables 9 and 10. Scores are separated into sex groupings for each group to provide evidence, again, that no significant differences between boys' and girls' mean scores in any measure of the study, within groups, were apparent in either the experimental or control groups.

Table 9 presents raw scores, grade equivalent scores, means and standard deviations for the post-test vocabulary, paragraph meaning and composite achievement measures of the experimental group, by sex. No significant differences within this group existed, as shown by Fisher t-test computations.

Table 10 is also a tabulation, by sex, of the post-test achievement measures of the control group in which vocabulary, paragraph meaning, and composite achievement measures indicate no significant differences within the control group, as evidenced by Fisher t-levels of significance.

Tables 11 and 12 present a summarization of the post-test data, comparing the experimental and control groups in the above measures. The Fisher t-test of significant differences between independent group means was applied to ascertain the .05 level of significant difference in post-vocabulary test means, favoring the experimental group (based on raw scores) and to establish that there was no significant difference between the experimental group and the control group (based on raw scores) in paragraph meaning means. Post-test grade equivalent means

TABLE 9

STANFORD ACHIEVEMENT POST-TEST SCORES EXPERIMENTAL GROUP

| Pupil | Sex | Feb. 1972 Vocabulary x | Vocabulary $x^2$ | Feb. 1972 Gr. Equiv. x | Gr. Equiv. $x^2$ | Fisher t-test of Significant Differences | Feb. 1972 Paragraph Meaning x | Paragraph Meaning $x^2$ | Feb. 1972 Gr. Equiv. x | Gr. Equiv. $x^2$ | Fisher t-test of Significant Differences | Composite Scores x | Composite Scores $x^2$ | Fisher t-test of Significant Differences |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M | 26 | 676 | 3.7 | 13.69 | | 41 | 1681 | 3.6 | 12.96 | | 3.7 | 13.69 | |
| 2 | M | 29 | 841 | 4.2 | 17.64 | | 38 | 1444 | 3.3 | 10.89 | | 3.7 | 13.69 | |
| 3 | M | 27 | 729 | 3.8 | 14.44 | | 41 | 1681 | 3.6 | 12.96 | | 3.7 | 13.69 | |
| 4 | M | 28 | 784 | 4.0 | 16.00 | | 38 | 1444 | 3.3 | 10.89 | | 3.6 | 12.96 | |
| 5 | M | 27 | 729 | 3.8 | 14.44 | | 39 | 1521 | 3.4 | 11.56 | | 3.6 | 12.96 | |
| 6 | M | 25 | 625 | 3.6 | 12.96 | | 32 | 1024 | 2.9 | 8.41 | | 3.2 | 10.24 | |
| 7 | M | 23 | 529 | 3.3 | 10.89 | | 22 | 484 | 2.3 | 5.29 | | 2.8 | 7.84 | |
| 8 | M | 18 | 324 | 2.8 | 7.84 | | 30 | 900 | 2.8 | 7.84 | | 2.8 | 7.84 | |
| 9 | M | 17 | 289 | 2.7 | 7.29 | | 25 | 625 | 2.5 | 6.25 | | 2.6 | 6.76 | |
| 10 | M | 18 | 324 | 2.8 | 7.84 | | 22 | 484 | 2.3 | 5.29 | | 2.5 | 6.25 | |
| 11 | M | 17 | 289 | 2.7 | 7.24 | | 16 | 256 | 1.9 | 5.61 | | 2.3 | 5.29 | |
| 12 | M | 17 | 289 | 2.7 | 7.29 | | 8 | 64 | 1.5 | 2.25 | | 2.1 | 4.41 | |
| 13 | M | 19 | 361 | 2.9 | 8.41 | | 10 | 100 | 1.7 | 2.89 | | 1.8 | 3.24 | |
| 14 | M | 7 | 49 | 1.7 | 2.89 | | 13 | 169 | 1.8 | 3.24 | | 1.7 | 2.89 | |
| 15 | M | 9 | 81 | 1.8 | 3.24 | | 10 | 100 | 1.7 | 2.89 | | 1.7 | 2.89 | |
| 16 | M | 1 | 1 | 1.2 | 1.44 | | 8 | 64 | 1.5 | 2.25 | | 1.4 | 1.96 | |
| N=16 | | 308 | 6920 | 47.6 | 153.59 | | 393 | 12041 | 40.1 | 109.47 | | 43.2 | 126.60 | |
| Range | | 29 - 1 = 28 | | 4.2 - 1.2 = 3.0 | | | 41 - 8 = 33 | | 3.6 - 1.5 = 2.1 | | | 3.7 - 1.4 = 2.3 | | |
| Mean | | 19.2 | | 2.97 | | | 24.6 | | 2.51 | | | 2.70 | | |
| S.D. | | 7.9 | | .87 | | | 12.1 | | .73 | | | .78 | | |

Fisher t-test of Significant Differences

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{19.2 - 17.9}{\sqrt{\frac{7.9^2}{16} + \frac{7.0^2}{14}}} = \frac{1.3}{\sqrt{3.90 + 3.50}} = \frac{1.3}{\sqrt{7.40}} = \frac{1.3}{2.7} =$$

.481 N.S.

One-tailed test
df 16+14-2 = 28

p > .05 = 1.69*
p > .01 = 2.45**

Fisher t-test of Significant Differences

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{24.6 - 23.3}{\sqrt{\frac{12.1^2}{16} + \frac{11.4^2}{14}}} = \frac{1.3}{\sqrt{9.15 + 9.28}} = \frac{1.3}{\sqrt{18.43}} = \frac{1.3}{4.3} =$$

.302 N.S.

One-tailed test
df 16+14-2 = 28

p > .05 = 1.69*
p > .01 = 2.45**

Fisher t-test of Significant Differences

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{2.70 - 2.55}{\sqrt{\frac{.78^2}{16} + \frac{.75^2}{14}}} = \frac{.15}{\sqrt{.038 + .008}} = \frac{.15}{\sqrt{.046}} = \frac{.15}{.21} =$$

.714 N.S.

One-tailed test
df 16+14-2 = 28

p > .05 = 1.69*
p > .01 = 2.45**

TABLE 9--(continued)

| Pupil | Sex | Feb. 1972 Vocabulary x | Feb. 1972 Vocabulary $x^2$ | Feb. 1972 Gr. Equiv. x | Feb. 1972 Gr. Equiv. $x^2$ | Fisher t-test of Significant Differences | Feb. 1972 Paragraph Meaning x | Feb. 1972 Paragraph Meaning $x^2$ | Feb. 1972 Gr. Equiv. x | Feb. 1972 Gr. Equiv. $x^2$ | Fisher t-test of Significant Differences | Composite Scores x | Composite Scores $x^2$ | Fisher t-test of Significant Differences |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | F | 30 | 900 | 4.4 | 19.36 | | 33 | 1089 | 3.0 | 9.00 | | 3.7 | 13.69 | |
| 18 | F | 25 | 625 | 3.6 | 12.96 | | 39 | 1521 | 3.4 | 11.56 | | 3.5 | 12.25 | |
| 19 | F | 24 | 576 | 3.5 | 12.25 | | 39 | 1521 | 3.4 | 11.56 | | 3.4 | 11.56 | |
| 20 | F | 25 | 625 | 3.6 | 12.96 | | 32 | 1024 | 2.9 | 8.41 | | 3.2 | 10.24 | |
| 21 | F | 20 | 400 | 3.0 | 9.00 | | 32 | 1024 | 2.9 | 8.41 | | 2.9 | 8.41 | |
| 22 | F | 20 | 400 | 3.0 | 9.00 | | 30 | 900 | 2.8 | 7.84 | | 2.9 | 8.41 | |
| 23 | F | 22 | 484 | 3.2 | 10.24 | | 24 | 576 | 2.4 | 5.76 | | 2.8 | 7.84 | |
| 24 | F | 18 | 324 | 2.8 | 7.84 | | 30 | 900 | 2.8 | 7.84 | | 2.8 | 7.84 | |
| 25 | F | 13 | 169 | 2.3 | 5.29 | | 18 | 324 | 2.0 | 4.00 | | 2.1 | 4.41 | |
| 26 | F | 19 | 361 | 2.9 | 8.41 | | 12 | 144 | 1.7 | 2.89 | | 1.8 | 3.24 | |
| 27 | F | 9 | 81 | 1.8 | 3.24 | | 12 | 144 | 1.7 | 2.89 | | 1.7 | 2.89 | |
| 28 | F | 7 | 49 | 1.7 | 2.89 | | 12 | 144 | 1.7 | 2.89 | | 1.7 | 2.89 | |
| 29 | F | 9 | 81 | 1.8 | 3.24 | | 11 | 121 | 1.7 | 2.89 | | 1.7 | 2.89 | |
| 30 | F | 10 | 100 | 1.9 | 3.61 | | 2 | 4 | 1.1 | 1.21 | | 1.5 | 2.25 | |
| N=14 | | 251 | 5175 | 39.5 | 120.29 | | 326 | 9436 | 33.5 | 87.15 | | 35.7 | 92.81 | |
| Range | | 30 - 7 = 23 | | 4.4 - 1.7 = 2.7 | | | 39 - 2 = 37 | | 3.4 - 1.1 = 2.3 | | | 3.7 - 1.5 = 2.2 | | |
| Mean | | 17.9 | | 2.8 | | | 23.3 | | 2.39 | | | 2.55 | | |
| S.D. | | 7.01 | | 1.14 | | | 11.4 | | .96 | | | .35 | | |

TABLE 10

STANFORD ACHIEVEMENT POST-TEST SCORES CONTROL GROUP

| Pupil | Sex | Feb. 1972 Vocabulary | | Feb. 1972 Gr. Equiv. | | Fisher t-test of Significant Differences | Feb. 1972 Paragraph Meaning | | Feb. 1972 Gr. Equiv. | | Fisher t-test of Significant Differences | Composite Scores | | Fisher t-test of Significant Differences |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | x | $x^2$ | x | $x^2$ | | x | $x^2$ | x | $x^2$ | | x | $x^2$ | |
| 1 | M | 23 | 529 | 3.3 | 10.89 | $t = \frac{M_1 - M_2}{\sqrt{\frac{c^2}{N_1} + \frac{c^2}{N_2}}} =$ | 35 | 1225 | 3.1 | 9.61 | $t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{c^2}{N_2}}} =$ | 3.2 | 10.24 | $t = \frac{M_1 - M_2}{\sqrt{\frac{c^2}{N_1} + \frac{c^2}{N_2}}} =$ |
| 2 | M | 17 | 289 | 2.7 | 7.29 | | 33 | 1089 | 3.0 | 9.00 | | 2.3 | 7.84 | |
| 3 | M | 19 | 361 | 2.9 | 8.41 | | 25 | 625 | 2.5 | 6.25 | | 2.7 | 7.29 | |
| 4 | M | 17 | 289 | 2.7 | 7.29 | | 17 | 289 | 2.0 | 4.00 | | 2.3 | 5.29 | |
| 5 | M | 13 | 169 | 2.3 | 5.29 | $\frac{14.6 - 14.2}{\sqrt{\frac{4.15^2}{9} + \frac{4.28^2}{13}}} =$ | 21 | 441 | 2.2 | 4.84 | $\frac{24.1 - 18.5}{\sqrt{\frac{1.99^2}{9} + \frac{8.9^2}{13}}} =$ | 2.2 | 4.84 | $\frac{2.43 - 2.19}{\sqrt{\frac{.26^2}{9} + \frac{.49^2}{13}}} =$ |
| 6 | M | 28 | 324 | 2.8 | 7.84 | | 9 | 81 | 1.6 | 2.56 | | 2.2 | 4.84 | |
| 7 | M | 12 | 144 | 2.1 | 4.41 | | 20 | 400 | 2.1 | 4.41 | | 2.1 | 4.41 | |
| 8 | M | 7 | 49 | 1.7 | 2.89 | $\frac{.4}{\sqrt{3.32}} =$ | 27 | 729 | 2.6 | 6.76 | $\frac{5.6}{.440 + 6.093} =$ | 2.1 | 4.41 | $\frac{.24}{.0075 + .0184} =$ |
| 9 | M | 15 | 225 | 2.6 | 6.76 | | 12 | 144 | 1.7 | 2.89 | | 2.1 | 4.41 | |
| 10 | M | 13 | 169 | 2.3 | 5.29 | $\frac{.4}{1.8} =$ | 11 | 121 | 1.7 | 2.89 | $\frac{5.6}{\sqrt{65.33}} =$ | 2.0 | 4.00 | $\frac{.24}{\sqrt{.0259}} =$ |
| 11 | M | 11 | 121 | 2.0 | 4.00 | | 14 | 196 | 1.8 | 3.24 | | 1.9 | 3.61 | |
| 12 | M | 11 | 121 | 2.0 | 4.00 | .222 N.S. | 8 | 64 | 1.5 | 2.25 | $\frac{5.6}{8.1} =$ | 1.7 | 2.89 | $\frac{.24}{.1609} =$ |
| 13 | M | 9 | 81 | 1.8 | 3.24 | One tailed test | 9 | 81 | 1.6 | 2.56 | | 1.2 | 1.44 | |
| N = 13 | | 185 | 2871 | 31.2 | 77.60 | df 13 + 9 = 20 | 241 | 5485 | 27.4 | 61.26 | .691 N.S. | 28.5 | 65.51 | 1.49 N.S. |
| Range | | 23 - 7 = 16 | | 3.3 - 1.7 = 1.6 | | p > .05 = 2.09* | 35 - 8 = 27 | | 3.1 - 1.5 = 1.6 | | | 3.2 - 1.2 = 2.0 | | |
| Mean | | 14.23 | | 2.40 | | | 18.5 | | 2.10 | | One-tailed test | 2.19 | | One-tailed test |
| S.D. | | 4.28 | | .45 | | | 8.9 | | .54 | | df 13 + 9 = 20 | .49 | | df 13 + 9 - 2 = 20 |
| 14 | F | 23 | 529 | 3.3 | 10.89 | | 25 | 625 | 2.5 | 6.25 | p > .05 = 2.09* | 2.9 | 8.41 | p > .05 = 2.09* |
| 15 | F | 17 | 289 | 2.7 | 7.29 | | 25 | 625 | 2.5 | 6.25 | σ > .01 = 2.84** | 2.6 | 6.76 | p > .01 = 2.84** |
| 16 | F | 18 | 324 | 2.8 | 7.84 | | 25 | 625 | 2.5 | 6.25 | | 2.6 | 6.76 | |
| 17 | F | 14 | 196 | 2.5 | 6.25 | | 25 | 625 | 2.5 | 6.25 | | 2.5 | 6.25 | |
| 18 | F | 14 | 196 | 2.5 | 6.25 | | 22 | 484 | 2.3 | 5.29 | | 2.4 | 5.76 | |
| 19 | F | 14 | 196 | 2.5 | 6.25 | | 21 | 441 | 2.2 | 4.84 | | 2.3 | 5.29 | |
| 20 | F | 12 | 144 | 2.1 | 4.41 | | 25 | 625 | 2.5 | 6.25 | | 2.3 | 5.29 | |
| 21 | F | 10 | 100 | 1.9 | 3.61 | | 27 | 729 | 2.6 | 6.76 | | 2.2 | 4.84 | |
| 22 | F | 10 | 100 | 1.9 | 3.61 | | 22 | 484 | 2.3 | 5.29 | | 2.1 | 4.41 | |
| N = 9 | | 132 | 2074 | 22.2 | 56.40 | | 217 | 5263 | 21.9 | 53.43 | | 21.9 | 53.77 | |
| Range | | 23 - 10 = 13 | | 3.3 - 1.9 = 1.4 | | | 27 - 21 = 6 | | 2.6 - 2.2 = .4 | | | 2.9 - 2.1 = .8 | | |
| Mean | | 14.6 | | 2.46 | | | 24.1 | | 2.43 | | | 2.43 | | |
| S.D. | | 4.15 | | .46 | | | 1.99 | | .17 | | | .26 | | |

TABLE 11

SUMMARY DATA: TOTAL EXPERIMENTAL AND CONTROL POST TEST DATA

| | Raw Scores | |
|---|---|---|
| | Experimental Group | Control Group |
| | Post-test Vocabulary Scores | |
| Total N | 16 + 14 = 30 | 13 + 9 = 22 |
| $\Sigma$ | 308 + 251 = 559 | 185 + 132 = 317 |
| Range | 30 - 1 = 29 | 23 - 7 = 16 |
| M | = 18.63 | = 14.41 |
| S.D. | = 7.75 | = 4.13 |

Fisher t-test: Post-test Vocabulary Difference

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{18.63 - 14.41}{\sqrt{\frac{7.75^2}{30} + \frac{4.13^2}{22}}} = \frac{4.22}{\sqrt{2.777}} = \frac{4.22}{1.66} = 2.54^*$$

Significant @ .05 level

| | | |
|---|---|---|
| Total N | 16 + 14 = 30 | 13 + 9 = 22 |
| $\Sigma$ | 393 + 326 = 719 | 241 + 217 = 458 |
| Range | 41 - 2 = 39 | 35 - 8 = 27 |
| M | = 23.96 | = 20.82 |
| S.D. | = 12.0 | = 7.4 |

Fisher t-test: Post-test Paragraph Meaning Difference

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{23.96 - 20.82}{\sqrt{\frac{12.0^2}{30} + \frac{7.4^2}{22}}} = \frac{3.14}{\sqrt{4.80 + 2.48}} = \frac{3.14}{2.7} = 1.15 \text{ N.S.}$$

*One tailed test df 30 + 22 - 2 = 50; p > .05 = 2.01
**One tailed test df 30 + 22 - 2 = 50; p > .01 = 2.68

TABLE 12

SUMMARY DATA: TOTAL EXPERIMENTAL AND CONTROL POST-TEST DATA

| | Grade Equivalent Scores | |
|---|---|---|
| | Experimental Group | Control Group |
| | **Post-test Vocabulary Scores** | |
| Total N | 16 + 14 = 30 | 13 + 19 = 22 |
| Σ | 47.6 + 39.5 = 87.1 | 31.2 + 22.2 = 53.4 |
| Range | 4.4 - 1.2 = 3.2 | 3.3 - 1.7 = 1.6 |
| M | = 2.90 | = 2.43 |
| S.D. | = .84 | = .43 |

Fisher t-test: Post-test Vocabulary Difference

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{2.90 - 2.43}{\sqrt{\frac{.84^2}{30} + \frac{.43^2}{22}}} = \frac{.47}{\sqrt{.0235 + .0084}} = \frac{.47}{\sqrt{.0319}} = \frac{.47}{.17} = 2.77^{**}$$

Significant @ .01 level

| | | |
|---|---|---|
| | **Post-test Paragraph Meaning Scores** | |
| Total N | 16 + 14 = 30 | 13 + 19 = 22 |
| Σ | 40.1 + 33.5 = 73.6 | 27.4 + 21.9 = 49.3 |
| Range | 3.6 - 1.1 = 2.5 | 3.1 - 1.5 = 1.6 |
| M | = 2.45 | = 2.24 |
| S.D. | = .74 | = .44 |

Fisher t-test: Post-test Paragraph Meaning Difference

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{2.45 - 2.24}{\sqrt{\frac{.74^2}{30} + \frac{.44^2}{22}}} = \frac{.21}{\sqrt{.0182 + .0088}} = \frac{.21}{\sqrt{.0270}} = \frac{.21}{.164} = 1.28 \text{ N.S.}$$

| | | |
|---|---|---|
| | **Post-test Composite Scores** | |
| Total N | 16 + 14 = 30 | 13 + 9 = 22 |
| Σ | 43.2 + 35.7 = 78.9 | 28.5 + 21.9 = 50.4 |
| Range | 3.7 - 1.4 = 2.3 | 3.2 - 1.2 = 2.0 |
| M | = 2.63 | = 2.29 |
| S.D. | = .63 | = .42 |

Fisher t-test: Post-test Composite Difference

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma^2}{N_1} + \frac{\sigma^2}{N_2}}} = \frac{2.63 - 2.29}{\sqrt{\frac{.63^2}{30} + \frac{.42^2}{22}}} = \frac{.34}{\sqrt{.0132 + .0080}} = \frac{.34}{\sqrt{.0212}} = \frac{.34}{.145} = 2.34^{**}$$

Significant @ .05 level

*One-tailed test df 30 + 22 - 2 = 50; $p > .05 = 2.01$
**One tailed test df 30 + 22 - 2 = 50; $p > .01 = 2.68$

indicated a significant difference at the .01 level between the experimental and control groups in vocabulary means; no significant differences in grade equivalent means between the two groups in paragraph meaning means; and a .05 level of significant difference between the groups in composite grade equivalent means.

Table 13 is a summarized collection of pre- and post-test data on the achievement measures of the study, comparing total experimental and total control group means. Fisher t-test levels of significance reveal:

--Pre-test vocabulary mean differences favored the experimental group at 2.74 (.01 level) based on raw scores.

--Pre-test paragraph meaning mean differences favored the experimental group at 4.66 (.001 level) based on raw scores.

--pre-test composite mean differences favored the experimental group at 2.38 (.05 level) based on grade equivalent scores.

Pre-test measures indicated the initial superiority of the experimental group prior to the application of the study criteria.

--Post-test vocabulary mean differences favored the experimental group at 2.54 (.01 level) based on raw scores.

--Post-test paragraph mean differences were of no significance (1.15).

--Post-test paragraph mean differences of 2.34 (.05 level) favored the experimental group based on grade equivalent scores.

It is interesting to note, when comparing pre- and post-test gains within groups that the experimental group showed no significant gains in pre- versus post-test means while the control group revealed highly significant gains, from pre- to post-test means, in paragraph

TABLE 13[a]

SUMMARY DATA: TOTAL PRE- AND POST-TEST ACHIEVEMENT MEAN DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS

| | Pre-test Vocabulary Means | | Post-test Vocabulary Means | | Fisher t-test Pre- and Post-Test Diff. (Gr. Equiv.) |
|---|---|---|---|---|---|
| | Raw Sc. | Gr. Equiv. | Raw Sc. | Gr. Equiv. | |
| Experimental Group | N = 31 | N = 31 | N = 30 | N = 30 | |
| M | 17.4 | 2.8 | 18.6 | 2.9 | |
| S.D. | 4.9 | .47 | 7.7 | .84 | .574 N.S.[d] |
| Control Group | N = 33 | N = 33 | N = 22 | N = 22 | |
| M | 14.2 | 2.4 | 14.4 | 2.4 | |
| S.D. | 4.5 | .59 | 4.1 | .43 | .000 N.S.[d] |
| Fisher t-test between groups | 2.74[b]** | 3.08[c] | 2.54[c]** | 2.77** | |

| | Pre-test Paragraph Meaning | | Post-test Paragraph Meaning | | |
|---|---|---|---|---|---|
| Experimental Group | N = 31 | N = 31 | N = 30 | N = 30 | |
| M | 22.6 | 2.3 | 23.9 | 2.4 | |
| S.D. | 11.4 | .61 | 12.0 | .74 | .588 N.S.[d] |
| Control Group | N = 33 | N = 33 | N = 22 | N = 22 | |
| M | 11.7 | 1.7 | 20.8 | 2.2 | |
| S.D. | 6.4 | .38 | 7.4 | .44 | 4.38[e]** |
| Fisher t-test between groups | 4.66[b]** | 4.72[c]** | 1.15[c] N.S. | 1.22 N.S. | |

TABLE 13--(continued)

| | Pre-test Composite Means | | Post-test Composite Means | | Fisher t-test Pre- and Post-Test Diff. (Gr. Equiv.) |
|---|---|---|---|---|---|
| | Raw Sc. | Gr. Equiv. | Raw Sc. | Gr. Equiv. | |
| Experimental Group | N = 31 | N = 31 | N = 30 | N = 30 | |
| M | | 2.4 | | 2.6 | |
| S.D. | | .77 | | .63 | 1.11 N.S.[d] |
| Control Group | N = 33 | N = 33 | N = 22 | N = 22 | |
| M | | 2.0 | | 2.3 | |
| S.D. | | .50 | | .42 | 2.42[e]** |
| Fisher t-test between groups | | 2.38[b]* | | 2.34[c]* | |

[a]Refer to Appendix I for computations.

[b]df = 31 + 33 - 2 = 62. *p > .05 = 1.67
df = 31 + 33 - 2 = 62. **p > .01 = 2.39

[c]df = 30 + 22 - 2 = 50. *p > .05 = 1.68
df = 30 + 22 - 2 = 50. **p > .01 = 2.40

[d]df = 31 + 30 - 2 = 59. *p > .05 = 1.67
df = 31 + 30 - 2 = 59. **p > .01 = 2.39

[e]df = 33 + 22 - 2 = 53. *p > .05 = 1.68
df = 33 + 22 - 2 = 53. **p > .01 = 2.40

meaning, and composite means at the .01 level of 4.38 and 2.42, respectively. No hypothesis for such an occurrence is offered by the author except to assume that a reorganization within the school affecting the composition of the control group sample, might have created an uncontrolled influence on the children in attendance for the post-tests of the control group.

In an effort to ascertain if the variances around the mean, among the experimental and control groups, were factors of influence in the significant gains of the control group from pre- to post-test means in paragraph meaning, the application of the standard, or "z," score formula was employed, as shown in Tables 14, 15, and 16.

The "z" score formula is employed often to equate differing groups or differing tests, based on the scores being divided by the standard deviation of the particular group, then squared. A mean "z" and a mean standard deviation of "z" is then used to ascertain differences as in the Fisher t-test of significant differences among means of independent groups.

Tables 14 and 15 present a compilation of raw scores, translated into "z" scores, means and standard deviations for both the experimental and the control groups in pre- and post-vocabulary and paragraph meaning tests, respectively.

Pre-test vocabulary "z" means of 3.54 and 3.16 shown in Table 14 for the experimental and control groups revealed no significant differences, based on in-group variance, in these pre-test scores. No significant differences between the experimental and control groups were shown in comparisons of the pre-test paragraph meaning means of 1.98 and 1.83

TABLE 14

"z" SCORE APPLICATION: TOTAL EXPERIMENTAL AND CONTROL GROUPS:
PRE-TEST ACHIEVEMENT DATA SUMMARIZATION

| Experimental Group Pre-Vocabulary Raw Scores | | | Control Group Pre-Vocabulary Raw Scores | | | Experimental Group Pre-Paragraph Meaning Raw Scores | | | Control Group Pre-Paragraph Meaning Raw Scores | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| x | z | $z^2$ | x | z | $z^2$ | x | z | $z^2$ | x | z | $z^2$ |
| 27 | 5.51 | 30.3601 | 15 | 3.33 | 11.0889 | 35 | 3.07 | 9.4249 | 8 | 1.25 | 1.5625 |
| 24 | 4.89 | 23.9121 | 11 | 2.44 | 5.9536 | 38 | 3.33 | 11.0889 | 5 | .78 | .6084 |
| 19 | 3.88 | 15.0544 | 19 | 4.22 | 17.8084 | 27 | 2.36 | 5.5696 | 12 | 1.88 | 3.5344 |
| 15 | 3.06 | 9.3636 | 19 | 4.22 | 17.8084 | 15 | 1.32 | 1.7424 | 20 | 3.12 | 9.7344 |
| 20 | 4.08 | 16.6464 | 5 | 1.11 | 1.2321 | 36 | 3.16 | 9.9856 | 1 | .16 | .0256 |
| 22 | 4.48 | 20.0704 | 10 | 2.22 | 4.9284 | 28 | 2.46 | 6.0516 | 13 | 2.03 | 4.1209 |
| 16 | 3.26 | 10.6276 | 10 | 2.22 | 4.9284 | 16 | 1.40 | 1.9600 | 9 | 1.41 | 1.9881 |
| 7 | 1.43 | 2.0449 | 11 | 2.44 | 5.9536 | 8 | .70 | .4900 | 9 | 1.41 | 1.9881 |
| 19 | 3.88 | 15.0544 | 12 | 2.66 | 7.0756 | 37 | 3.24 | 10.4976 | 15 | 2.34 | 5.4756 |
| 14 | 2.86 | 8.1796 | 12 | 2.66 | 7.0756 | 15 | 1.32 | 1.7424 | 1 | .16 | .0256 |
| 10 | 2.04 | 4.1616 | 15 | 3.33 | 11.0889 | 13 | 1.14 | 1.2996 | 9 | 1.41 | 1.9881 |
| 20 | 4.08 | 16.6464 | 24 | 5.33 | 28.4089 | 29 | 2.54 | 6.4516 | 36 | 5.62 | 31.5844 |
| 27 | 5.51 | 30.3601 | 16 | 3.55 | 12.6025 | 36 | 3.16 | 9.9856 | 10 | 1.56 | 2.4336 |
| 16 | 3.26 | 10.6276 | 16 | 3.55 | 12.6025 | 17 | 1.49 | 2.2201 | 14 | 2.18 | 4.7524 |
| 11 | 2.24 | 5.0176 | 12 | 2.66 | 7.0756 | 3 | .26 | .0676 | 7 | 1.09 | 1.1881 |
| 9 | 1.84 | 3.3856 | 13 | 2.88 | 8.2944 | 4 | .35 | .0064 | 0 | 0 | 0 |
| 16 | 3.26 | 10.6276 | -- | -- | -- | 15 | 1.32 | 1.7424 | 17 | 2.66 | 7.0756 |
| 23 | 4.69 | 21.9961 | 15 | 3.33 | 11.0889 | 3 | .26 | .0676 | 17 | 2.66 | 7.0756 |
| 10 | 2.04 | 4.1616 | 0 | 0.00 | 0 | 25 | 2.19 | 4.7961 | 9 | 1.41 | 1.9881 |
| 11 | 2.24 | 4.1616 | 19 | 4.22 | 17.8084 | 32 | 2.81 | 7.8961 | 8 | 1.25 | 1.5625 |
| 16 | 3.26 | 10.6276 | 18 | 4.00 | 16.0000 | 38 | 3.33 | 11.0889 | 12 | 1.88 | 3.5344 |

TABLE 14--(continued)

| Experimental Group Pre-Vocabulary Raw Scores | | | Control Group Pre-Vocabulary Raw Scores | | | Experimental Group Pre-Paragraph Meaning Raw Scores | | | Control Group Pre-Paragraph Meaning Raw Scores | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| x | z | $z^2$ | x | z | $z^2$ | x | z | $z^2$ | x | z | $z^2$ |
| 15 | 3.06 | 9.3636 | 12 | 2.66 | 7.0756 | 35 | 3.07 | 9.4249 | 14 | 2.18 | 4.7524 |
| 16 | 3.26 | 10.6276 | 13 | 2.88 | 8.2944 | 31 | 2.72 | 7.8961 | 15 | 2.34 | 5.4756 |
| 18 | 3.67 | 13.4689 | 15 | 3.33 | 11.0889 | 29 | 2.54 | 6.4516 | 10 | 1.56 | 2.4336 |
| 24 | 4.89 | 23.9121 | 16 | 3.55 | 12.6025 | -- | -- | -- | 12 | 1.88 | 3.5344 |
| 18 | 3.67 | 13.4689 | 15 | 3.33 | 11.0889 | 26 | 2.28 | 5.1984 | 8 | 1.25 | 1.5625 |
| 18 | 3.67 | 13.4689 | 20 | 4.44 | 19.7136 | 14 | 1.23 | 1.5129 | 15 | 2.34 | 5.4756 |
| -- | -- | -- | 15 | 3.33 | 11.0889 | 23 | 2.02 | 4.0804 | 20 | 3.12 | 9.7344 |
| 17 | 3.47 | 12.0409 | 11 | 2.44 | 5.9536 | 32 | 2.81 | 7.8961 | 11 | 1.72 | 2.9584 |
| 17 | 3.47 | 12.0409 | 18 | 4.00 | 16.0000 | | | | 14 | 2.18 | 4.7524 |
| 19 | 3.88 | 15.0544 | 17 | 3.77 | 14.2129 | | | | 12 | 1.88 | 3.5344 |
| 24 | 4.89 | 23.9121 | 17 | 3.77 | 14.2129 | | | | | | |
| | | | 16 | 3.55 | 12.6025 | | | | | | |
| | | | 13 | 2.88 | 8.2944 | | | | | | |
| 538 | 109.71 | 420.7452 | 470 | 104.30 | 361.0522 | 702 | 61.56 | 153.6987 | 386 | 60.31 | 142.9529 |
| N=31 | | | N=33 | | | N=31 | | | N=33 | | |
| M=17.4 | | | M=14.2 | | | M=22.6 | | | M=11.7 | | |
| S.D. = 4.9 | | | S.D. = 4.5 | | | S.D. = 11.4 | | | S.D. = 6.4 | | |
| Mz = 3.54 | | | Mz = 3.16 | | | Mz = 1.98 | | | Mz = 1.83 | | |
| S.D.z = 1.02 | | | S.D.z = .97 | | | S.D.z = 1.01 | | | S.D.z = .99 | | |
| $z = \frac{x}{S.D.}$ | | | z difference: 1.52 N.S. | | | | | | z difference: .600 N.S. | | |

*df 31 + 33 - 2 = 62; p > .05 = 1.67
**df 31 + 33 - 2 = 62; p > .01 = 2.39

TABLE 15

"Z" SCORE APPLICATION: TOTAL EXPERIMENTAL AND CONTROL GROUPS: POST-TEST ACHIEVEMENT DATA SUMMARIZATION

| Experimental Group Post-Vocabulary Raw Scores | | | Control Group Post-Vocabulary Raw Scores | | | Experimental Group Post-Paragraph Meaning Raw Scores | | | Control Group Post-Paragraph Meaning Raw Scores | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| x | z | $z^2$ | x | z | $z^2$ | x | z | $z^2$ | x | z | $z^2$ |
| 26 | 3.38 | 11.4244 | 23 | 5.61 | 31.4721 | 41 | 3.41 | 11.6281 | 35 | 4.73 | 22.3729 |
| 29 | 3.76 | 14.1376 | 17 | 4.14 | 17.1396 | 38 | 3.16 | 9.9856 | 33 | 4.46 | 19.8916 |
| 27 | 3.51 | 12.3201 | 19 | 4.63 | 21.4369 | 41 | 3.41 | 11.6281 | 25 | 3.38 | 11.4244 |
| 28 | 3.64 | 13.2496 | 17 | 4.14 | 17.1396 | 38 | 3.16 | 9.9856 | 17 | 2.29 | 5.2441 |
| 27 | 3.51 | 12.3201 | 13 | 3.17 | 10.0489 | 39 | 3.25 | 10.5625 | 21 | 2.84 | 8.0656 |
| 25 | 3.24 | 10.4976 | 18 | 4.39 | 19.2721 | 32 | 2.66 | 7.0756 | 9 | 1.21 | 1.4641 |
| 23 | 2.98 | 8.8804 | 12 | 2.92 | 8.5264 | 22 | 1.83 | 3.3489 | 20 | 2.70 | 7.2900 |
| 18 | 2.34 | 5.4756 | 7 | 1.71 | 2.9241 | 30 | 2.50 | 6.2500 | 27 | 3.64 | 13.2496 |
| 17 | 2.21 | 4.8841 | 15 | 3.65 | 13.3225 | 25 | 2.08 | 4.3264 | 12 | 1.62 | 2.6244 |
| 18 | 2.34 | 5.4756 | 13 | 3.17 | 10.0489 | 22 | 1.83 | 3.3489 | 11 | 1.48 | 2.1904 |
| 17 | 2.21 | 4.8841 | 11 | 2.68 | 7.1824 | 16 | 1.33 | 1.7689 | 14 | 1.89 | 3.5721 |
| 17 | 2.21 | 4.8841 | 11 | 2.68 | 7.1824 | 8 | .66 | .4356 | 8 | 1.08 | 1.1664 |
| 19 | 2.46 | 6.0516 | 9 | 2.19 | 4.7961 | 10 | .83 | .6889 | 9 | 1.21 | 1.4641 |
| 7 | .91 | .8281 | 23 | 5.61 | 31.4721 | 13 | 1.08 | 1.1664 | 25 | 3.38 | 11.4244 |
| 9 | 1.17 | 1.3689 | 17 | 4.14 | 17.1396 | 10 | .83 | .6889 | 25 | 3.38 | 11.4244 |
| 1 | .13 | .0169 | 18 | 4.39 | 19.2721 | 8 | .66 | .4356 | 25 | 3.38 | 11.4244 |
| 30 | 3.89 | 15.1321 | 14 | 3.41 | 11.6281 | 33 | 2.75 | 7.5625 | 25 | 3.38 | 11.4244 |
| 25 | 3.24 | 10.4976 | 14 | 3.41 | 11.6281 | 39 | 3.25 | 10.5625 | 22 | 2.97 | 8.8209 |
| 24 | 3.12 | 9.7344 | 14 | 3.41 | 11.6281 | 39 | 3.25 | 10.5625 | 21 | 2.84 | 8.0656 |
| 25 | 3.24 | 10.4976 | 12 | 2.92 | 8.5264 | 32 | 2.66 | 7.0756 | 25 | 3.38 | 11.4244 |
| 20 | 2.60 | 6.7600 | 10 | 2.44 | 5.9536 | 32 | 2.66 | 7.0756 | 27 | 3.64 | 13.2496 |

TABLE 15--(continued)

| Experimental Group Post-Vocabulary Raw Scores | | | Control Group Post-Vocabulary Raw Scores | | | Experimental Group Post-Paragraph Meaning Raw Scores | | | Control Group Post-Paragraph Meaning Raw Scores | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| x | z | $z^2$ | x | z | $z^2$ | x | z | $z^2$ | x | z | $z^2$ |
| 20 | 2.60 | 6.7600 | 10 | 2.44 | 5.9536 | 30 | 2.50 | 6.2500 | 22 | 2.97 | 8.8209 |
| 22 | 2.86 | 8.1796 | | | | 24 | 2.00 | 4.0000 | | | |
| 18 | 2.34 | 5.4756 | | | | 30 | 2.50 | 6.2500 | | | |
| 13 | 2.34 | 2.8224 | | | | 18 | 1.50 | 2.2500 | | | |
| 19 | 2.46 | 6.0516 | | | | 12 | 1.00 | 1.0000 | | | |
| 9 | 1.17 | 1.3689 | | | | 12 | 1.00 | 1.0000 | | | |
| 7 | .91 | .8281 | | | | 12 | 1.00 | 1.0000 | | | |
| 9 | 1.17 | 1.3689 | | | | 11 | .92 | .8464 | | | |
| 10 | 1.30 | 1.6900 | | | | 2 | .16 | .0256 | | | |
| 559 | 72.58 | 203.8656 | 317 | 77.25 | 293.6937 | 719 | 59.83 | 148.7847 | 458 | 61.85 | 196.0987 |
| N = 30 | | | N = 22 | | | N = 30 | | | N = 22 | | |
| M = 18.63 | | | M = 14.41 | | | M = 23.96 | | | M = 20.82 | | |
| S.D. = 7.7 | | | S.D. = 4.1 | | | S.D. = 12.0 | | | S.D = 7.4 | | |
| Mz = 2.42 | | | Mz = 3.51 | | | Mz = 1.99 | | | Mz = 2.81 | | |
| S.D.z = .96 | | | S.D.z = 1.01 | | | S.D.z = .99 | | | S.D.z = 1.01 | | |
| z difference: -4.04** | | | | | | z difference: -2.93** | | | | | |

for the respective experimental and control groups.

In Table 15, post-test vocabulary "z" means of 2.42 for the experimental group and 3.51 for the control group, based on such in-group variance, however, revealed significant differences (at the .01 level of confidence) in favor of the control group at 4.04. Similarly, significant differences between groups was revealed by a "z" difference of 2.93 (.01 level) again favoring the control group in post-test paragraph meaning "z" means of 1.99 and 2.81 for the experimental and control groups, respectively.

The summary Table 16 is a consolidation of the above data, and includes pre- to post-test differences in which the experimental group shows a highly significant loss in pre- to post-vocabulary "z" means of 4.48 (.01) with a non-significant gain in pre- to post-vocabulary "z" means of 1.29 for the control group.

In like fashion, when comparing pre- and post-test "z" means in paragraph meaning tests, the experimental group showed a non-significant gain in means while the control group evidenced a highly significant (.01 level of confidence) gain from pre- to post-test means in paragraph meaning of 3.63.

## Final Analysis of Data

The two types of statistical handling produced the following results:

TABLE 16[a]

SUMMARY TABLE: "Z" MEANS OF ACHIEVEMENT DIFFERENCES
IN TOTAL EXPERIMENTAL AND CONTROL GROUPS

| | Pre-Vocabulary z Scores | Post-Vocabulary z Scores | Pre/Post Vocabulary Diff. | Pre-Paragr. Mean z Scores | Post-Paragr. Mean z Scores | Pre/Post Paragraph Mean Diff. |
|---|---|---|---|---|---|---|
| Experimental Group | N = 31 | N = 30 | | N = 31 | N = 30 | |
| Mz | 3.54 | 2.42 | | 1.98 | 1.99 | |
| S.D.z | 1.02 | .96 | -4.48[b]* | 1.01 | .99 | .040[b] N.S. |
| Control Group | N = 33 | N = 22 | (.01) | N = 33 | N = 22 | |
| Mz | 3.16 | 3.51 | | 1.83 | 2.81 | |
| S.D.z | .97 | 1.01 | | .99 | 1.01 | |
| z difference between groups | 1.52[c] | -4.04[d]** | +1.29[e] N.S. N.S. | .600[c] | -2.93[d]** (.01) | 3.63[e] (.01) |

[a]Refer to Appendix I for computations.

[b]df 31 + 31 - 2 = 60.

[c]df 31 + 33 - 2 = 62.

[d]df 30 + 22 - 2 = 50.

[e]df 33 + 22 - 2 = 53.

*p > .05 = 1.67
**p > .01 = 2.39

| Fisher t-test of differences | t- | Sign Test Exp. | Sign Test Control |
|---|---|---|---|
| Age differences | | | |
| Experimental group | 1.89* | + | |
| Sex differences | | | |
| Experimental in-group | N.S. | | |
| Control in-group | N.S. | | |
| Experimental-control | N.S. | | |
| Cognitive Abilities differences | | | |
| Experimental group | 1.72* | + | |
| Pre-Vocabulary differences | | | |
| Experimental group | 2.74** | + | |
| Pre-Paragraph Meaning differences | | | |
| Experimental group | 4.66** | + | |
| Pre-Composite test differences | | | |
| Experimental group | 2.38* | + | |
| Post-Vocabulary differences | | | |
| Experimental group | 2.54** | + | |
| Post-Paragraph Meaning differences | N.S. | | |
| Post-Composite test differences | | | |
| Experimental group | 2.34* | + | |
| Pre- to Post-Vocabulary differences | | | |
| Experimental group | N.S. | | |
| Control group | N.S. | | |
| Pre- to Post-Paragraph Meaning differences | | | |
| Experimental group | N.S. | | |
| Control group | 4.38 | + | |
| Pre- to Post-Composite test differences | | | |
| Experimental group | N.S.** | | |
| Control group | 2.42 | + | |

| | t- | Sign Test Exp. | Sign Test Control |
|---|---|---|---|
| Pre-Vocabulary differences | N.S. | | |
| Pre-Paragraph Meaning differences | N.S. | | |
| Post-Vocabulary differences | | | |
| Control group | 4.04** | | + |
| Post-Composite differences | | | |
| Control group | 2.93** | | + |
| Pre- to Post-Vocabulary differences | | | |
| Experimental group | -4.48** | | + |
| Control group | * 1.29 | | |
| Pre- to Post-Paragraph Meaning differences | | | |
| Experimental group | N.S. | | |
| Control group | + 3.63** | | + |

## Discussion of Results

The Fisher t-test application revealed the pre-test advantage of the experimental group by age difference, rated cognitive abilities, vocabulary, paragraph meaning, and composite test means. This initial advantage, while favoring the experimental group, was not completely sustained in the post-paragraph meaning test when compared with the control group, however, and lesser levels of significance were shown in post-test comparisons with the control group.

In the between-group comparisons, the experimental group, likewise, failed to make significant gains in all pre- and post-test comparisons. The control group, on the other hand, showed significant pre- to post-test gains in both paragraph meaning and composite test means.

Employment of the "z" formula, to equate groups on the basis of in-group variance, showed no significant differences in pre-test vocabulary and paragraph meaning means between the experimental and control groups.

Post-test vocabulary and paragraph meaning "z" means, however, showed the control group as significantly higher (at the .01 level of confidence) when compared with the post-test vocabulary and paragraph meaning "z" means of the experimental group.

Pre- to post-test gains in paragraph meaning means were evidenced at a highly significant level (.01) by the control group.

# CHAPTER V

## FINDINGS AND CONCLUSIONS

The present study has been concerned with investigating teaching practices, age and sex differences in and among groups, and student achievement testing results between a behavioral objective type program and a conventional type program for the teaching of reading to third graders in a school.

Several interesting findings were revealed relative to the specific samples in a comparison of achievement results based on standardized tests of two reading programs.

Sex differences, among or between groups in any of the measures of the study (age, rated cognitive abilities, pre- or post-test vocabulary, paragraph meaning or composite mean scores) were not revealed. Thus it is concluded, the variable of sex had little or no apparent effect on the measured results of the study in the school.

Teaching methodologies, by the same teacher of both the experimental and the control groups were proven to be significantly related, or similar, based on verbal measures of a random sample of teacher verbalism with the experimental group. No difference in methodology was thus apparent concerning the evaluative responses to pupil responses in terms of being supporting, approving, neutral rejecting, and

disapproving. In other words, the variable of teacher influence in language methodology (verbal conduct of lessons) was consistent with both groups.

An Education U.S.A. study[1] implies that no one teaching method is superior to others. There are indications that some results show improvements in combinations of programs such as a basal and supplementary phonics programs over single programs. These data referred to an analysis of first graders at the University of Minnesota by Guy L. Bond and Robert Dykstra for the U. S. Office of Education. They found that children of similar intelligence levels, same sex, same proficiency in distinguishing sounds, and other skills which influence reading capabilities, seemed to achieve proportionately the same under all of the recognized techniques of teaching reading. The participating teacher views the experimental class as being quite similar in class behavior, group dynamics, attitudes, and motivations. In fact, this class required a minimum of motivation to become the most alert, highly responding, excellent oral reading and comprehending group. This to a degree parallels some of the data presented by Bond and Dykstra.

The present study, supported by Gerhard's pilot program,[2] indicated the difficulty in arriving at establishing significant differences on standard achievement test measures. Since a major purpose of this study was to test the behavioral versus the conventional approach outcomes with available instruments (standard achievement tests), the author now concurs with Gerhard that the findings of the study based on

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[1] Education U.S.A. Special Report, op. cit., pp. 46-47.

[2] Gerhard, op. cit., p. 23.

such tests, "do not measure one's ability to apply knowledge and understanding, but rather to measure one's ability to recall specific bits of information."[1] Gerhard's study found no differences between experimental and control groups on standard achievement test results. Findings of this study reflect a regression as compared with pre-test results. Although the experimental group evidenced initial pre-test superiority in age, rated cognitive abilities, and all pre-test achievement measures, subsequent experimental group post-test achievement measures, in comparison, showed decreasing differences in the means of the two groups. In other words, the control group showed higher significant superiority in post-test vocabulary and composite test means than did the experimental group. As previously stated, the experimental group was the most alert, highly responding, excellent oral reading and comprehending group. Yet, the results do not support it. This reaffirms Gerhard's findings concerning what tests measure.

The significant changes in the measured means of the control group from pre-test to post-test in both vocabulary and paragraph meaning test seem to support the contention that the conventional-factual approach is congruent with the achievement type testing employed in the study.

Several views concerning the validity of reading tests were cited by Hechinger[2] when he states that an achievement test is poorly synchronized with thought processes of a third grader; it measures

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[1] Ibid.

[2] Fred M. Hechinger, "Reading: Maybe Testers Can't Read," The New York Times, CXXI, No. 41,700 (March 26, 1972).

thinking processes rather than reading abilities; and in view of word choices, it ignores the personal, childish nature of a child's language development. The author considers these points as important factors in determining which publisher's tests to administer. Three examples from the tests administered during the study illustrate the views, such as:

1) An object which is standing still is
   heavy large secure motionless
2) To loosen the ground around the plants in your garden, you might use
   a sprayer a captivator an elevator a cultivator
3) If a park is convenient, it is
   handy large crowded closed

Unfortunately, very few students selected the correct responses during pre- or post-tests for these particular items. These are not terms commonly found in children's language usage. All publishers of educational tests should be informed concerning the urgency of using children's language in test exercises. Data on specific samples which may or may not adhere to children's language found in test exercises from various publishers should be accumulated on a comparison basis. From such comparisons, school personnel will be able to make better decisions on which tests meet the needs of their students. Thus, it is concluded that precise selections of tests should be made on the basis of language utilized in the exercises. Until better testing instruments are developed, it is likely that a revival of teacher constructed tests will become necessary.

Another purpose of the study was to build upon Chall's analysis of methodologies. Chall's[1] research cites Mills' (1956) study with word

[1]Chall, op. cit., pp. 173-175.

recognition techniques in which he found ". . . low IQ pupils achieved best results with phonic approaches." Since structured phonic lessons were used with both groups, and since the control group showed significant lower rated cognitive abilities, it seems logical to assume that the impact of the phonics emphasis may have been greater on this group than on the higher rated cognitive ability experimental group. Another assumption is that the experimental group with its workbook exercises (see Appendix: Workbook, Panorama) consisting of many sequential phonic activities in addition to the Phonics in Reading activity probably exceeded the needs of that class. They may have been oversaturated with phonics to the extent of tuning themselves out when the need for application arose during the post-test. On the other hand, the control group may have had its needs satisfied with the one basic treatment of Phonics in Reading activity. It seems safe to make that assumption. The writer will not try to make further explanations on the unexpected phenomenon in which the experimental group retrogressed in achievement according to standardized tests results as compared with pre-test results. It was Russell[1] who said that the success of or the best test of a school's reading program may not be in the scores on a reading achievement test, but in the realm of reading habits which children have when they leave school. It is of little value to have children score well on a reading test and never open a book on their own for any pleasure or informative reading. The writer concludes that considerable value lies in observing and knowing that children are reading on their own accord rather than

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[1]Russell, op. cit., pp. 19-22.

using the present reading tests, with their inherent limitations, as the only guidelines to prove that some degree of success is being achieved.

Attendance irregularity was cited as a limitation common to many schools in similar settings. Students in the experimental class maintained daily attendance of ninety percent in and ten percent out whereas the control group was seventy percent in and thirty percent out daily. The teacher was usually notified concerning absenteeism. It is logical to assume that the higher rated cognitive ability experimental group acquired a change in the affective domain from the vicarious reading and learning experiences. They matured in attitudes concerning a desire to attend regularly. The parents and guardians must be given credit for making this possible for their children.

Observations of child behavior in the experimental class showed a growing awareness of each other and an increase in the sense of responsibility. Each student seemed to grow in his desire to participate in the simplest of mechanical tasks to the fullest extent of cognitive inferences and generalizations. Student altercations subsided among experimental members, but very few improvements appeared among control members. The control group did not begin to approach the maturity and cognitive growth which the experimental class actually began with. In view of the attendance regularity which was observed among the experimental class members and the positive child behavior observations of that same group, it seems logical to assume that the behavioral approach--its emphasis and materials--has had a healthy outcome with the morning homeroom students.

Although the statistical summary data, based on the Stanford Achievement Test results, including previously cited limitations, tend to rate the control group over the experimental group in terms of significant gains (i.e., the conventional approach group over the behavioral approach group in reading), the teacher's records reflected the fact that more students in the experimental class were better oral and interpretive readers than those in the control class. One of the objectives of the behavioral approach was the development of enthusiastic and everbroadening interests in reading. The study shows that this is one of a few affective changes which occurred. Students seemed to enjoy reading practically every lesson. They would gladly do so without the teacher's suggestion. In fact, many children would enjoy rereading many selections. A brief review of lesson content reveals that quite a contrast exists among the other readers. For example, one of the most delightful stories which the students enjoyed immensely, involved the experiences of a group of students who rode to school in a carpool. Such reading experiences, including a pet snake as the central attraction, seemed to enthrall and in interest the class of experimental students to the extent that they located and read more books about animals in the school library. Selections of this caliber are adored by children. In fact, most selections consist of concepts and experiences which have not appeared in any previously used reading series. This is built in motivation. It seems, then, since other graded readers of this series contain similar collections of enthusiastic lessons, there is tremendous merit in using them even though testing results (with their limitations) are not encouraging at this time. Thus, the writer

concludes that this third grade level Panorama should be continued in use as a basal reader for children in related school settings.

## Areas of Additional Study

Unfortunately, sufficient studies have not been conducted at the third grade level concerning reading difficulties from the viewpoint of instructional objectives. It has been known for many years that a breakdown in reading ability seems to occur somewhere between the primary grades and the fifth grade. The writer, from his experience and research, would like to see more studies focussing on the third grade. In his view, this is a critical grade level that determines to a great extent the success or failure of the student in the ensuing years.

Behavioral objectives as an instructional methodology is here to stay in the opinion of the writer. They seem to be the most precise tools for accountability yet developed. More studies should be conducted to validate statistically such an approach.

Finally, it can be concluded from this research project that the major findings cited significant statistical gains of the control group over the experimental group. Such gains involved a comparison of post-test over pre-test reading achievement results as measured by the Stanford Reading Achievement Test. This occurred in a climate of consistent teacher methodology (including one teacher) with a small student universe that was nonrandomly selected which is quite common for small schools. Although the measured results of this study did not reflect the anticipated higher post-test results for the experimental class, the writer believes that the objective nature of the research was

preserved. Consequently, the Hawthorne Effect in the area of teacher variability was not a factor in the study.

Much remains to be done in the areas of determining and utilizing the most appropriate phases of instructional objectives in terms of meeting specific student needs at the third grade level. It is hoped that this research project has contributed a bit to the small body of knowledge available.

# APPENDIX I

## SAMPLE LESSON PLANS

Lesson Plan--Control Group

December 11, 1971

Section 2, Grade 3

Objectives

| Benedict's Group | Flora's Group |
|---|---|
| 1. To provide pupil with skill in silent reading with comprehension. | 1. To provide practice in dictionary skill--locating words from an alphabetical listing (using alphabetical order) |
| 2. To provide activity in relating one's reading to one's experiences. | 2. To provide pupil with skill in silent reading with comprehension. |

Materials

| | | |
|---|---|---|
| Texts: | New Faces, New Places | Friends Far and Near |
| | Reading with Phonics | Reading with Phonics |
| | | Written seatwork |

Teacher Directed Activity with Both Groups:

Phonics Lesson--from Reading with Phonics, p. 45

Adding Consonant Diagraphs to Vowels

| | |
|---|---|
| 1. Introduce new vocabulary. | 1. Assign written seatwork on dictionary practice: Alphabetizing and looking up words |
| 2. Silent reading of story, "Mr. Wolf Traps Himself," p. 91, assisted by guided questions. | 2. Guided silent reading, "The Secret Spark," pp. 73+ |

Summarization of lessons and evaluations.

Lesson Plan

January 5, 1972

Section 1, Grade 3

Behavioral Objectives

1. Given, a list of words supported by a model exercise, the pupil will gain proficiency in discriminating among words.

2. Given an exercise on the G blend and words, the student will be able to attack new words with similar beginnings.

3. Given an exercise, the student will be able to recognize and discuss the main idea of a paragraph.

Material

Text: Panorama

Exercises (pp. 130 and 273--teacher manual)

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Reading with Phonics (both groups)--pp. 48-47

The g blend and words

| Charles' Group | Karen's Group |
|---|---|
| 1. Introduce lesson "Stone Soup," pp. 126+. | 1. Independent activity-- "Getting the Main Idea," p. 287 (T.M.). |
| 2. Assign independent activity-- Word discriminations, pp. 130-273 (T.M.). | 2. Check progress on main ideas. Introduce poem, "Where," p.142 for purposeful study. |
| 3. Check activity progress. | 3. Independent word recognition activity, pp. 130-273 (T.M.). |

Evaluate both groups relating common as well as different purposes.

Lesson Plan--Control Group

January 10, 1972

Section 2, Grade 3

Objectives

| Benedict's Group | Flora's Group |
|---|---|
| 1. To give practice in initial consonant and blend substitutions. | 1. To give practice in syllabication and consonant blends. |
| 2. To encourage concern for those who need assistance. | 2. To encourage purposeful reading. |
| 3. To encourage purposeful reading. | 3. To encourage interest in and love for pets. |

Materials

Texts: New Faces, New Places — Friends Far and Near

Reading with Phonics (both groups)--pp. 54-55

The (voiceless stopped) sound, (k)

| | |
|---|---|
| 1. Introduce "The Runaway," pp. 135-136 (T.M.) through new vocabulary. | 1. Independent word attack activity--syllabication and consonant blends. |
| 2. Set purposes for guided reading. | 2. Check and analyze the exercise. |
| 3. Discuss the story--emphasis on comprehension. | 3. Set purposes for guided silent reading--"My Dog Rinty," pp. 311+. |
| 4. Assign independent activity--initial consonant and blend substitutions. | 4. Independent lesson follow-up activity on comprehension and sequence. |

Speaker from each group shares (discusses) lesson outcomes.

# APPENDIX II

## WORKSHEET A

WORKSHEET A

SUMMARY DATA: TOTAL PRE- AND POST-TEST ACHIEVEMENT MEAN DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS

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Exp. Pre-Vocabulary
Cont. Pre-Vocabulary

$$\frac{17.4 - 14.2}{\sqrt{\frac{4.9^2}{31} + \frac{4.5^2}{33}}} = \frac{3.2}{\sqrt{\frac{24.01}{31} + \frac{20.25}{33}}} = \frac{3.2}{\sqrt{.7745 + .6136}} = \frac{3.2}{\sqrt{1.3881}} = \frac{3.2}{1.17} = 2.74$$

Exp. Pre-Paragraph
Cont. Pre-Paragraph

$$\frac{22.6 - 11.7}{\sqrt{\frac{11.4^2}{31} + \frac{6.4^2}{33}}} = \frac{10.9}{\sqrt{\frac{129.96}{31} + \frac{40.96}{33}}} = \frac{10.9}{\sqrt{4.19 + 1.24}} = \frac{10.9}{\sqrt{5.43}} = \frac{10.9}{2.33} = 4.66$$

Exp. Gr. Eq. Vocab.
Cont. Gr. Eq. Vocab.

$$\frac{2.8 - 2.4}{\sqrt{\frac{.47^2}{31} + \frac{.59^2}{33}}} = \frac{.4}{\sqrt{\frac{.2209}{31} + \frac{.3481}{33}}} = \frac{.4}{\sqrt{.0071 + .0105}} = \frac{.4}{\sqrt{.0176}} = \frac{.4}{.13} = 3.08$$

Exp. Gr. Eq. Paragraph
Cont. Gr. Eq. Paragr.

$$\frac{2.3 - 1.7}{\sqrt{\frac{.61^2}{31} + \frac{.38^2}{33}}} = \frac{.6}{\sqrt{\frac{.3721}{31} + \frac{.1444}{33}}} = \frac{.6}{\sqrt{.0120 + .0043}} = \frac{.6}{\sqrt{.0163}} = \frac{.6}{.127} = 4.72$$

Exp. Gr. Eq. Comp.
Cont. Gr. Eq. Comp.

$$\frac{2.4 - 2.0}{\sqrt{\frac{.77^2}{31} + \frac{.50^2}{33}}} = \frac{.4}{\sqrt{\frac{.5929}{31} + \frac{.2500}{33}}} = \frac{.4}{\sqrt{.0191 + .0076}} = \frac{.4}{\sqrt{.0267}} = \frac{.4}{.16} = 2.38$$

WORKSHEET A--(continued)

Exp. Post-Vocabulary
Cont. Post-Vocabulary

$$\frac{18.6 - 14.4}{\sqrt{\frac{7.7^2}{30} + \frac{4.1^2}{22}}} = \frac{4.2}{\sqrt{\frac{59.29}{30} + \frac{16.81}{22}}} = \frac{4.2}{\sqrt{1.976 + .764}} = \frac{4.2}{\sqrt{2.740}} = \frac{4.2}{1.65} = 2.54$$

Exp. Post Paragraph
Cont. Post Paragraph

$$\frac{23.9 - 20.8}{\sqrt{\frac{12.0^2}{30} + \frac{7.4^2}{22}}} = \frac{3.1}{\sqrt{\frac{144.00}{30} + \frac{54.76}{22}}} = \frac{3.1}{\sqrt{4.800 + 2.489}} = \frac{3.1}{\sqrt{7.289}} = \frac{3.1}{2.7} = 1.15$$

Exp. Post Vocab. Gr. Equiv.
Cont. Post Vocab. Gr. Equiv.

$$\frac{2.9 - 2.4}{\sqrt{\frac{.84^2}{30} + \frac{.43^2}{22}}} = \frac{.5}{\sqrt{\frac{.7056}{30} + \frac{.1849}{22}}} = \frac{.5}{\sqrt{.0235 + .0084}} = \frac{.5}{\sqrt{.0318}} = \frac{.5}{.18} = 2.77$$

Exp. Post Paragr. Gr. Equiv.
Cont. Post Paragr. Gr. Equiv.

$$\frac{2.4 - 2.2}{\sqrt{\frac{.74^2}{30} + \frac{.44^2}{22}}} = \frac{.2}{\sqrt{\frac{.5476}{30} + \frac{.1936}{22}}} = \frac{.2}{\sqrt{.0182 + .0088}} = \frac{.2}{\sqrt{.0270}} = \frac{.2}{.164} = 1.22$$

Exp. Comp. Gr. Equiv.
Cont. Comp. Gr. Equiv.

$$\frac{2.63 - 2.29}{\sqrt{\frac{.63^2}{30} + \frac{.42^2}{22}}} = \frac{.34}{\sqrt{\frac{.3969}{30} + \frac{.1764}{22}}} = \frac{.34}{\sqrt{.0132 + .0080}} = \frac{.34}{\sqrt{.0212}} = \frac{.34}{.145} = 2.34$$

WORKSHEET A--(continued)

Exp. Pre/Post Vocab. Diff.

$$\frac{2.9 - 2.8}{\sqrt{\frac{.84^2}{30} + \frac{.47^2}{31}}} = \frac{.1}{\sqrt{\frac{.7056}{30} + \frac{.2209}{31}}} = \frac{.1}{\sqrt{.0235 + .0071}} = \frac{.1}{\sqrt{.0306}} = \frac{.1}{.174} = .574$$

Exp. Pre/Post Paragr. Diff.

$$\frac{2.4 - 2.3}{\sqrt{\frac{.74^2}{30} + \frac{.61^2}{31}}} = \frac{.1}{\sqrt{\frac{.5476}{30} + \frac{.3721}{31}}} = \frac{.1}{\sqrt{.0182 + .0120}} = \frac{.1}{\sqrt{.0302}} = \frac{.1}{.17} = .588$$

Cont. Pre/Post Paragr. Diff.

$$\frac{2.2 - 1.7}{\sqrt{\frac{.44^2}{22} + \frac{.38^2}{33}}} = \frac{.5}{\sqrt{\frac{.1936}{22} + \frac{.1444}{33}}} = \frac{.5}{\sqrt{.0088 + .0044}} = \frac{.5}{\sqrt{.0132}} = \frac{.5}{.114} = 4.38^{**}$$

Exp. Pre/Post Comp. Gr. Equiv

$$\frac{2.6 - 2.4}{\sqrt{\frac{.63^2}{30} + \frac{.77^2}{31}}} = \frac{.2}{\sqrt{\frac{.3969}{30} + \frac{.5929}{31}}} = \frac{.2}{\sqrt{.0132 + .0191}} = \frac{.2}{\sqrt{.0323}} = \frac{.2}{.18} = 1.11$$

Cont. Pre/Post Comp. Gr. Equiv.

$$\frac{2.3 - 2.0}{\sqrt{\frac{.42^2}{22} + \frac{.50^2}{33}}} = \frac{.3}{\sqrt{\frac{.1764}{22} + \frac{.2500}{33}}} = \frac{.3}{\sqrt{.0080 + .0076}} = \frac{.3}{\sqrt{.0156}} = \frac{.3}{.124} = 2.42^{**}$$

# APPENDIX III

## WORKSHEET B

WORKSHEET B

"Z" SCORES: TO EQUATE DIFFERENT GROUPS ON TESTS

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$$z = \frac{x}{S.D.}$$

$$t \text{ of } z = \frac{M_{z_1} - M_{z_2}}{\sqrt{\frac{\sigma^2}{\frac{z^2}{N_1}} + \frac{\sigma^2}{\frac{z^2}{N_2}}}}$$

One tailed test

df 31 + 33 - 2 = 62

.05 = 1.67*

.01 = 2.39**

Exp. Pre-Vocab.
Cont. Pre-Vocab.

$$\frac{3.54 - 3.16}{\sqrt{\frac{1.02^2}{31} + \frac{.97^2}{33}}} = \frac{.38}{\sqrt{.0335 + .0285}} = \frac{.38}{\sqrt{.0620}} = \frac{.38}{.25} = 1.52 \text{ N.S.}$$

Exp. Pre-Paragr.
Cont. Pre-Paragr.

$$\frac{1.98 - 1.83}{\sqrt{\frac{1.01^2}{22} + \frac{.99^2}{30}}} = \frac{.15}{\sqrt{.0329 + .0297}} = \frac{.15}{\sqrt{.0626}} = \frac{.15}{.25} = .600 \text{ N.S.}$$

df 30 + 22 - 2 = 50

.05 = 1.69*

.01 = 2.39**

Exp. Post-Vocab.
Cont. Post-Vocab.

$$\frac{3.51 - 2.42}{\sqrt{\frac{1.01^2}{22} + \frac{.96^2}{30}}} = \frac{1.09}{\sqrt{.0463 + .0307}} = \frac{1.09}{\sqrt{.0770}} = \frac{1.09}{.27} = 4.04**$$

Exp. Post-Paragr.
Cont. Post-Paragr.

$$\frac{2.81 - 1.99}{\sqrt{\frac{1.01^2}{22} + \frac{.99^2}{30}}} = \frac{.82}{\sqrt{.0464 + .0326}} = \frac{.82}{\sqrt{.0790}} = \frac{.82}{.28} = 2.93**$$

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