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Individual Instruction: Third Grade Arithmetic

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INDIVIDUALIZED INSTRUCTION: THIRD GRADE ARITHMETIC

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CHAPTER I

INTRODUCTION

Teachers in our elementary schools find that they are constantly faced with the problem of adjusting the arithmetic curriculum to the child's needs. Due to individual differences in the ability to learn and the variability of the teacher's skills, the range of differences in ability within the classroom is continually widening.

The problem of providing for each child at his level of ability is the dilemma that confronts the teacher. Bruner maintains that children can learn almost anything faster than adults, providing it is given to them in terms they can understand. Throughout Chapter IV, Intuitive Thinking, he constantly equates the various types of thinking abilities with mathematics. (9:55)

Evidence is available which indicates that "children receiving instruction at their level of ability within a good classroom learning environment will show greater improvement in understanding and computation, than those placed in a one group situation." This and other surveys show that individual instruction is a very important consideration for inclusion of any school program. (17:10)

Furthermore, in these days when our schools are facing demands for stepping up the mathematics curriculum at all grade levels, many schools are contemplating some

form of grouping system designed to provide for individual differences, which will increase the effectiveness of instructional techniques. Suggestions have been made for preventing loss of potential, through regrouping pupils, reducing class size and affecting major organizational changes within the schools.

To discover and make provisions for individual differences in pupils is one of the most challenging problems in the field of education.

I. THE PROBLEM

The purpose of this study is to examine available literature for methods of individualized instruction, class groupings and organizational procedures; that can be adapted to a third grade level in arithmetic. Through such library research, the writer hopes to be able to initiate a practicable program of individualized instruction that will enable each third grade pupil involved to develop his maximum potential in mathematics.

Importance of the study. Today it is imperative that all citizens attain mathematical literacy to carry out the responsibilities and use of the opportunities of effective citizenship in a modern technocracy. ..... Teachers must recognize and assume their share of responsibility through effective arithmetic instruction in our public schools. (4:49) Brownell suggests two ways for improving the arithmetic program:

> The demands of modern living make arithmetical competence one of the real imperatives. The program of arithmetic instruction to which the present generation

of adults were subjected did not produce this competence. The results of extensive testing by the Army and Navy have served only to highlight the prevailing adult arithmetic deficiencies, a fact which was well known to teachers of mathematics in secondary schools and colleges.

To remedy the evils of current mathematical deficiency what seems to be needed is not more of the same kind of instruction which produced these evils, but a fundamental reorganization in the subject matter and teaching of arithmetic.

The arithmetic programs of the past twenty-five years have been inadequate chiefly at two points. First, these programs have given children little chance to use ideas and skills already learned in solving their own personal problems. Second, these arithmetic programs have neglected the meanings and rational principles which make arithmetic a phase of mathematics. (22:3-4)

About two-thirds of the work in reforming elementary school studies was on mathematics. The mathematicians got there first with both quantity and quality---and their subject, though commonly the worse taught, is probably the easiest to teach well. (11:110)

Arithmetic causes more school failures above the first grade than any other subject in the elementary school. A population which is burgeoning in an era of rapid scientific and technological development and in times of ever-present threat to the national welfare can ill afford the waste of talent which results from pupils' dropping out of school psychologically even before they leave physically. In the words of the preamble to the National Defense Education Act, "the security of the nation requires the fullest development of the mental resources and technical skills of its young men and women," (18:4)

Limitations of the study. Due to limited time and to the scarcity of action-research available on the third grade level, the greater part of this study will be drawn from such research as is available. However, Vincent Glennon, "What Does Research Say About Arithmetic," re-

minds us:

> "...all modern educational practices were at one time, or still are, the result of speculative inquiry. Also, in the last analysis all curriculum problems are value problems. It is doubtful if the decisions that must be made in curriculum planning can ever be determined solely by application of research techniques. Hence it is important to consider some questions that do not have research-based answers. (22:ix)

II. DEFINITIONS OF TERMS USED

Mathematical disability. This is generally interpreted as a student who is working one or two years below his grade level, but in this paper it will indicate any student who is experiencing difficulty in developing mathematical concepts, problem solving ability, or seeing quantitative relationships. (11:3)

The underachiever. While this term is usually applied to the slow learning child, in this paper it will also include the bright child who is working below his ability level. DeHaun and Kough define the underachiever as: "a child whose mental ability is high enough to justify keeping him in the regular classroom but low enough to give him considerable difficulty in keeping up with the average speed of the class." (16:152)

Individualized instruction. According to Leo J. Brueckner, (7:14)

> "The recognition of the fact that individuals in a given group differ so greatly has led to the accept-

ance of the position that instruction in classrooms should be so organized that curriculum, methods of teaching, and materials of instruction will provide fully for individual differences. This point of view has sometimes been denoted as "individualizing instruction."

Nolan C. Kearney, gives the following description:

> "The individualizing of instruction has reference to the steps taken to meet the needs of pupils, each of whom is a unique individual. These steps will sometimes involve the selection of organization of content, but they will include, as well, the creation of situations in which pupils will work and be considered both as individuals and as members of a group. In no sense should "individualizing of instruction" be equated with "individual teaching" or tutoring. Realistic adjustments to differences within a classroom requires that both group and individualized instruction be carried out." (24:268)

Individual differences.

> "The phrase individual differences, according to Clymer refers to the dissimilarities among various members of a class or age group in any characteristic that can be identified." (24:267)

Organization of the study. The literature related to individualized instruction will be reviewed in Chapter II. Selected organizational procedures, adaptable for third grade instruction will be summarized in Chapter III. The Summary and Conclusions will be given in Chapter IV.

CHAPTER II

REVIEW OF LITERATURE AND RESEARCH

The purpose of this chapter is to review the various plans for providing the educational needs of pupils through individualized instruction. The chapter begins with a brief history of the graded elementary school in the United States and a resume of the attitudes and beliefs which are implicit in the graded school system. This is followed by an enumeration of the claims made for individualizing instruction to meet individual needs and a summarization of research findings pertinent to the subject. The last portion of the chapter will deal more specifically with individualization of instruction in arithmetic, what research says about it, and a report of "action research" as being conducted in self-contained classrooms today.

Historical background of the elementary school. The traditional public school in the United States is the graded school. At the time of its design it conformed to the then prevalent conceptions of child development and education as a schooling process. Though the citizenry of the new nation believed education essential to the preservation and extension of a democratic form of government, resistance to tax support for schools was strong, educational theory and practice were based on philosophical foundations, educational research was unknown and competent teachers difficult to obtain. It was in this background that the graded school had its origin. (25:179)

"During the colonial and early national period of our country, the schools were essentially ungraded schools with most of the instruction tutorial in design. Acceleration and retardation..." (were unknown) "as each pupil progressed at his own rate." (25:180)

The period of 1800 to 1850, was a period of rapid expansion in population growth, and demands for elementary education increased. "There was intense need for a unifying social agency to develop common national ideals and to integrate the various sections of the country as well as the newly arrived immigrants. Facing the need of creating an effective school system to deal with the increasing numbers of students to be taught and the lack of teachers available, the tutorial system was replaced by the "graded system. (25:179f)

"By 1870 nearly all the elementary schools had been graded" (25:180) and the lock-step system of educating the masses was initiated. It followed naturally that a policy of acceleration or retardation would be utilized to insure that a student at a particular grade level would be ready for the specified material which was to be presented. Many students failed to meet the strict subjective standards for promotion, "and the 'laggards' in our schools became a major educational problem. In some schools the failure rate reached 50 per cent." (25:183)

Some of the beliefs about grade standards and the effects of promotion and/or non-promotion are summarized:

1. Grade levels should signify rather definite levels of academic achievement.

2. Promotion of all pupils, regardless of achievement, tends to lower the average achievement of a school system.

3. A liberal promotion policy increases the range of ability in the upper grades.

4. Students of low academic achievement will achieve more if they are retained in their present grade than if they are advanced to the next grade.

5. Regular promotion of low-achieving students results in emotional problems because of their progressive inability to do the work of the next grade.

6. Individual differences are undesirable and should be reduced as much as possible. The graduates of a school must be a standardized product.

7. The grade level at which certain knowledges, skills, and abilities should be learned can be determined with a high degree of specificity.

8. If individual differences are truly provided for, all students can be brought up to a respectable level.

9. Teachers should be criticized for promoting pupils who are "unable to do the work of the next grade." (25:184)

The above beliefs seem to be basic assumptions inherent in the "common sense" approach to the graded-textbook school.

> The first five of these have been subjected to experimental verification, and some of the evidence bearing on each follows. The remaining four assumptions are either correlates of the first five or assumptions "that the Creator erred in individualizing mankind." (25:185)

> Learned and Wood's study of The Student and His Knowledge gives a graphic portrayal of intellectual variations. Their research is an excellent illustration of the major findings of variation in ability at all educational levels. Intelligence which was measured by the Otis-Self-Administering Test of Mental Ability reveals that the broad range of intelligence found in the lower schools has not disappeared in either the high school or college. (25:185)

Research in a wide variety of situations reveals that the range of achievement in any given grade is subject to rather regular patterns and can be estimated quite easily. If the 2 per cent at each extreme of the distribution is eliminated from consideration, we find that the range of ability is equal to two-thirds of the chronological age of the usual student at the grade level under consideration. (36:188)

Serious reflection reveals that when the goals of the curriculum are unlimited, a good instructional program will increase rather than decrease the range of individual differences. Therefore, one may conclude that grade levels do not signify very definite standards of academic achievement.

Twentieth century trends. For several generations competent and dedicated teachers and administrators have tried to break the lock-step pattern and individualize instruction in an attempt to cope with individual differences which manifest themselves in children and youth.

In the early part of the Twentieth Century, Preston Search recommended individualized instruction as opposed to the common practice wherein all pupils in a class studied the same textbooks at the same time, received the same assignments, and progressed at the same rate regardless of ability or quality of performance. (24:854)

> In 1916, the psychologist, Louis M. Terman suggested a need for differentiated courses of study, to permit each pupil "to progress at the rate 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. (18:9-10)

The development of standardized tests stimulated educators to experiment with various instructional plans designed to cope with the newly recognized variations in the ability and learning rate of children.

> "Perhaps the best known early work was done by Frederick L. Burke, who developed individual instructional materials. Burke's ideas were carried further by Carleton W. Washburne, who had been on the staff of Burke's school. Washburne's plan came to be known as the Winnetka Plan. Concurrently with Washburne, Helen Parkhurst developed the Dalton Laboratory Plan. Other plans following the same general direction also emerged. The best known of these was the Morrison Plan designed for use in the secondary schools. These plans are usually classified under the heading "Laboratory methods." (24:854)

Usual features of this approach are:

(a) The student is freed from recitation and other class routines of the common type;

(b) the classroom ceases to be a recitation and lecture room and becomes a laboratory for work:

(c) the curriculum is divided into minimum essentials and social creative activities:

(d) the minimum essentials are then sub-divided into their component parts for instruction;

(e) elaborate materials are used, including diagnostic tests, achievement tests, study guides, practice materials, and record forms.

(f) Each student is permitted to proceed through the work as rapidly as his abilities and level of motivation permit; and

(g) the role of the teacher is that of giving help and guidance to the students in their study. (24:854)

About 1925 opposition to individual instruction, with concurrent emphasis upon group planning and group activities led to the abandonment or modification of the individualized program. During the 1930's and 1940's, however, some educators, among them Daisy M. Jones and Williard Olsen, continued to press for differentiation of instruction according to needs, interests and abilities of learners particularly in reading. Between 1950 and 1960 there was a resurgence of interest in individual reading instruction. (23:10)

The foregoing serves to note the continuity of the appeal for adjustment of curricula to individual needs. Most of the historically significant plans dealing directly with human individuality within the organization of the school have been related to grouping for instruction. Shane lists thirty-five plans and proposals and reports that this

> ...."while no means comprehensive, serves to emphasize the fact that during the last century or longer many ideas have been expressed with a view to personalizing teaching and recognizing individual differences." (25:49)

> Fred T. Wilheims was closely associated with the supervised correspondence education movement and reports: "....the resource should be used far more widely than it has been. And yet, analysis of this system, as of the laboratory plans, reveals a disappointing amount of true individualization." In both schemes there has been far too much tendency to individualize with respect to little more than rate of progress. (25:64)

As a generality, curriculums are planned for groups, not for individuals. In attempts to more closely fit individual needs, the group has often been subdivided in various ways, on the basis of general intelligence, special aptitude, vocational goal or interest and so on. These kinds of efforts to fit curriculum to all students have produced little genuine accomodation. "Individualization has been largely illusionary."

Research: Indications. One of the most careful studies dealing with individualizing instruction was done by Daisy Jones. She sought to find out whether children would make greater progress in learning the common elementary school skills when they were taught at their own level of achievement rather than when they were taught under usual mass-education procedures.

> On the average, the experimental group showed development 2.5 months ahead of the control group. Individualization appeared to be more beneficial to those students who were slow or who were just average in ability than to the superior students. Since the numbers in Jones' group were large, and the experimental situation carefully handled, the evidence from this study can be given considerable weight in favor of the growth of individualizing instruction in the classroom. (24:854)

> In this same vein Willard C. Olsen argues that ".... if self-selective practices were utilized systematically in the classroom, instruction would truly be individualized and many of the problems which arise from mass education would never arise." (24:854)

Reports from current literature. Since 1960, educational journals have contained numerous articles recommend-

ing individualization of instruction. Two of the more recently published books in this category are Individualizing Instruction, the Sixty-first Yearbook of the National Society for the Study of Education, Part I, and Individualized Instruction, the 1964 Yearbook of the Association for Supervision and Curriculum Development. Part I of the former has been used by this writer as a primary source of information. Some of the ideas gained from this source usable for implementing a program of individualized instruction are summarized below:

1. The need to know the students.
2. The need to recognize that not all teachers will adjust to individual differences in the same way.
3. The need to provide generous time allotments.
4. The need to plan carefully whatever is to be done in the classroom.
5. The need to work effectively with the group as a whole.
6. The need to move slowly into any type of adjustment to individual differences.
7. The need to accept more noise and confusion.
8. The need to recognize failure and begin again.
9. The need to accept less than 100 percent adjustment to individual differences.
10. The need to recognize that adjusting to individual differences calls for plain hard work. (25:276)

Throughout the book emphasis is placed on the teacher as the key to a successful program of individualized instruction. The purposes of individualized instruction, the release of human potential, is developed through the behavioral change resulting from interaction of the teaching-learning situation.

The 1964 Yearbook of the Association for Supervision and Curriculum Development, Individualizing Instruction, though more general in content, illustrates the importance of human potential its development and release, and the part the teacher must play in this transformation.

The following excerpt is pertinent:

> Lessons of recent years should have taught school personnel that they cannot afford to judge potential merely by intelligence quotients and records of scholastic achievement. For example, during the period 1955-1957, Strauss studied the careers of 89 men who had earned Ph.D.s in physics, chemistry and engineering at the University of California, Cornell University and the Ohio State University. Their high school guidance records showed that three percent of these men had intelligence quotients ranging from 96 through 100; six percent, quotients from 101 through 110; 29 percent, quotients from 111 through 120...In high school 36 percent of this group of future high achievers in science and technology had ranked below the top tenth of their senior classes. Strauss concluded that the significant characteristics of the group were drive to succeed, non-conformity, and response to the helpful interest and concern of teachers or laymen. Even more dramatic examples of the unreliability of intelligence quotients and scholastic records in predicting life success have been discovered by analyzing the careers of men and women in other fields. (18:14)

The importance of group interactions and of attitudes in establishing a favorable climate for learning are summarized below:

1. Positive attitudes toward persons promote feelings of worth and stature.

2. Wholesome attitudes toward differences promote feelings of belonging and acceptance.

3. Favorable attitudes toward learning enhance the role of the teacher and of the learner.

The above are crucial to the way the individual perceives himself, to his relation to others and to learning. The following point up the importance of the teacher as catalyst:

1. The classroom atmosphere is a reflection of the teacher.

2. In many ways the teacher builds respect for learning.

3. The teacher helps the child build new perceptions. (18:99)

The promising ways for releasing potential through teaching are included because they point up the value of the interaction between the teacher and the learner.

These promising ways include:

Observing and listening to learners with increased care and concern.

Becoming more sensitive to clues which indicate how teachers can help.

Achieving openness in teacher-pupil relationships, to permit improved response and interaction.

Helping learners toward the objective of personal relevance and, as practiced by supervisors and administrators, helping teachers to the twin objectives of personal and professional relevance.

Recognizing and accepting different ways of responding, according to learners' individualized styles and needs.

Stimulating creation and re-creation of self-image that encourages further development.

Taking directly into account the presence of such barriers as alienation, cultural pluralism, and unconscionable pressures.

Questioning, probing and responding in ways that lead learners to assume responsibility.

Standing aside judiciously to let the learner discover and exercise his own resources.

Shifting one's vantage point for viewing learners in action.

Placing learners in various roles.

Making development of the learner the chief goal in teaching subject matter.

Achieving free affective response and seeing its relevance to intellectual development.

Helping learners to find order, pattern and meaning in phenomena.

Establishing a school environment that encourages teachers to be empathetic and helpful to learners and to each other.

Achieving free and constructive communication with learners.

Respecting experimentation and supporting experimenters in both their failures and their success.

Helping learners sense the living dynamic of man's creations, as revealed by history and the current scene.

> Clearing the way, by whatever means, for stretching learners' minds and abilities in creative, self-fulfilling endeavor. (18:160)

Reports on individualizing instruction in arithmetic: Action-research. Despite widespread interest in the adoption of instruction to individual needs, a relatively small number of valid researches dealing with the techniques and effects of such instruction have been reported to date. Frank Spanga (43:52) in 1960 reported success in using a refresher course in arithmetic as the basis for an individualized instructional program. Because the course covered a wide range of content at varying levels of difficulty, it was possible to adjust assignment to the needs of individual students. Fred Weaver (51:304) in 1954 used another method for individualizing instruction. As each new concept or process was introduced, the child was encouraged to suggest and follow their own methods of attack. Then the teacher observed the levels of response, and followed through with the necessary instruction to insure each child's understanding of the subject matter.

Reported results of these and other investigations tend to show that individual instruction is more effective in meeting pupils' needs than is group instruction. There are not enough studies on individualized instruction in arithmetic, however, to indicate any definite trend.

Many teachers are attempting individualized instruction in arithmetic, for example, by letting each child study in the textbook independently, completing each lesson as quickly as he can, or taking as much time as he needs. The teacher in this case, helps each child when the child is confronted by a problem he cannot solve himself. Pupils also help each other.

Franklyn Searight, a fifth-grade teacher in a self-contained classroom, reports his method of organization for individualizing arithmetic instruction: A large chart was prepared with the names of all the children in the class listed from top to bottom. Across the top were listed all the pages within the book which he felt were important enough to be assigned. This was posted where children could easily refer to it during arithmetic period. The chart was designed to allow the children to progress at their own rate. Then they finished an assignment on the chart, they checked their answers in one of the answer books available, circled the exercises or problems done incorrectly, wrote the numbers of the answers wrong, if any, at the top of the page, and turned in their papers. They then proceeded, immediately in most cases, to the next assignment on the chart. Before the following arithmetic period, the teacher would examine the papers, concentrating on the problems done incorrectly.

Those papers finished with no mistakes were checked off on the chart next to the child's name. Those with mistakes which indicated mere carelessness were returned, and the incorrect problems or exercises reworded. When the paper was resubmitted and found to be without error it was checked off on the chart. Those papers which indicated the child was having difficulty with a certain concept were kept and reviewed individually, with the child during arithmetic period.

When assignments relating to a certain concept or process were satisfactorily completed, the child was then ready, in most cases, for another concept or process, and time was made in which to work with him and others ready for that concept. When the child was able to demonstrate an adequate understanding of what was being taught, he returned to his textbook, did those pages listed on the chart which were chosen to strengthen his learning, and came to the teacher whenever necessary for further explanation.

Though the range of differences rapidly increased, as the more able moved ahead and the slower learners dropped behind, each was making progress in accordance with his own ability. Searight recommends making individual charts for each child, allowing assignments based more on individual needs, and offering some measure of privacy regarding the achievements of the less able learners. This organization left him free to give enrichment and remedial assistance

The report by Searight has been given considerable space because it is similar to the practices in articles the writer has read, but not included in this study because they were repetitious.

Elizabeth Irish reports on an experimental two year study with fourth graders of individualization in arithmetic with emphasis on children stating generalizations in their own words, that the scores in the experimental group were significantly higher than those in the control group. (28:169-174)

Caroline C. Potamkin offers the following suggestions to facilitate organization of the program. Ditto the list of assignments to be covered, give a list to each child. Run off ten copies of answers for each of the assignments listed on the worksheets. Each child corrects his own work before proceeding on to the next assignment. The answer sheets are kept in a folder with appropriate marking. On the bulletin board are the directions, "Use the answer sheets to correct each assignment. If you made mistakes, turn over the answer sheet and check again. When your work is correct, put the answer sheet back, put your paper in the folder marked Finished Work and go on to the next assignment." Appoint able students to help the less able. Give extra credit for special worksheets. Provide enrichment, review exercises for those who need review.

The children follow a planned sequence, they progress at their own pace and are apprized of the results of their work as they go along. An invaluable by-product is that the students are acquiring independent work habits and share responsibility. Instruction and correction is given according to individual needs. (38:155-162)

A variety of factors influence pupil interest and achievement in arithmetic and these factors must be taken into consideration in planning ways of helping each individual to progress in arithmetic in accordance with his ability.

Assuming that each teacher can identify the various factors related to pupil interest and achievement in arithmetic, there still remains the problem of deciding on appropriate variations in learning time needed, in content, in materials and in methods of teaching.

Frances Flournoy, who has done pilot studies on individualized arithmetic, considers the following essential.

1. Variation in learning time

   Allowing slow learners more time
   Giving shorter assignments to slow learners
   Assigning special homework for slow learners to give additional practice
   Planning additional enrichment activities for the faster worker to move on at his own rate of speed

2. Content variations

   Adding topics for the fast learner not ordinarily in the course of study
   Varying level of difficulty undertaken in any one topic

Varying the content of practice exercises
Providing rapid learners with more difficult horizontal enrichment, involving problem situations in which research is necessary to gather data

3. Varying teaching methods and materials

Follow up reteaching of a new skill to slow learner
More closely teacher directed reading of textbook for slow learners
Longer and more frequent use of concrete materials with slow learners
More independent uses of reference textbooks by fast learners
More mental arithmetic exercises for fast learners

In addition, a type of class organization must be selected that will facilitate the carrying out of varying needs of individuals in the classroom. The following are possible types of organizations.

1. Class a whole procedure in which the teacher carries all pupils through the arithmetic program for the school year together and gives help and encouragement to individuals as the need and opportunity for doing so is recognized.

2. Combination of small classes and small group organization. Each new topic is introduced to the class as a whole. The class is later grouped so the teacher may reteach when necessary.

3. Grouping the class into two or more groups according to arithmetic achievement. (20:80:85)

Jettye Fern Grant who has experimented extensively with individualized instruction, recommends contracts filled out by the children indicating the assignments they will undertake for the week. The pupils are given

individual or group assistance according to the number of pupils ready for a new concept at a given time. If help is needed, during the arithmetic period, the child may ask another pupil or the teacher. If the teacher is busy, the child places his name on the blackboard to alert the teacher. The teacher then goes to him as soon as possible or arranges for a conference time. Conference times are scheduled at regular intervals for teacher-pupil evaluation. Records are kept by the teacher and the student. Daily note is made of the pupils' progress at the time roll is taken. As the child's name is called, he responds giving the book in which he is working, the page on which he is working and indicating either that he is doing all right or needs assistance. The teacher makes note of this and gives the needed direction during arithmetic period. At the end of the week the child fills out a self-evaluation sheet and turns this in along with his self corrected work.

In developing a climate favorable to learning Miss J. F. Grant favors student government. This solves discipline problems, as children are more willing to follow rules which they set up. (23:29f)

Reports of these and other investigators tend to show that individual instruction is more effective than is group instruction. There is not, however, sufficient research to determine the superiority of one method of

instruction over another.

Holmes and Harvey studied the relative merits of "permanent" versus "flexible" grouping for arithmetic instruction in two third grade classes and two sixth grade classes. Data were collected on subject matter, attitude toward arithmetic, and achievement and social structure of the classes. They concluded "that method used in grouping arithmetic classes was not particularly crucial; more crucial were the teacher's personal and professional qualities and methods of teaching." (22:75)

Banks D. Wilburn cites studies of cases carried out through self-instruction in an arithmetic program of Grades I, II, and III.

a. There is much evidence to indicate that pupils in each grade in the elementary school can teach themselves a particular selection of content of arithmetic largely by their own efforts.

b. It seems evident that, beginning in Grade I and moving progressively forward through Grades II and III, pupils can learn by methods of self-instruction the arithmetic appropriate for the year.

c. The outcomes of the experiments possibly offer teachers reasonable justification for having pupils begin in the first of the year and attempt to teach themselves the arithmetic of the elementary school. (22:58)

Both the above reports indicate that much research must be done in the field of learning. Inasmuch as there is a fifty year lag between research findings and

implementation, we cannot stand still; we must take direction and encouragement from Piaget's words: "We know too little about how children learn, we must be willing to experiment, to devise methods that will be of benefit to the child's learning."

Summary. The literature pertaining to individualized instruction was reviewed in this chapter. From historical background to current times, the problem of mass education and individual needs was emphasized. The many organizational devices developed to cope with the situation as well as the inconclusive research indicates that further investigation is needed. The last section of the chapter dealt more specifically with action-research reports of individualized instruction in arithmetic. Particular note was made of organizational procedures suitable for a self-contained classroom.

CHAPTER III

INDIVIDUALIZED INSTRUCTION

THIRD GRADE ARITHMETIC

In this chapter, the writer will describe the steps necessary for initiating individualized instruction in arithmetic for a third grade level. The program will be based on the most usable procedures gleaned from the action-research reports reviewed in the previous chapter.

Preplanning. At this time, objectives are established, directions mapped and preliminary work accomplished.

Teacher's Checklist

1. Check school records of those students entering your class.
2. Prepare an attractive arithmetic bulletin board.
3. Gather materials for an arithmetic center.
4. Make an appealing chart "We are Good Citizens, We Help One Another,"
5. Gather or make diagnostic tests.
6. Gather or make inventory checklists
   attitude checklists
   interest checklists
7. Ditto checklists for student use:
   a. evaluation
   b. preparation
   c. progress chart
   d. work contracts
   e. ticket for undesirable behavior
   f. grading standards
   g. verification slips
   h. report to parent form

8. Prepare class chart for Arithmetic progress.
9. Prepare daily recording sheet.
10. Prepare class recording sheet for the 390 basic facts.

These items will be discussed under Evaluation and Recording.

The items included under Teacher Checklist are time savers and have a direct bearing on the amount of individualized teaching done. This conserved time can be spent studying the child's needs, adjusting materials to strengthen his learnings and in teacher-pupil interviews.

Ways of getting to know the students. Because it is necessary to know about the whole child, the teacher will need use of many methods for gathering information and keeping records. Observations, listening, anecdotal records, diagnostic tests, inventory checklists, of special interests and attitudes are a few that can be used to help in learning about the child's mental ability, strengths and weaknesses in arithmetical skills and understandings, physical or emotional problems and special interests and abilities.

With the foregoing knowledge it will be easier to determine how to adjust materials to the child's level of ability; through this adjustment, the child will experience success, always a good motivation.

The actions of the teacher, which convey acceptance and personal warmth and interest, are most important. Children

react to genuineness in an adult, and learning is facilitated when a close personal relationship exists between the teacher and the pupil.

Establishing a good climate for learning. Learning is one of those things with which the teacher is most concerned. It would be nice if an "educational button could be pushed and all children would learn and want to learn." Inasmuch as the "educational button" referred to has not been invented, the next best button "discipline" must be used.

> "Good discipline is a way of achieving teamwork toward goals. Not only is good discipline important in achievement, it is equally important in affecting the way we feel about ourselves and, indirectly the way we feel about others. Our morale, our confidence, and our self-esteem are affected by the manner in which we achieve what we set out to achieve and by the way we handle the tasks of everyday living." (37:4)

This is important in individualized instruction where the student is considered as an individual and as a member of the group. The benefits he receives as an individual are the adjustments to his level of performance. The benefits received, as a member of a group in a self-contained classroom, that are conducive to learning are many. This group situation offers the pupil opportunities for:

(a) development of a strong human relationship,
(b) a teacher who knows him well,
(c) growth in self-understanding and respect,

(d) learning how to budget time,
(e) integration of subject matter and
(f) individualized instruction (47:84)

The teacher's actions and attitude are most important in establishing a good climate, for the climate in which the group lives determines how it lives and what it learns. The child's status in the group and the way he feels about the group affects his learning ability. The individualization of instruction gives personal relevance to experiences which the learner shares with other members of the group. Though the group and the individual are inseparable the teacher establishes the feeling that the interests of the individual and the group are equally important, therefore room management must be democratic.

Evaluation and record keeping. The most time consuming aspect of the program is in the stages of preplanning, getting to know the student and establishing a climate for learning. This phase on evaluation and record keeping will go smoothly provided that the previous steps were thoroughly developed. The following techniques of evaluation and record keeping is where one gains the time for individualizing instruction.

Arithmetic folder. The student's arithmetic folder is where the self-corrected papers are kept. These are papers resulting from work on his ability level and worksheet

papers. On the inside of the folder is the current month's assignment. These assignments were decided upon jointly by student and teacher during a regular evaluation interview, at which time the goals were determined.

Self-correcting practices. Each child is given a sheet of plastic to protect his arithmetic book. He places the plastic on the page he plans to work. The paper he uses is onion skin, through which he can see the problems. The child writes only the answers. Not only is this time saving, but results in better written numerals and prevents copying errors. This establishes a good work habit. After the assignment is completed, the child, using the teacher's manual, corrects his own paper. By placing his paper correctly, the student will find that the answers in the manual will appear directly beneath his answers and facilitates correction. After his paper is filed in his folder and recorded, the student will file an evaluation slip for the teacher. (See Appendix Form #1)

Evaluation slip. This form indicates the reason for errors and is where all basic fact errors are kept. It, in turn, becomes a tool for the teacher in helping the child.

Workbook sheets. These are sheets from all levels that have been mounted on tagboard, marked with a color code to indicate the level of difficulty, (enrichment,

supplementary and remedial) laminated and filed. A sheet of onion skin paper is used for the answer sheet. The correct answers are on the reverse side in such a position that when the child places his paper there for correcting, the answers will appear directly under his. He records the grade on the sheet provided for this purpose in his folder and fills out the evaluation sheet for the teacher.

Basic fact records. These are the set of eight records put out by Imler Caddy Creations, Inglewood, California. (See description Appendix Form #2). The children are given facts study sheets for the particular record they are working on. When they think they are ready for the test, they request a Verification sheet.

Verification sheet. This and the study sheet are taken home. The parent or a friend gives the test twice. When the parent signs the verification sheet (See Appendix Form #4) verifying that the child has given the answers correctly, without hesitation, the child may take the test. This procedure insures successful test results and keeps the phonograph area from becoming congested. These tests are corrected by the teacher or a helper, depending on the situation.

Class assignment chart. All textbook assignments on which the group as a whole are to work are listed across the top of this chart. Down the left hand side are listed

the student's names. The chart is scored into squares corresponding to the student's names and the assignments. When the child has completed an assignment satisfactorily, the date of completion is entered in the appropriate square.

Daily progress record. This combines taking attendance with recording arithmetic progress. As the student's name is called, he answers with the book, page number on which he is working and whether or not he is having difficulty. If it is a worksheet he gives code and page. If he is preparing for a test on the basic facts record, he tells what record number and which speed. These are then recorded and note is taken of those who are having difficulty, in order that they may be given help as soon as possible.

Test keys. These are for teacher use to facilitate scoring tests. The tests are dittoed, and kept in a plastic folder when used. The child is given an answer sheet corresponding to that particular test. The answer sheet is so arranged that the perforated key indicates at a glance the correct answers. This the teacher records on her test form.

Daily schedule. The arithmetic period will be the first part of the school day, from 8:40 till 9:30. When the children enter the room they immediately get ready

for work, since each child knows his assignment he can proceed without waiting for directions. If some child has not formed the correct habits there is a form to remind him of the proper procedure. (See Appendix Form #3. This is a checklist). In order to speed morning exercises the flag salute and opening song are begun the moment the bell rings. Each child wishing to purchase either milk or hot lunch places his money on his name tag which is fastened to the top left hand corner of his desk. The teacher collects this money giving the correct change as the child checks the milk or lunch column beside his name. (See Appendix Form #4). As she is collecting the lunch money observations can be made regarding workhabits, difficulties etc. After the lunch monies have been collected the roll is called and notice is made of the arithmetic progress and needs. Seven minutes are budgeted for these activities.

Self government. During this period of the day a system of student government is utilized. A president, vice-president and secretary are elected during social studies class and democratic policies are discussed. Children participate more readily if they are actively involved in establishing their own rules. They formulate guidelines to insure effective study periods. Children noticing noise will raise their hand to give the signal for quiet. Infractions of the rules are handled by giving

the frequent offender a slip for undesirable behavior. (See Appendix Form #5) This slip is issued when it has been determined that the student has disrupted class study and in so doing has interfered with the rights of others. The above methods are included because they are part of the time saving devices that free the teacher, allowing more time for giving individualized instruction.

The program is initiated by administering the diagnostic tests during the first week of school. Methods of getting to know the child are utilized at this time. After abilities have been evaluated, flexible sub-groups are formed on the basis of needs. Conferences are held and the child's individual assignments are made. These conferences are held at least once a month and oftener if needed. The first fifteen minutes of the arithmetic period is spent working with the group as a whole. The balance of the session is spent working with individuals or small groups depending on the needs that are greatest. If, during the time the teacher is busy, a child needs some help, he may ask another student or he may write his name on the board, which alerts the teacher to his need.

Work contract. Though the children have their assignments for the current month, each child fills out a work contract for the work he wishes to do in the coming week. (See Appendix Form #6). (The more mature children may not need this regular direction.)

Two copies of this contract are filled out. One copy is kept by the student; the other is given to the teacher. This helps develop the habit of budgeting time.

Concrete and manipulative materials are used to introduce new concepts. These are kept in the Arithmetic Center and are available for the child's use in solving his problems as long as he feels the need. Understanding is essential if the child is to learn to work independently. The arithmetic class is a laboratory period in which each child works at his own level on his individual program or works with the group on a group project. Group projects are differentiated so that all may participate at their ability level.

In this program the child is not compared with other members of the class. His concern is with his own progress and his success creates self-motivation.

Procedures for getting to know the child and evaluation are continuous. Differences in the range of abilities will become greater, but each child will be challenged on his own level.

This individualized instruction is a good program, but Theodore Clymer and Nolan Kearney, "Curricular and Instructional Provisions for Individual Differences," remind us of the needs of the program, which must be considered:

1. The need to provide generous time allotments.
2. To plan carefully whatever is to be done in the class.
3. The need to work effectively with the group as a whole.
4. The need to move slowly into any type of adjustment to individual differences.
5. The need to accept more noise and more confusion.
6. The need to accept failure and begin again.
7. The need to accept less than one-hundred percent adjustment to individual differences.
8. The need to recognize that adjusting a program to individual differences calls for plain, hard work. (25:276)

CHAPTER IV

SUMMARY AND CONCLUSIONS

This report reviews the various methods used for meeting individual needs through individualized instruction. Special note is taken of those most usable for individualizing arithmetic instruction. Those of value for use in a third grade room are dealt with in detail. While little research has evaluated the actual benefits of this type instruction, the general opinion is that it is more profitable to the student in helping him release maximum potential for learning than is the one-group method.

It is the writer's opinion that, through the use of organization, check-lists and a climate for learning, a teacher can initiate individualized instruction of arithmetic for a third grade level.

The sequential nature of mathematics, necessitates the mastery of each concept during the elementary school years to insure a solid foundation. Through individualizing instruction each child is assured step by step progress. The importance of mastery with understanding cannot be overemphasized. Evidence that mathematical disability, proportionate dislike for the subject and potential school dropouts have their inception in the primary school years; along with Piaget's statement that "things learned between the age

of seven and eleven are learned more readily and are most influential in later years," makes it imperative that we, as educators, must find a way to increase the child's arithmetical understandings.

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APPENDIX

FORM #1

Checklist for Student Evaluation

Name_____ Date_____

Assignment_____ Book_____Pages_____

Problems done_____ Problems Correct_____

My mistakes were:

adding_____

subtraction_____

multiplication_____

division_____

wrong process_____

copy error_____

The number facts I missed were:

_____

_____

_____

_____

Student's comments: In order to keep from repeating these mistakes,

I will_____

Teacher's comments:_____

FORM #2

Checklist for Records of 390 basic facts:

1 addition combinations 0 - 9

2 subtraction " 0 - 9

3 multiplication " 0 - 16

4 division " 0 - 16

5 addition " 10 - 18

6 subtraction " 10 - 18

7 multiplication " 18 - 981

8 division " 18 - 81

Each record has three different speeds. The children practice for the test. When they think they have mastered it they take a sheet for verification of the fact that they are ready for the test. They also take a test home. Using the verification sheet, a parent or friend gives the oral test over same facts but in different order. This is designed to keep the record player from being tied up with pupils who are not ready for the test.

\- - - - - - - - - -

Verification Sheet

Name of the test_____

Record no._____Side_____Speed_____Date_____

Checkers 1._____2._____3._____

When the child brings this form back to school signed, he may take the test.

Caddy Imler Creations. Set of 8 records. The 390 Basic Facts. Inglewood California. 1951 Copyright.

Make arithmetic fact sheet so they have practice. First give demonstrations, use concrete things. Have manipulative materials for student understandings.

FORM #3

Student's Aid

Getting ready for work

Name_____ Date issued_____Date removed_____

I get ready for work:

1. Materials ready
   a. pencils sharpened
   b. paper handy
2. I understand the assignment
3. I work carefully
   a. quietly
   b. neatly
4. When finished I
   a. correct my work
   b. record my score
   c. fill out an evaluation sheet
   d. put evaluation sheet on teachers desk
   e. file my paper in my folder

Mon.	Tues.	Wed.	Thur.	Fri.

This sheet is put on red construction paper and fastened to the desk of children having difficulty remembering procedures. It is removed when they have developed proper work habits.

FORM #4

Miscellaneous

For lunch count: A dittoed sheet with all students names and squared paper can be used for miriad checks.

MILK	NAME	LUNCHES

FORM #5

TICKET FOR UNDESIRABLE BEHAVIOR

Name_____Date_____

What I did wrong_____

_____

Punishment that will help me remember_____

_____

_____

Signed:_____ _____
(student) (teacher)

Signed:_____ _____
(parent) (principal)

Comments:_____

_____

_____

FORM #6

Weekly Work Contract

Name_____

Assignments for the week of_____

I plan to do Book_____Pages_____

I plan to do Work sheets_____

I plan to study for record (Basic facts)_____Speed_____

Two of these are filled out by the student, one for the teacher and one is kept by the student.

* After the teacher becomes familiar with student ability to take long term responsibility, these are only issued to the persons needing most guidance.

FORM #7

GRADING STANDARDS

The A Pupil

Is careful, thorough, and prompt in preparing all work.

Is quick in using suggestions for extra activities.

Is clever in using original ideas.

Is interested enough to do projects other than just the work assigned.

Uses his time well.

Does not guess at answers.

Expresses his thoughts carefully and accurately.

Shows leadership in classroom activities.

Has excellent self-control.

Has good study habits.

The B Pupil

Works carefully.

Is conscientious and dependable.

Does his work on time.

Shows daily interest.

Responds fairly quickly when called upon.

Does all work assigned and some extra activities.

Has good study habits.

Is helpful, dependable.

The C Pupil

Does good work, but needs extra help and encouragement from teacher.

Needs help when giving a report before the class.

Is usually dependable and cooperative.

Needs to learn to work with less supervision from the teacher.

Interest is not always high.

Does the work assigned, but little, if any, more.

Inclined to be slow.

Inclined to be careless in his work.