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THE EFFECT OF THE "INDIVIDUALIZED MATHEMATICS SYSTEM" ON THE MATHEMATICS ACHIEVEMENT OF PUPILS IN SELECTED PUBLIC SCHOOLS

by

Myron L. Ballain

A DISSERTATION

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In Partial Fulfillment of Requirements

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Department of Educational Administration

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TITLE

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Myron L. Ballain

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Edgar A. Kelley	November 15, 1977
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M.L.B.

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CHAPTER I

INTRODUCTION

Change is an integral and prominent part of our educational system. As people and society change, there are new and renewed demands for educational change. Improvements are necessary to respond to new needs. As one observer has noted, "change is needed to meet the requirements of modern man in an increasingly complex society."[1]

Many people have questioned the necessity or value of continual change. In some instances, the emphasis on change has been equated with looseness and instability in our educational systems. On the other hand, a commitment to change has often resulted in a solid basis for improving education.[2]

Many people believe that changes occur in a random and haphazard manner without adequate planning, implementation, and evaluation.[3] When this is true, ineffective programming and curriculum development are the result. Successful changes in schools can be made, however, by utilizing steps of pre-planning for determining goals and objectives,

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[1]Henry Scattergood, "Three Dimensions of Curricular Change," The Challenge of Curricular Change (New York: College Entrance Examination Board, 1966), p. 20.

[2]Hollis L. Caswell and Associates, Curriculum Improvement in Public School Systems (New York: Teachers College, Columbia University, 1950), p. 20.

[3]Ibid., p. 1.

planning, implementation and evaluation.[4] Pre-planning should involve parents, pupils, teachers and administrators. These are the people that will be directly involved in, or affected by, the changes. The elimination of the input of any one group often produces a less than effective curriculum change.[5]

Within the process of curriculum change, one particular phase does not receive the consideration it merits. Evaluation of curriculum change is often the least effective step in the process. As Saylor and Alexander have observed:

> Evaluation is frequently the weakest link in this chain of curriculum planning. After the planning is done, is not the time to decide to evaluate. Because evaluation is frequently approached as hindsight only, evidence is frequently inadequate as to the success of changes made.[6]

Since change is a part of curricular improvement, current and future changes should be evaluated. Doll has suggested that a "major action to help the process of curriculum improvement is building into each project, from its very inceptions, procedures for evaluating the effects of the project."[7] Indeed, as Saylor and Alexander stated:

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[4]Ronald C. Doll, Curriculum Improvement: Decision-Making and Process (Boston: Allyn and Bacon, Inc., 1970), pp. 162-189.

[5]B. Othanel Smith, William O. Stanley and J. Harlan Shores, Fundamentals of Curriculum Development (New York: World Book Company, 1950), pp. 676-698.

[6]J. Galen Saylor and William M. Alexander, Curriculum Planning for Better Teaching and Learning (New York: Rinehart and Company, Inc., 1954), pp. 579-580.

[7]Doll, op. cit., p. 186.

"Skeptics and critics of curriculum change are not answered very well when school personnel say they 'think' the new practice is better."[8] Ebel has described the essence of evaluation:

> All of those concerned with the process of education--students, teachers, parents and school officials--need to know periodically how successful their efforts have been, so that they can decide which practices to continue and which to change.[9]

A current example of change in curriculum has taken place at one of four elementary schools in a medium-sized midwestern school district. The particular change was made in the mathematics curriculum beginning with the school year 1974-1975. The program implemented was the Ginn "Individualized Mathematics System" (IMS). This particular program was implemented for two basic reasons. First was the educator concern for the dichotomy between the philosophized practice of individualizing instruction and the actual instructional practice occurring in the classroom setting. Second were concerns regarding the levels of mathematics achievement attained by most elementary pupils in the district. IMS was designed and adopted to accommodate the professed philosophy and to assist teachers with the improvement of instruction in mathematics skills. It was hoped that pupils would demonstrate improved performance in this curriculum area.

The IMS Program was selected after a two-year study of available mathematics programs. Selection was made on the basis of compatibility

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[8]Saylor and Alexander, loc. cit.

[9]Robert L. Ebel, Essentials of Educational Measurement (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1972), p. 41.

with the district philosophy and objectives. The final selection and adoption was made jointly by the parent advisory group and the faculty of the building who were to be involved in use of the IMS Program.

Pre-planning for the IMS Program began in the spring of 1974. At that time the program goals, objectives, procedures of implementation and means for evaluation were reviewed and discussed. The implementation began with a two-day pre-school workshop for teachers in the fall of 1974. Teachers received training in regard to instructional materials, methods and procedures for IMS. Throughout the first year of implementation, monthly inservice training was provided as a followup to the pre-school workshop. These training sessions were held for a two-hour period one afternoon each month.

Pupils were introduced to IMS on the second day of school. Orientation continued in daily sessions twenty-five minutes in length for a two-week period. This was a suggested approach designed by the producer of the materials. The orientation for pupils utilized commercially prepared audio-visual instructional materials.

Parents were introduced to the program by letter. The letter informed parents of a change in the mathematics curriculum, the reason for the change and provided an overview of IMS. This introductory letter was followed by a parent orientation session conducted during the annual "Open House" Program. A commercially prepared cassette tape recorded instructional session with accompanying filmstrip was utilized to give parents specific information and details about the program.

In replacing one instructional program with another, plans for evaluation must consider the effects of the new program on intended curricular outcomes. At a minimum, the new program should be as effective as the program being replaced. Hopefully, a new program should prove to be more effective in producing intended results. Otherwise, the change is one of form and not one of substance.

In the implementation of the IMS Program at the experimental school, the intent was to improve pupil performance in mathematics. This study was undertaken to evaluate whether or not the intended results occurred.

STATEMENT OF THE PROBLEM

The specific problem investigated in this study was whether or not pupils receiving instruction in the Individualized Mathematics System (IMS) differed in their attainment of mathematics skills when compared to pupils who continued to receive instruction in the formats used prior to introduction of IMS.

SIGNIFICANCE OF THE STUDY

The major significance of this study was to determine the effect of the IMS on the mathematics achievement of pupils. It was also felt that this particular research effort might establish an example for the host school district or other districts to use in planning evaluation of future curricular changes.

DEFINITION OF TERMS

Control group. That group of pupils who received mathematics instruction in the traditional program. These pupils were enrolled as fourth graders at the control school during the 1974-1975 school year and were included as subjects during each year of the study.

Experimental group. That group of pupils receiving mathematics instruction in the IMS Program. These pupils were enrolled as fourth graders at the experimental school during the 1974-1975 school year and were included as subjects during each year of the study.

Ginn "Individualized Mathematics System" (IMS). A commercially prepared mathematics program, published by Ginn and Company, that is intended as a means of opportunity for pupil mastery and continuous progress through contemporary mathematics content. It is expected that each student will be able to make use of his mathematics learning potential after teacher use of individual diagnosis followed by special prescriptive practices.

Mathematics achievement. Pupil performance as measured by three forms of the Iowa Test of Basic Skills (ITBS). This particular set of instruments was used to measure overall mathematics achievement as well as achievement in mathematics concepts and problem solving.[10]

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[10]The three forms used for measuring mathematics performance were those regularly used by the school district in which the study was completed. Each form was the one recommended for utilization at the respective grade level. Form 1 (Copyright 1955) was used for testing Grade 4 pupils. Form 3 (Copyright 1955) was employed to test Grade 5 pupils. Grade 6 pupils were tested with Form 4 (Copyright 1955).

Intelligence quotient (IQ). Intelligence quotient or ability. In this study, IQ was measured by Otis-Lennon, Elementary Level II (Copyright 1967, Form J).

Traditional instruction. A traditional teacher-directed instructional approach utilizing the same mathematics text for all pupils within a classroom, at any given grade level, and relying primarily on large group instructional practices.

ASSUMPTIONS

1. Teachers of pupils in the experimental and control groups were equal in ability and training.

2. The pupils included in the experimental and control groups were of similar socioeconomic background.

3. The ITBS Tests used to measure mathematics achievement were a valid measure of student performance and achievement.

4. IQ, as measured by the Otis-Lennon, was a valid means of equating the quantitative aptitudes of pupils.

LIMITATIONS OF THE STUDY

The population of this study was limited to elementary pupils who were enrolled during the 1974-1975 school year as fourth-graders in two of the four elementary schools in the host school district and who subsequently remained enrolled in these two elementary schools during the 1975-1976 and 1976-1977 school years. Pupils who dropped from the enrollment or enrolled after data collection for the first year of the

study had been completed were excluded as subjects, i.e., first year data include only pupils who participated for the first year of the study; second year data include only pupils who continued to participate for the second year of the study; third year data include only pupils who continued to participate for the third year of the study.

This study was limited to measurement of pupil performance in mathematics for the subjects involved in the study. Measurement of pupil performance in mathematics was limited to data obtained for the subjects in the study as a result of yearly administration of the Iowa Test of Basic Skills (ITBS).

HYPOTHESIS

There are no significant differences in the mathematics achievement of pupils in the experimental group as compared to the mathematics achievement of pupils in the control group.

ORGANIZATION OF THE STUDY

The problem of the study, the significance and research hypothesis were presented in Chapter I. In addition, the limitations, assumptions and definition of terms have been discussed.

A review of the current and related literature is presented in Chapter II. Literature on evaluation, curriculum evaluation and the IMS Program are examined.

The focus of Chapter III is the design and procedures utilized in conducting the study. A presentation of the collected and analyzed