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Analysis of Achievement Using Individualized Instruction Compared With Other Group-Paced Types of Instruction in Two Selected Omaha Public Schools: An Experimental Case Study

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ANALYSIS OF ACHIEVEMENT USING INDIVIDUALIZED INSTRUCTION COMPARED WITH OTHER GROUP-PACED TYPES OF INSTRUCTION IN TWO SELECTED OMAHA PUBLIC SCHOOLS: AN EXPERIMENTAL CASE STUDY

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CHAPTER I

INTRODUCTION

Individualization of instruction is one of the most important directions for innovation and reform in American education. The past decade has seen serious and widespread attempts to introduce more and more instruction of an individualized nature into our elementary schools. Yet there is a question of continuing concern to elementary teachers. How can they adequately meet the individual needs of pupils in a school operation which is geared to masses of students? Although this problem largely remains unsolved, attempts have been made to provide for individual needs through various plans of individualized instruction.

Individualized instruction is a way of thinking about the teaching-learning process. It is based on the premise that children learn when they are involved in their learning and not merely told; that pupil interest is a great factor in learning; that immediate reinforcement aids learning rate; and that children learn best when allowed to learn at their own pace and within their own realm of learning. It is exciting! It has put "vigor in the step of the teachers and sparkle in the quest of students."[1]

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[1]Mardelle Olson, "WHERE WE ARE--Individualized Instruction" (Omaha, Nebraska: Omaha Public Schools, 1970), p. 1. (Mimeographed.)

Individualized instruction in four elementary schools in Omaha began early in 1970 after a grant from Title III of the National Defense Education Act was designated for the development of resource centers and materials. It is one of twenty-nine newly developed projects in the Omaha Public Schools.

During the past eighteen months staff members have been actively involved in special in-service training programs, seminars, and workshops; the writing of OMAPACS in four areas of instruction--language arts, social studies, mathematics, and science; and the implementation of individualized instruction through changes in organizational patterns.

Where are we going? As the individualized program is implemented, staff members realize the necessity for evaluation as they revise, rewrite, and revamp existing instructional materials, methods, and organizational patterns. To make decisions as the program evolves and to plan for further in-service education, an analysis of student achievement is imperative.

THE PROBLEM

Statement of the Problem

The purpose of this study was to compare the achievement of students in individualized instruction programs with students engaged in group-paced instructional methods in the areas of mathematics, language arts, and social studies in

grades four, five, and six. Comparisons were made between two schools selected on the basis of their similarity in variables.

Discussion of the Problem

In the experimental school, departmentalization utilizing teacher strengths and promoting greater mobility among groups of students was used.

To facilitate working individually with each child, it was necessary to provide a variety of possible learning activities from which the student could make selections. Opportunities were provided through the use of multi-media, multi-text, multi-level references, and packaged learning materials. OMAPACS were used in all three areas--language arts, social studies, and mathematics. Packaged materials included the Sullivan Programmed Math, Singer and Random House materials in mathematics, Educational Progress Corporation materials in social studies, and Cyclo-Teachers.

In the experimental school there was a library staffed with a library clerk and a resource center staffed with a para-professional available at all times to assist students in their individual pursuits.

There were traditional student desks but one also saw individual study carrels, round tables and chairs suitable for small group discussions, trapezoidal tables, and a separate area apart from the classroom for testing.

In the control school, teacher-directed group-paced

instructional methods were evident. Here the teacher defined the scope and sequence of curriculum to be taught and served mainly as a presenter of information. Each teacher provided instruction in all three areas of the curriculum.

For instruction in mathematics and the entire language arts area of the curriculum in the control school, students were grouped within a given grade according to ability as determined by achievement tests. There was movement of students within rooms at grade levels for instruction in language arts and mathematics.

All students used textbooks as a basis for instruction in mathematics in the control school. A multi-text approach was used in the area of language arts. It was also used in social studies. Many other reference materials and media were also used in social studies.

A library, staffed by a part-time library clerk, was available to students in the control school. A resource center, as a separate existing facility, was not available.

Hypotheses

There is no significant difference in six-month gain scores in achievement as measured by the Iowa Tests of Basic Skills for students using individualized instruction programs compared to students engaged in group-paced instructional methods in grades four, five, and six in two selected schools of the Omaha Public Schools.

1. There is no significant difference in six-month gain scores in achievement in mathematics as measured by the Iowa Tests of Basic Skills for fourth grade students using individualized instruction programs compared to students engaged in group-paced instructional methods.

2. There is no significant difference in six-month gain scores in achievement in mathematics as measured by the Iowa Tests of Basic Skills for fifth grade students using individualized instruction programs compared to students engaged in group-paced instructional methods.

3. There is no significant difference in six-month gain scores in achievement in mathematics as measured by the Iowa Tests of Basic Skills for sixth grade students using individualized instruction programs compared to students engaged in group-paced instructional methods.

4. There is no significant difference in six-month gain scores in achievement in language arts as measured by the Iowa Tests of Basic Skills for fourth grade students using individualized instruction programs compared to students engaged in group-paced instructional methods.

5. There is no significant difference in six-month gain scores in achievement in language arts as measured by the Iowa Tests of Basic Skills for fifth grade students using individualized instruction programs compared to students engaged in group-paced instructional methods.

6. There is no significant difference in six-month gain scores in achievement in language arts as measured by the Iowa Tests of Basic Skills for sixth grade students using individualized instruction programs compared to students engaged in group-paced instructional methods.

7. There is no significant difference in six-month gain scores in achievement in social studies as measured by the Iowa Tests of Basic Skills, Work-Study Skills tests, for fourth grade students using individualized instruction programs compared to students engaged in group-paced instructional methods.

8. There is no significant difference in six-month gain scores in achievement in social studies as measured by the Iowa Tests of Basic Skills, Work-Study Skills tests, for fifth grade students using individualized instruction programs compared to students engaged in group-paced instructional methods.

9. There is no significant difference in six-month gain scores in achievement in social studies as measured by the Iowa Tests of Basic Skills, Work-Study Skills tests, for sixth grade students using individualized instruction programs compared to students engaged in group-paced instructional methods.

Assumptions

For the purpose of this study the following assumptions were made:

1. It was assumed that the attendance areas were similar in socio-economic level and mobility of population, the school plant facilities were equal in quality, and the instructional staff was properly certified and fully qualified in both selected schools.
2. It was assumed that the two schools used in this study were comparable in ability and in levels of achievement at the beginning of the experiment.
3. It was assumed that curriculum content taught in both schools was not different in objectives.
4. Although the method has changed, it was assumed that the cognitive content of the curriculum did not appreciably change in the experimental group.
5. It was assumed that the control group remained acceptably free of contaminating variables.

6. Because of similarity in the control and experimental groups, it was assumed that any difference in pupil gain scores could be attributed to the treatment variable.
7. It was assumed that the Iowa Tests of Basic Skills were adequate measurements of pupil growth in achievement in the areas studied.
8. It was assumed that the growth in achievement by pupils during a six-month period could be determined by using one form of the Iowa Tests of Basic Skills as a pre-test and a post-test.
9. It was assumed that the pre-test was non-reactive.
10. It was assumed that the following sub-tests of the Iowa Tests of Basic Skills were accurate measurements in the specified areas of instruction:

Test A--Arithmetic Skills--for mathematics
- A-1 Arithmetic Concepts
- A-2 Arithmetic Problem Solving

Test L--Language Skills--for language arts
- L-1 Spelling
- L-2 Capitalization
- L-3 Punctuation
- L-4 Usage

Test W--Work-Study Skills--for social studies
- W-1 Map Reading
- W-2 Reading Graphs and Tables
- W-3 Knowledge and Use of Reference Materials

Limitations

1. This study was limited to an evaluation of individualized instruction programs in the areas of language arts, mathematics, and social studies in two comparable

elementary schools of the Omaha Public Schools.

2. Although individualized instruction was used in the area of science, no attempt was made to evaluate instruction in this area of the curriculum. This limitation was imposed because the Iowa Tests of Basic Skills did not contain an appropriate section.
3. Evaluation in this study was limited to student achievement.
4. No attempt was made to determine the quality of teaching. It is considered quite difficult to measure teacher competency adequately; it would be of even greater difficulty to control this if it were measureable.
5. Only the scores for children who completed both the pre-test and post-test were used.

Definitions of Terms Used

Individualized instruction. The learning program for each curriculum area is organized in such a manner as to allow each child to move at his own pace under the guidance of his teacher. Instruction is non-graded, enabling each child to go as far in each subject as his ability permits. The student assumes more responsibility for learning. It involves: (1) diagnosis--pretesting to determine student needs, (2) prescription--individual prescription based on student need rather than group instruction, (3) treatment--through packaged learning, multi-media, multi-text materials, and (4) assessment--through continuous progress reporting and

self-appraisal. It encompasses: (1) students working individually or helping each other, (2) small group discussions, (3) large group discussions, (4) teachers conferring with children, and (5) students using the library and resource center independently. In individualized instruction, reward and reinforcement are almost immediate.

Group-paced instructional methods. In this approach the major responsibility for student learning is placed upon the teacher with directed group learning activities by him. The concepts and learning alternatives are presented by the teacher. Learning activities are prescribed on a group level basis. Individual student help is given as time permits. Reinforcement and reward are usually not immediate. Elements of the following are present but are limited: (1) students working on an individual basis, (2) small group discussions, (3) teachers conferring with children, and (4) students working independently in the library or resource center.

OMAPACS. These self-paced learning contracts are being used in the areas of language arts, social studies, mathematics, and science by students in the experimental group.

Language arts. Language arts as defined by the Omaha Public Schools includes the four areas of speaking, listening, reading, and writing. The scope of language arts

in this study is limited to include the areas of oral and written communication skills and spelling.

Mathematics. This area of the curriculum provides for the learning of fundamental concepts, mastery of the basic processes in numbers, and growth in reasoning and problem-solving activities. Major emphasis is given to the development of meaning and understanding by learning through discovery.

Social studies. This curriculum embraces those concepts of history, geography, economics, government, and other disciplines that will enable the student to function effectively in a democratic society. Under the scope of the social studies curriculum, children are given opportunities to obtain and process knowledge and work successfully with others. These skills include the ability to: (1) use a variety of sources of information; (2) organize information from many sources and communicate this information to others orally, graphically, or in written form; (3) comprehend information by analysis of what is read, heard, or observed; (4) identify the difference between fact and opinion; (5) interpret and design maps, charts, graphs, and other visual presentations of facts; and (6) work effectively as a group member in solving problems and participating in group efforts.

Resource center. This is an area containing materials and equipment needed by students to pursue their learning during their independent study time in one or more disciplines. Materials include all types of books, audio-visual materials and equipment, and references that provide learning alternatives on a self-service basis. Student study is supervised by a para-professional.

Multi-text approach. This term refers to any number of different textbooks, though there may not be sufficient copies of a given book to allow several pupils to work together with the same text. It usually implies the use of two or more different titles. The books may deal with the same field of study, but they may not be of equal difficulty or interest. No one book may be considered the basic text. With this approach, boys and girls learn to work independently of each other. They tend to work from topical references rather than from page-by-page assignments.

PROCEDURES OF THE STUDY

Population

Two groups of students enrolled in grades four, five, and six during the 1970-71 school term and matched on variables relevant to the experiment were used in this study.

Each group approximated two hundred students. The experimental group was exposed to the independent variable, individualized instruction.

Data

Form 4 of the Iowa Tests of Basic Skills was used as a pre-test and a post-test. After a six-month period of instruction, achievement of students in mathematics, language arts, and social studies in the two groups was analyzed. Mean gain scores of all students completing both the pre-test and post-test at each of the three grade levels in each group were compared.

Statistical Treatment

A t test was utilized for testing the significance of the differences in gain scores in each of the three areas of instruction in grades four, five, and six.

ORGANIZATION OF THE STUDY

The report of this study is organized in the following manner:

1. Chapter I has presented the background, statement of the problem, discussion of the problem, and major steps in the procedure of the study.

2. Chapter II presents a review of the related literature concerning this problem.

3. Chapter III is devoted to the groups and procedures used in this study.

4. Chapter IV is devoted to the presentation and analysis of the data.

5. Chapter V gives a summary of the findings of this study, as well as the conclusions and recommendations.

6. A bibliography is included recording the sources of information used by the researcher.

CHAPTER II

REVIEW OF RELATED LITERATURE

Educators are well aware of the need to educate the individual, to humanize the person, and to focus on individual growth of students. More has probably been written and spoken on this need than on any other contemporary educational subject. Yet, the question of personalized instruction remains unanswered.[2]

Mario D. Fantani spoke of needed reform in our schools when he wrote:

> Today's young people demand schools that are relevant to their lives. In recent decades, we have asked schools to grapple with our monumental social problems: poverty, alienation, delinquency, and racism. Schools have become central to our national defense and to the frenetic growth of the great society. We have asked schools to educate everyone, and simultaneously, to develop the maximum potential of the individual child.[3]

"Our schools for the seventies probably will reflect a direction from the group to the individual," said Ole Sands. He further stated:

> Provision for individual differences should be made by qualified teaching personnel through diagnosis of

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[2]Virginia Rapport (ed.), Learning Centers: Children on their Own (Washington, D.C.: Association for Childhood Education International, 1964), p. 5.

[3]Mario D. Fantani, "Schools for the Seventies: Institutional Reform," Today's Education, LIX (April, 1970), 43.

> learning needs and through appropriate variety of content, resources for learning, and instructional methods. Individualized programs for learners should be our goal.[4]

In extending the direction of institutional reform, Fantani suggested, "All students will develop their skills and achieve mastery of academic subjects through individually tailored programs involving the support of all kinds of educational technology."[5]

Three efforts which have added power and impetus to the search for meaning of individualization of instruction have been the curriculum reform movement, the development of technology adaptable to education, and concern for the disadvantaged pupil and the concomitant desegregation moves.[6]

Attempts to achieve individualization of teaching have generally rested on an assumption that there exists at any given educational level a fixed body of subject matter which is most worth learning. Some pupils learn the prescribed content rapidly; others learn it more slowly.[7]

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[4]Ole Sands, "Schools for the Seventies," National Elementary Principal, XLVII (September, 1967), 26.

[5]Fantani, op. cit., p. 61.

[6]Virgil M. Howes (ed.), Individualization of Instruction (New York: The Macmillan Company, 1970), p. 69.

[7]Ronald C. Doll (ed.), Individualizing Instruction (Washington, D.C.: Association for Supervision and Curriculum Development, National Education Association, 1964), p. 9.

In describing individualized instruction, Jasik pointed out that:

> A pediatrician cannot offer a blanket prescription for all his young patients but must prescribe what his diagnosis reveals, combined with what he knows about his ailing patient. In the same way, a teacher is unable to maintain a healthy learning climate for his class unless he observes, diagnoses, and prescribes on an individual basis.[8]

A BRIEF HISTORY OF INDIVIDUALIZED INSTRUCTION

In 1916, the psychologist Terman suggested a need for differentiated courses of study to permit each pupil "to progress at the rate which is normal for him, whether that rate be rapid or slow." He proposed to teachers that they "measure out the work for each child in proportion to his mental ability."[9]

Since the 1930's, many of the plans for individualizing instruction have emphasized so-called homogeneous grouping, though this form of grouping has not been found consistently effective.

The Winnetka Plan

Carleton W. Washburne, an early advocate of individualized instruction, initiated many firsts in the educational

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[8]Marilyn Jasik, "Breaking Barriers by Individualizing," Childhood Education, XLV (October, 1968), 74.

[9]Doll, loc. cit.

field during his superintendency in the Winnetka, Illinois schools. His so-called "Winnetka Plan," following the work of F. L. Burk in San Francisco State College's training school, was developed after 1919. The plan, using self-instructional materials, was based on the theory that individuals progress at different rates. This idea, widely accepted now, was considered most advanced for its time, approximately forty years before Skinnerian ideas began to influence education.[10]

Instruction for each pupil was individualized through a division of the curriculum into two parts. The most important phase of the program called for the establishment of individual work centers about the "common essentials" or the body of knowledge and basic skills which everyone had to master. The second phase provided each pupil with opportunities to be self-expressive along with a chance to contribute something of his own special interests and abilities.[11]

Common essentials were learned through "self-instructional materials." Each pupil kept his own record of progress as a motivating factor. From time to time the

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[10]Robert H. Anderson, "Organizing Groups for Instruction," Individualizing Education, Sixty-first Yearbook of the National Society for the Study of Education, Part I (Chicago: University of Chicago Press, 1962), p. 242.

[11]George I. Thomas and Joseph Crescimbeni, Individualizing Instruction in the Elementary School (New York: Random House, Inc., 1967), p. 27.

teacher worked with individual pupils and with small groups of children, but he was not apt to be found teaching the common essentials on an all-class basis.[12]

Although the Winnetka Plan has had great influence upon other efforts to individualize instruction and combat the lock-step graded system and philosophy, it has undergone considerable modification over the years.

The Dalton Plan

Another similar plan, attempting to allow each child to master the successive units of work in the fundamental subjects at his own pace, became known as the Dalton plan. It was introduced in a high school at Dalton, Massachusetts in 1919 by Helen Parkhurst. It was soon used in elementary schools starting with the fourth grade. In essence, it called for the division of the work of several subjects into monthly job classifications. Each job classification was subdivided into twenty days' work per subject. These individual work units would be prepared by the teacher, the pupils, or teacher and pupil working together. At the beginning of the month or twenty-day period, each pupil signed up for a job contract.[13]

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[12] Ibid., p. 28.

[13] Ibid., p. 26.

SELECTED PROJECTS IN INDIVIDUALIZED INSTRUCTION

Several proposals that are old and a few that are new are finding their way into elementary schools with some thought of increasing and improving individualization. These include departmentalization, team teaching, and employment of para-professionals and teacher aides; programmed learning and language laboratories; and acceleration and enrichment.[14]

A recent survey, made under a United States Office of Education grant, identified more than 600 school districts throughout the country as having installed some form of individualized instruction. However, current information is limited regarding evaluations of these projects.

Individually Prescribed Instruction

One of the most popular projects is Individually Prescribed Instruction (IPI), the elaborate system developed by the Learning Research and Development Center at the University of Pittsburgh and disseminated by Research for Better Schools (RBS), a regional educational laboratory in Philadelphia. It is being used in over 300 schools at the present time. About 1,000 other schools have applications pending. The program is offered at the elementary school level in three subjects--mathematics, reading, and science.

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[14]Doll, op. cit., p. 11.

Programs in spelling, handwriting, science, and social studies are now in various stages of readiness. It is estimated that by 1975 programs will be available in all curriculum areas including physical education.

IPI has been used for three years in two elementary schools in the same district in a suburb northwest of Chicago. In a state-financed evaluation, these conclusions were reported:

1. There was no statistical difference between the achievement of IPI pupils and students in other district schools.

2. There was a difference in favor of IPI pupils in attitudes toward school. They tended to develop better "independent behavior."

3. Parents of IPI pupils were more positive in attitudes toward their schools. In IPI schools, 98 per cent of the parents said the school was doing a good job, compared with 92 per cent of the parents at the other schools in the district.[15]

A study conducted in Urbana, Illinois compared a group of 200 IPI students in math and reading with a control group of 200 students in the same ungraded school's primary program. The test period lasted one school year, 1966-67. At the end of this period the pupils were given the California

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[15]"IPI Results from Illinois," IPI Newsletter, March, 1969, p. 2.

Achievement Test. Results showed that all IPI pupils at nearly every IQ level scored higher than non-IPI students. At the lower primary level, IPI pupils in the 110-119 I.Q. range received a grade placement score of 2.97 in reading comprehension; similar non-IPI pupils received a grade placement score of 1.18. In arithmetic fundamentals, IPI lower primary pupils in the 110-119 I.Q. range scored 2.42; similar non-IPI pupils scored 1.97.[16]

Evaluations at the Oakleaf School in suburban Pittsburg, where IPI began in 1963, have indicated some significant differences for pupils exposed to IPI. However, standard tests were found not to cover the full range of IPI material. Therefore, they have not provided an accurate measure for comparison, officials report.[17] The computer was introduced at Oakleaf School in 1969. It is now used for diagnosis and prescription for groups and individuals.

The Brookmeade Elementary School, Nashville, Tennessee

The Brookmeade Elementary School in Nashville, Tennessee began to experiment as an ESEA demonstration center in 1966. By 1969-70, classrooms at all levels were converted to a learning center or data bank approach that

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[16]Editorial, The Christian Science Monitor, March 8, 1969, p. 12.

[17]Alexander Frazier (ed.), A Curriculum for Children (Washington, D.C.: Association for Supervision and Curriculum Development, National Education Association, 1969), p. 28.

permitted children to spend a significant portion of each day working independently on projects that had meaning and relevance for them. Seven teachers jointly served more than 200 fifth and sixth grade pupils. Classrooms were redesignated as learning laboratories in language arts, science, mathematics, art, and social studies. They were stations containing instructional packets that permitted children to work independently. Frequent opportunities were provided to check their progress.

Not all the time in the learning laboratories was spent in individual research. The staff discovered early that children needed organized contact with their teachers and peers. About 40-60 per cent of the time for each child was devoted to structured group situations, such as a film to launch an area of study, a simulation activity or game in social studies, dramatic reading or presentation in language arts, experiments in science, or teacher-led discussions of what had been learned.

Children in the school seemed more highly motivated and knowledgeable than was formerly true. While evaluation at a technical level was not undertaken, achievement test scores in several areas appeared to be higher than at the same school in prior years.[18]

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[18]Jack W. Miller and Haroldine G. Miller, "Individualizing Instruction Through Diagnosis and Evaluation," Childhood Education, XLVI (May, 1970), 419.

The Duluth, Minnesota Public School Program

The Duluth, Minnesota school system has developed its own curriculum for individualization. In that program, each subject area is broken down into a series of sequential contracts which children undertake and complete at their own pace. Esbensen, in Working With Individualized Instruction, has described the program involving three elementary school projects with widely varying student populations.[19]

Project Congdon began in 1964 with four teachers, four student teachers, and approximately 120 fifth and sixth graders. These students were a group of high achievers. Student assignments were in the form of individualized lesson plans designed for one week's work. Each lesson plan was called a contract.

The Iowa Tests of Basic Skills were used to measure student achievement. The project students did well in all parts of the tests. However, a control group working in a traditional self-contained classroom did just as well as the experimental group. On the tests, the fifth grade students as a class scored at the 92nd percentile, and the sixth grade students scored at the 98th percentile. Esbensen contended:

> The significant point is that Project Congdon not only worked effectively in promoting the basic academic achievement of the project students, but it also made it possible for these students to grow in the ability to

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[19]Thorwald Esbensen, Working With Individualized Instruction (Belmont, California: Fearon Publishers, 1968), p. 16.

organize their own learning activities, and to become adept in acquiring the skills of independent inquiry.[20]

The second project involved the schools of Franklin and Nettleton where achievement scores on the Iowa Tests of Basic Skills were generally the lowest in the city. Both schools were old, traditional buildings. Additional staff members employed in addition to the regularly assigned teachers were: one regular teacher, seven teacher aides, one secretary, and one elementary counselor. This project involved some 500 children and was carried out at all grade levels, kindergarten through grade six. Youngsters in the primary grades were on a fixed schedule for their various subjects while students in the upper grades were, for the most part, self-scheduled.[21]

In 1967 an attitude survey was conducted among project pupils and their parents. Of the parents responding, 74 per cent felt that his child's school experience had benefited him more than during the previous year, 18 per cent checked the "same as", and 8 per cent checked "less than." Of the group of students responding, 72 per cent felt that they had enjoyed school more than during the previous year, 12 per cent checked the "same as", and 15 per cent checked "less than."[22]

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[20] Ibid., p. 22.

[21] Ibid., p. 57.

[22] Ibid., p. 76.

The third project was at Chester Park Elementary School, a facility designed for individualized instruction. It was a shell containing three large classrooms and a library. It housed 371 students, 12 regular teachers, a resource teacher, and a part-time professional librarian.

In formulating a general conclusion, Esbensen stated:

> It is difficult to state with assurance that individualized instruction is indisputably superior to traditional forms of schooling. As measured by a traditional kind of standardized achievement test (the Iowa Tests of Basic Skills), the results show a general standoff in performance.[23]

However, reports showed that there appeared to be a drop in absenteesism among project students and less window breakage for project schools in the inner-city. Esbensen further stated that the program has "neither pleased all parents nor motivated all students."[24]

Project PLAN

The American Institutes for Research in the Behavioral Sciences (AIR), the Westinghouse Learning Corporation of Palo Alto, California, and thirteen cooperating school systems have developed Project PLAN (Program for Learning in Accordance with Needs). It is a non-graded K-12 program of individualized instruction in language arts, mathematics, social studies,

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[23] Ibid., p. 119.

[24] Ibid., p. 121.

and science. In Project PLAN each student plays a vital role in deciding with his teacher the instructional objectives, the instructional materials, the instructional procedures, and the length of time he will study the objectives in each subject.[25]

Desks and chairs in Project PLAN classrooms are frequently arranged so that students who are working on similar learning activities can work together in small groups. Part of the classroom is often set aside for a testing area. Instructional materials are frequently grouped into specific areas. Each classroom becomes the instructional materials center for one subject area.[26]

The teacher and student select the module or set of objectives defining about two weeks' work for the average student. Usually each module has several Teaching Learning Units that relate to the instructional objectives of the module.[27]

In Project PLAN the computer serves an administrative function rather than a direct teaching function. It assists the teacher by storing and assessing the findings of each test taken by the student, suggesting how he can proceed,

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[25]Thomas J. Quirk, "The Student in Project PLAN: A Functioning Program of Individualized Education," Elementary School Journal, LXXI (October, 1970), 43.

[26]Ibid., p. 44.

[27]Ibid., p. 48.

keeping records up-to-date, grading and recording the results of each test taken at the end of a Teaching Learning Unit, and providing teachers with a weekly status report of the progress of each child. The student is never on-line with the computer. Instead, the computer terminals in the thirteen school districts transmit messages from mark-sensed cards over telephone lines to the computer in Iowa City, Iowa. Eventually the computer will recommend a specific Teaching-Learning Unit to a student based on empirical data of the past performance of similar students.[28]

Other Projects

Other school systems throughout the nation--Dayton, San Francisco, San Mateo, Philadelphia, Washington, D.C., West Hartford, and Memphis--are engaging in various experimental projects to individualize instruction.

SUMMARY

Individualized instruction does not depend for its success upon any given arrangement of persons, materials, or environmental conditions. In an individualized system, the teacher, the school, and the community make most of the decisions about what the student is expected to achieve, and the student makes most of the decisions about how he will achieve.

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[28] Ibid., p. 53.

The degree of individualization of instruction in a given school or classroom will be an outcome of the degree to which provision is made in the curriculum for each of five elements: (1) purposeful pacing of learning for each student, (2) alternative means of learning, (3) a variety of self-evaluation processes, (4) decision-making activities, and (5) purposive interaction.[29]

In discussing individualized instruction, Doll asserted that:

> Individualization of teaching goes beyond the content of the curriculum and beyond standardized instruction . . . It gives personal relevance to experiences which the individual learner shares with the other members of his group. The times demand that the individual's potential be discovered, developed, and released because of the multiple benefits which the realization of his full potential can eventually offer the individual person and the society in which he lives.[30]

Individualized programs cannot possibly replace the teacher. Instead, they will take the load off the teacher for teaching much of the basic skills and content, leaving him valuable time to humanize learning.

Blake and McPherson, in conceiving of the role of the teacher and individualized programs, contend:

> Not only will individualized instructional programs give the teacher a new status and role in the classroom,

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[29]Patrick A. O'Donnel and Charles W. Lavaroni, "Elements of Individualized Instruction," The Education Digest, XXXVI (September, 1970), 17.

[30]Doll, op. cit., p. 13.

but they will bring a new excitement into teaching and learning, making it a truly creative experience for teachers and children. Good teachers will seek good individualized instructional programs and will develop a philosophy that will enable them to use this approach in their classrooms; for such programs offer the greatest assurance of raising the quality of both teaching and learning.[31]

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[31]Howard E. Blake and Ann W. McPherson, "Individualized Instruction--Where Are We?" Educational Technology, IX (December, 1969), 65.

CHAPTER III

GROUPS AND PROCEDURES USED IN THIS STUDY

THE PROGRAM

The project, "Individualizing Instruction in the Elementary School" was a curriculum research project developed and implemented in the Omaha Public Schools during the 1970-71 school term. The primary goal was to modify or restructure curriculum and teaching methods so that instruction could be individualized.

A departmentalized program utilizing teacher strengths and promoting greater mobility among groups of students was used in the experimental group. Students were given many opportunities to interact with those who helped guide their learning--teachers, student teachers, a library clerk, a paraprofessional in the social studies resource center, and volunteer parents.

The program design permitted changing the role of the student from a passive learner in teacher-directed group activity to an active self-directed participant in the learning process.

There were many opportunities provided through the use of multi-media, multi-texts, multi-level references, and packaged learning materials. These materials included:

(1) Cyclo-Teachers in all subject areas, (2) Individualized Mathematics by Singer/Random House, (3) Computational Skills Development Kit by SRA, and (4) Continuous Progress Laboratory, Series 500, by Educational Progress Corporation.

One form of individualized instruction, the OMAPAC, was used to give each student an individual course of study. OMAPACS were used extensively at all three grade levels in social studies, language arts, and for enrichment in mathematics.

The format for each OMAPAC included four parts:

1. A Title Page which stated the content and purpose of the OMAPAC.

2. A Pre-Test which was a diagnostic instrument used to determine whether the student needed to proceed through the OMAPAC. This test was taken individually in an area of the classroom restricted for this purpose. It was also used as a study guide. One hundred per cent accuracy in the pre-test was usually required to bypass an OMAPAC and move on to another one.

3. A Compac which stated the behavioral objective (the behavior the student should possess or exhibit after learning successfully.) A variety of resources or learning experiences were itemized in each Compac for selection by the student in achieving the stated behavioral objective. It was not necessary for the student to complete all of the resources listed in each Compac. In conferring with the

teacher, the student chose the learning experiences he wanted to undertake proceeding as rapidly or as slowly as his interests or ability permitted. Usually there were three or more Compacs in each OMAPAC. Challenge activities were also provided for in-depth research or creative pursuits.

4. A Post-Test which was an evaluative technique designed to reveal whether the student had achieved the behavioral objectives within the OMAPAC. If a student attained the satisfactory accuracy level after completing the Compacs, he was permitted to proceed to the next OMAPAC. If he failed to reach the required level of accuracy, he was required to continue studying in the Compacs until he learned the material. The student was given the test again and upon passing it with a satisfactory accuracy level, he proceeded to the next OMAPAC.

At the beginning of the program all students were given a diagnostic test prepared by the teacher in the areas of math and spelling. This instrument helped the teacher to determine at what level the student would begin his course of studies.

The pre-tests and post-tests were checked by the teacher or student teacher.

A folder kept for each student in each subject area contained his work assignments and tests. Large wall charts also showed a student's progress in each subject area. This chart included the name of the OMAPAC, the date started, and

date of completion.

The individualized approach provided opportunities for teachers to work with students in a one-to-one relationship during conferences. The student was also provided with several alternatives to learning: (1) individually by locating information, taking notes from a reference, constructing a model or replica, viewing a filmstrip, reading silently, or using the resource center; (2) in a small group by taking part in a discussion, helping another student, being helped by another student, listening to a tape or record, or as a member of a small remedial group; and (3) in a large group by viewing a film or television lesson, listening to a resource person speaking on a topic of common interest, presenting the results of an activity to a group of classmates, or listening to a teacher-led presentation.

POPULATION

Two groups of students were used in this study. Both groups were enrolled in grades four, five, and six during the 1970-71 school term.

These two groups approximated each other as nearly as possible upon the following criteria:

(1) Percentage of attendance in school during the last five years. See Table 1, page 34.

(2) School membership in grades four, five, and six as of October 2, 1970. See Table 2, page 35.

(3) Composite grade equivalent achievement scores for students in grades three, four, and five obtained on the Iowa Tests of Basic Skills administered during February, 1970. See Table 3, page 35.

(4) Composite group intelligence test scores (verbal + non-verbal) for students in grade three obtained on the Lorge-Thorndike Intelligence Tests administered January 12, 1970. See Table 4, page 36.

Table 1

Percentage of Attendance in School During the Last Five Years

School Year	Control Group	Experimental Group
1966-67	96.4	96.3
1967-68	96.2	96.4
1968-69	95.9	95.7
1969-70	96.3	96.0
1970-71 (1st quarter)	97.8	97.4

Table 2

School Membership in Grades Four, Five, and Six as of October 2, 1970

Grade Level	Control Group	Experimental Group
Grade 4	83	74
Grade 5	66	51
Grade 6	82	81
Total Membership	231	206

Table 3

Composite Grade Equivalent Achievement Scores on Iowa Tests of Basic Skills Given February, 1970

Grade Level	Control Group	Experimental Group
Three	4.0	3.8
Four	4.8	5.1
Five	5.8	6.0
Composite Mean-Grades 3,4,5	4.8	4.9

Table 4

Lorge-Thorndike Composite Intelligence Test Scores for Grade Three Given January, 1970

Tests	Control Group	Experimental Group
Verbal	105.0	104.5
Non-Verbal	107.3	104.5
Verbal + Non-Verbal	106.1	104.5

PROCEDURES

One form of the control group design was employed using two groups of individuals that were reasonably matched on variables relevant to the experiment.

The experimental or independent variable, individualized instruction, was introduced in the experimental group only; it was not introduced in the control group. The control group was exposed to group-paced traditional types of instruction with teacher-directed learning activities.

Since the experimental and control groups were both pre-measured, it was determined that the differences between the scores of the two groups would approximate a direct indication of the experimental variable's influence.

The Iowa Tests of Basic Skills were administered to students in grades four, five, and six in both the control

and experimental groups. The pre-test, Form 4, was administered in October-November, 1970. The same form was used as a post-test and administered after a six-month period in April-May, 1971.

Mean raw scores and grade equivalent scores in the areas of mathematics, language arts, and work-study skills were compared at each grade level. Total gain in achievement made in each area at each grade level during the six-month period was determined. An analysis of the differences in achievement gain scores by students in both groups was made.

A t test was utilized for testing the significance of the differences in gain scores in each of the three areas of instruction in grades four, five, and six of the control and experimental groups.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Two groups of students were used in this study. The first, or control group, consisted of two hundred twenty-four students in grades four, five, and six who learned by teacher-directed group-paced instructional methods. The experimental group of one hundred ninety-one students participated in a program of individualized instruction. See Table 5. Only those students who completed both the pre-test and post-test were included.

Table 5

Number of Students in Grades Four, Five, and Six Used in Analysis of Test Data

Grade	Control Group	Experimental Group
Grade Four	81	66
Grade Five	63	48
Grade Six	80	77
Total	224	191

Achievement of the two groups in mathematics, language arts, and work-study skills was measured at the end of a six-month instructional period by the Iowa Tests of Basic Skills, Form 4, published by Houghton Mifflin and Company. Raw scores were used in the computation of data. The t test was applied to the scores in each of the three areas to determine whether or not there was a significant difference between the levels of achievement of the two groups.

For all computations there were one hundred forty-five degrees of freedom for grade four; one hundred nine degrees of freedom for grade five; and one hundred fifty-five degrees of freedom for grade six.

When the t test was applied to the scores of the two groups on the arithmetic pre-test, t had a value of 1.441 for fourth grade students. See Table 6.

Table 6

Comparison of Control and Experimental Group Pre-Test Scores for Students in Grades Four, Five, and Six on the Arithmetic Test of the Iowa Tests of Basic Skills, Form 4

Grade	Value of t	Critical Value of t at .05 Significance
Grade Four	1.441	1.960
Grade Five	0.026	1.964
Grade Six	-0.071	1.960

A t value of 1.960 was required to indicate a significant difference between the groups at the .05 level of significance.

For fifth grade students, t had a value of 0.026. This was not significant at the .05 level of significance since it was less than 1.964, the required t value.

For sixth grade students, t had a value of -0.071. This also was not significant at the .05 level of significance as it was less than 1.960, the required t value.

In applying the t test to the scores of the two groups on the language arts pre-test, t had a value of 0.600 for fourth grade students. See Table 7. For fifth grade students, t had a value of -0.498. For sixth grade students,

Table 7

Comparison of Control and Experimental Group Pre-Test Scores for Students in Grades Four, Five, and Six on the Language Arts Test of the Iowa Tests of Basic Skills, Form 4

Grade	Value of t	Critical Value of t at .05 Significance
Grade Four	0.600	1.960
Grade Five	-0.498	1.964
Grade Six	-0.288	1.960

t had a value of -0.288. These values were not significant at the .05 level of significance.

On the work-study skills pre-test, when the t test was applied to the scores of the two groups, t had a value of 1.041 for fourth grade students. See Table 8. For fifth grade students, t had a value of -0.662. For sixth grade students, t had a value of -0.241. None of these values was significant at the .05 level of significance.

Table 8

Comparison of Control and Experimental Group Pre-Test Scores for Students in Grades Four, Five, and Six on the Work-Study Skills Test of the Iowa Tests of Basic Skills, Form 4

Grade	Value of t	Critical Value of t at .05 Significance
Grade Four	1.041	1.960
Grade Five	-0.662	1.964
Grade Six	-0.241	1.960

As indicated in Tables 6, 7, and 8 there were no significant differences between the two groups on any of the pre-test scores.

When the t test was applied to the six-month gain scores of the two groups on the arithmetic test, t had a value of -0.684 for fourth grade students. See Table 9. A t value of 1.960 was required to indicate a significant difference between the groups at the .05 level of significance.

Table 9

Comparison of Control and Experimental Group Six-Month Gain Scores for Students in Grades Four, Five, and Six on the Arithmetic Test of the Iowa Tests of Basic Skills, Form 4

Grade	Value of t	Critical Value of t at .05 Significance
Grade Four	-0.684	1.960
Grade Five	-0.392	1.964
Grade Six	1.951	1.960

For fifth grade students, t had a value of -0.392. Since this was less than the required t level of 1.964, it was not significant at the .05 level of significance. For sixth grade students, t had a value of 1.951. This also was not significant at the .05 level of significance.

Application of the t test to the six-month gain scores of the two groups on the language arts test showed that t had a value of 1.893 for fourth grade students, a value of -0.806 for fifth grade students, and a value of -1.589 for sixth grade students. See Table 10. These values were not significant at the .05 level of significance.

Table 10

Comparison of Control and Experimental Group Six-Month Gain Scores for Students in Grades Four, Five, and Six on the Language Arts Test of the Iowa Tests of Basic Skills, Form 4

Grade	Value of t	Critical Value of t at .05 Significance
Grade Four	1.893	1.960
Grade Five	-0.806	1.964
Grade Six	-1.589	1.960

In applying the t test to the gain scores of the two groups on the work-study skills test, t had a value of 0.268 for fourth grade students, a value of 1.195 for fifth grade students, and a value of 1.085 for sixth grade students. See Table 11, page 44.

These values also were not significant at the .05 level of significance.

Table 11

Comparison of Control and Experimental Group Six-Month Gain Scores for Students in Grades Four, Five, and Six on the Work-Study Skills Test of the Iowa Tests of Basic Skills, Form 4

Grade	Value of t	Critical Value of t at .05 Significance
Grade Four	0.268	1.960
Grade Five	1.195	1.964
Grade Six	1.085	1.960

No statistically significant differences were found between the gain scores of students in the control group who learned by teacher-directed group-paced instructional methods and students in the experimental group engaged in individualized instruction programs.

It was noted that in mathematics at the sixth grade level, a comparison of pre-test scores of the two groups yielded a t value of -0.071. (slightly in favor of the experimental group.) Refer to Table 6, page 39. However,

a comparison of gain scores of the two groups revealed that t had a value of 1.951, .009 less than 1.960, the required t value to indicate a significant difference at the .05 level of significance for the control group. Refer to Table 9, page 42.

In addition to the data already presented, the accompanying table, Table 12 on page 46, presents a summary of grade equivalent scores for each group. There was a six-month period of instruction between the pre-test and post-test. Thus, a gain of 6.0 months would normally be expected in each of the three areas.

In analyzing the arithmetic skills, fourth and sixth grade students in the control group showed a gain of 6.0 months or more. In comparison, fourth grade students in the experimental group experienced a similar gain.

In the language arts skills, students in grades four and six of the control group again demonstrated a gain of 6.0 months or more while grade six students in the experimental group showed a significant gain, 10.8 months.

An analysis of the work-study skills reveals a 6.0 month gain for all students in the control group. In the experimental group, only fourth grade students experienced a similar gain.

Table 12

Analysis of Control and Experimental Group Grade Equivalent Scores for Students in Grades Four, Five, and Six on the Pre-Tests and Post-Tests of the Iowa Tests of Basic Skills, Form 4

Tests by Grade	Control Group			Experimental Group		
	Pre-Test	Post-Test	Gain in Mo.	Pre-Test	Post-Test	Gain in Mo.
ARITHMETIC SKILLS:						
Grade Four	4.61	5.24	6.3	3.96	4.70	7.4
Grade Five	5.36	5.86	5.0	5.33	5.88	5.5
Grade Six	6.15	6.94	7.9	6.20	6.64	4.4
LANGUAGE ARTS SKILLS:						
Grade Four	4.37	5.23	8.6	4.04	4.57	5.3
Grade Five	5.30	5.82	5.2	5.71	6.37	6.6
Grade Six	6.06	6.87	8.1	6.21	7.29	10.8
WORK-STUDY SKILLS:						
Grade Four	4.66	5.33	6.7	4.10	4.74	6.4
Grade Five	5.54	6.23	6.9	5.96	6.47	5.1
Grade Six	6.42	7.11	6.9	6.57	7.12	5.5

CHAPTER V

SUMMARY AND CONCLUSIONS

SUMMARY

The purpose of this study was to compare the achievement of students in individualized instruction programs with students engaged in group-paced instructional methods in the areas of mathematics, language arts, and social studies in grades four, five, and six. Comparisons were made between two schools selected on the basis of their similarity in variables. Nine hypotheses related to the aforementioned grades and curriculum areas were tested. Each of the hypotheses was stated in the null form.

This study included four hundred fifteen students. Two hundred twenty-four students, taught by traditional group-paced instructional methods, comprised the control population. One hundred ninety-one students who participated in individualized instruction programs were in the experimental population.

The investigator compared the two groups using specific statistical procedures. Comparisons were made of pre-test scores and six-month gain scores obtained by administering a post test.

CONCLUSIONS

Scores from the pre-test of the control group were very similar to those of the pre-test of the experimental group.

Six-month scores for students in grades four, five, and six in the areas of arithmetic, language arts, and work-study skills were not statistically significant at the .05 level of significance. No consistent pattern was found from grade to grade or subject to subject in either the control or experimental group.

We may conclude on the basis of the findings presented here that the null hypotheses can be accepted.

RECOMMENDATIONS

Based on the findings in this study, observations, and readings in related literature, the following recommendations are presented:

1. A similar study should be made over a longer period of time.

2. An attitude survey among pupils in individualized instruction programs and their parents would be relevant.

3. A study should be conducted of school attendance of pupils in individualized instruction programs as opposed to those in traditional instructional programs.

4. An additional study should be made utilizing a different standardized test instrument in measuring academic achievement of students in individualized instruction programs.

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