

SELECTING AND TEACHING THE SLOW LEARNER IN NINTH GRADE
MATHEMATICS IN THE SMALL HIGH SCHOOLS OF MONTANA

by

LEONARD L. AMUNDSON

A professional paper submitted to the Graduate Faculty in
partial fulfillment of the requirements for the degree

of

MASTERS OF EDUCATION

in

School Administration

MONTANA STATE UNIVERSITY
Bozeman, Montana

August, 1969

ACKNOWLEDGMENT

The completion of this study was possible only through the cooperation and assistance of many individuals. The writer wishes to thank all those who assisted.

The writer is grateful to Dr. Robert Thibeault, College of Education, Montana State University, for his time and assistance.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION.	1
Statement of the Problem.	3
Methods and Procedures.	3
Limitations.	4
Defintion of terms.	5
II. SURVEY OF LITERATURE.	6
III. ANALYSIS OF DATA.	16
IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS.	30
Conclusions.	30
Recommendations.	31
APPENDIX.	33
Appendix A, Letter to Teachers of Mathematics.	34
Appendix B, Sample Questionnaire.	35
LITERATURE CITED.	38

LIST OF TABLES

TABLE	PAGE
I. The Number of Schools that use the Given Teaching Devices.	20
II. The Number of Schools Using Certain Provisions to Identify the Slow Learner.	22
III. The Number of Schools That Use Certain Procedures to Educate the Slow Learner.	26

CHAPTER I

INTRODUCTION

In this country that prides itself on having one of the best educational systems in the world, the following statement is very difficult to understand. (22:233)

One third of the students in grades seven through twelve are unsuccessful in meeting the requirements of our educational system and repeat this experience of failure in the vocational and civic community.

Most Montana teachers have had experiences where there were situations in which the class that the individual taught was composed of students that could have been divided into three elements: the fast, the average, and the slow learner. This study is concerned with the individuals that are unsuccessful at meeting our educational requirements; we can forget the fast and the average and concentrate on the slow learner.

In some situations the slow learner would progress and get a good basic education, but this was not always the case. Sometimes he was the forgotten child in the class and was doomed to failure, other times he was not recognized for what he was and, therefore, received no help and many times ending up dropping out of school or getting expelled. It was possible that he could graduate because of good behavior but then he would not have acquired much of the knowledge he should have.

The problems of the slow learner are present in all phases of our

curriculum, but this paper is concerned with some of those in a very small segment of the vast spectrum of education, that of the methods of identifying them for the purpose of teaching them mathematics in the ninth grade and the methods that have been used in the small schools of Montana to teach them mathematics. If we discover some methods in this segment that will improve the situation, these methods might be applied to other subjects as well.

The discipline of mathematics holds a position of great importance in the education of any individual, including the slow learner. At the conference held in 1964 that was sponsored by the United States Office of Education and the National Council of Teachers of Mathematics, the following basic assumptions were agreed upon: (25:438)

1. Our nation needs the potential of the slow achiever in mathematics.
2. Low achievers will not be qualified for future employment unless they learn more mathematics than they are now learning.
3. The mathematical ability of the low achiever can be developed to the extent necessary for a saleable skill.
4. The low achiever should have mathematical instruction necessary for (a) saleable skill, and (b) a rich cultural citizenship.

In 1967 a conference was called, Designing Education for the Future, which was an eight state project. The following was expressed: (28:40)

Mathematics will also continue to be an important part of the basic core of the school's efforts. But much attention will be given to developing and understanding mathematics as a way of thinking about many kinds of phenomena. Commonly, today, mathematics is viewed by most children, and the public, as a set of

rules dealing with quantitative problems. Those whose occupations or avocations require computations become and remain facile in calculations and solving the common quantitative problems with which they deal. Others show little interest in mathematics and their computational skills are often erratic.

In the world of today, and even more in the world of the 1970's, many features of our lives cannot be understood without the use of concepts, like the binary number system, sets and subsets, systems cost benefit analyses, that are essentially mathematical. Hence, as with the language arts, the objectives of mathematics will be those that help the student think about many facets of his life and the world in mathematical terms, understanding basic mathematical concepts and using mathematical logic and other modes of thought when they are appropriate. To accomplish these goals, mathematics, in its various branches, will need to be part of the emphasis through the period of schooling.

From these statements it must be concluded that mathematics was important and will be important to all students, even the slow learner.

The Problem

What has been happening to the slow learner in ninth grade mathematics? Has the slow learner been identified using the methods recommended by research? After he has been identified, was he taught using procedures that research has recommended?

The problem was to determine the status in the small high schools of Montana with respect to these questions and then, if the situation warranted, make recommendations as to what should be changed.

Methods and Procedures

The Montana State University Library was used to make a survey

of the literature on the slow learner. This was done to determine what procedures were being recommended for identifying the slow learner. Articles dealing with the slow learner and mathematics were studied to determine what methods research recommended be used to instruct the slow learner.

A questionnaire concerning the methods of determining who was the slow learner and what procedures were used for their instruction was sent to 94 of the small high schools of Montana. These schools were chosen by consulting the 1968-1969 Montana Educational Directory that was distributed by the State Department of Public Instruction. All public high schools that had an enrollment of 150 or less were selected.

The results of the study of the literature was compared with the results of the questionnaire to determine if educators of the slow learner in the small high school of Montana were up to date on their methods or if they should be encouraged to update some of their procedures and eliminate others.

Limitations

This study was confined to schools in Montana with an enrollment of 150 or less. Of the 94 schools that were chosen to receive a questionnaire, 66 returned it, only 41 professed to have a program for the slow learner. The Montana State University Library was the only place that was used for reference material about the slow

learner.

Definitions

The following terms that were used throughout the study are defined here.

Slow learner: An individual that does not achieve what our society dictates he should.

Small high school: Any high school with an enrollment of 150 or less.

Minimal brain dyslexia: A disorder where the brain reverses the order of that which is seen, such as 24 to 42, b to d.

CHAPTER II

SURVEY OF LITERATURE

The slow learner is found in all strata of our society and his problem could have had a physical, mental or socio-economic background. (20:15) (19: 183) (36:341) Of the physical handicaps that could cause a student to be a slow learner, the two that were a unanimous choice were vision and hearing. Laurita (20:15) stated that if a student had any other handicap he would have to have near perfect vision and hearing if he were to succeed in our educational system. Other physical disabilities mentioned were limited manipulative skills, slow maturation (10:237) and speech impediment, (23:339) all of which could have been stumbling blocks when the learning process was considered.

Children with brain damage generally fall in the category of the slow learner. The child could have had brain damage from birth or it could have been caused by a current ailment. A high fever or a blow on the head are sufficient to cause brain damage. (21:10) If the brain damage was slight it would have been very hard to detect, in fact it may never be detected. A child with minimal brain dyslexia, which is a disorder that causes image reversal, could have been basically an intelligent person, but because his problem was never diagnosed he would end up a slow learner and have a very difficult time in school.

The culturally deprived or disadvantaged child's life experiences have made him antagonistic to the whole school process and program. He is almost certain to be a slow learner for he will have no desire to learn. (31:233)

It is clear, points out Shulman, that the environment from which handicapped children come, is a major determinant of their vocational development. (36:341)

Some of specific goals for which the teacher of the slow learner must strive as stated by DeWill were: (7:429)

1. To strengthen the students self-esteem by providing sufficient individualized instruction so that he is influenced to see himself as a worth while individual no matter what his past experience.
2. To provide instruction which will let him experience success and achievement, thus avoiding repeated failure.
3. To reduce the class size to eliminate the barriers to his success in the past by concentrating on him as an individual and defining and attacking these barriers.
4. To provide "fun" experiences, thus changing his belief that school threatens his self-concept.
5. To provide vocational orientation and work experiences within the school environment and eventually out of school.
6. To concentrate on remedial efforts to resolve academic problems that are resolvable.

Having stated the kind of atmosphere a teacher must create and some of the goals to be accomplished, this section on the role of the teacher is concluded by the following statement: (25:40)

A teacher who accepts the facts that slow achievers are teachable; a teacher who has a missionary spirit and a respect for the worth of pupils with limited ability; a teacher who can make a pupil feel he not only belongs but also is important; a teacher who can instill a sense of worthiness, responsibility and desire to achieve; a teacher who cares enough to give his very best to the low

achievers will make the program a success.

As with every individual the slow learner has a craving for success and it was because of this that he would disrupt a classroom or school by exhibiting some act that would make him the focus of attention. A teacher who has taught for any length of time would be able to recall instances like this. This is a characteristic of the slow learner and ought to be recognized as such, and provisions made for correction. If successful experiences for the slow learner were provided he would have been helped and at the same time some of the discipline problems would have been helped and eliminated. Other characteristics of the slow learner are that he is a poor analyser; he also has less curiosity and creative ability than an average child. (19:183) He may have been painfully shy, very dependent, unsmiling and lacked imagination.

Slow learners have a fear and dislike for mathematics. They found the classes were dull and could see little use of the subject and many times would endure these classes quietly but with great boredom. Frequently this was not the slow learner in the sense of having low intellectual ability.

In an article about the slow learner, Hoffman (17:90) has given this list of characteristics of the slow learner:

1. A record of failure in mathematics.
2. Achievement scores 3 to 4 years below grade level.
3. Reading and comprehension difficulties.
4. Quick conclusions without considering the facts.
5. Interest span very short---10 to 15 minutes.
6. High rate of absence.

7. Goals based on view of the immediate future.
8. Antisocial behavior.
9. Inability to see the practical use of mathematics.

If the slow learner happens to have been one of the disadvantage or deprived children, he had some special problems noted by Laurita:
(20:15)

He knows the fear of being overpowered by teachers who are ignorant of the cultures and mores of his society. He rears lack of recognition and understanding from the teachers whose backgrounds are totally dissimilar and who either misinterpret or fail to recognize many of his efforts to achieve and accomodate himself to demands which are basically alein.

If the teachers are to work with these children they have to know the patterns of life, value systems and motivational outlooks of these children; they must see it as the child sees it.

The slow learner has a dislike for and is bored with mathematics, therefore, new methods and procedures will have to be devised in order to penetrate the mental block he has acquired. It is as Minta(27:259) points out, "the disadvantaged children have been 'cooked and fried' in skill work. If they get to the ninth grade, providing more skill work isn't going to help."

Programs for the slow learner were appearing in many different schools and they all had certain elements in common. (17:88) One was the use of a mathematical laboratory which contained calculators, overhead projectors, film strips and projectors, movies, tape recorders, measuring devices and other manipulative devices that the slow learner could use in order to learn mathematics. Another

was the emphasis on the structure of the number system, beauty and interest of patterns of mathematics, number theory, intuitive geometry and informal geometry. The primary objective of these programs was to change the attitudes of the student. Unless the attitude of the student could be changed, the hope of teaching him the basic concepts of the discipline of mathematics were almost nonexistent.

One method that may help in our problem of changing the attitude of the slow learner is to use mathematical field trips as suggested by Foster. (12:332) These field trips could be organized to include such procedures as measuring an acre of land, visiting a lumberyard to get the understanding of the concept of boardfeet, or visit a grocery store to buy as many groceries as possible for twenty dollars. This could involve a great deal of effort but the rewards should be gratifying. There will be the administrative arrangements that may be very difficult and take much persuasion; this usually depends on the attitude of the administrator, the budget, and the time and distances involved. A must is a well constructed lesson plan, for if all this time and energy are to be expended the goals of the mission should not be left to chance. This may be a new exciting experience for the student and it should give the teacher an excellent opportunity to get acquainted and could alter the student's attitude toward mathematics. Field trips also present an excellent opportunity to establish the practical uses and values of mathematics that Hoffman (17:88) states the slow learner cannot

see.

Instructional materials are essential when dealing with the slow learner for he has difficulty understanding or relating concepts that are given him verbally or that he gets from the printed page. If a situation can be created where he can use other senses for reinforcement he is more apt to understand. The concept seven for example, would be much easier to explain and describe if seven objects which could be felt and seen were used. Man thinks in terms of the tangible and visible, therefore, it is logical to make use of these facts when teaching. These aids can be divided into three broad categories: literature, audio visual aids, and models and manipulative devices. If these three categories were kept in mind a more effective job of teaching could be done. (18:330)

The new approaches to mathematics for the slow learner recognize that low innate ability may not have been the only reason for a child to have been below average. (22:333) Other factors that were considered were: motivation, emotional disturbance, cultural deprivation, low socio-economic background and poor teaching in the lower grades. The goals of mathematics for the slow learner should be set and they should be the same as the goals of mathematics in the regular curriculum. One statement pertaining to these goals was made by Adler. (2:29) These goals were to develop the kind of mathematical literacy that is needed by a citizen in the era of automation and nuclear energy and to cultivate the intellect and

liberate the mind. Procedures for achievement of these goals are:

(2:30)

1. Present significant new mathematics ideas to the slow achiever.
2. Help him relearn arithmetic from a new, more meaningful, and more mature point of view.
3. Seek to arouse and maintain his interest in mathematics.
4. Provide him with opportunities to make genuine mathematical discoveries at his level of knowledge and performance.
5. Crystalize his learning experience around ideas that he understands, generalizations that he perceives and verbalizes, and skills that he masters.

A study of any five consecutive pages in almost any mathematics textbook will reveal a heavy vocabulary load and this vocabulary is a must if the student is to use the textbook with an degree of proficiency. If some of these words are listed, it will be obvious and easy to understand the great difficulty a slow learner must have. One such group is: addend, factors, circumference, decimal, diagonal, exponent, integer, isosceles, perimeter, perpendicular, quadrilateral, quinary, ratio, reciprocal, and trapezoid. Another group that may be even more difficult because they have more than one meaning is: acute, axis, braces, chord, come, cylinder, face natural, prime, radius, rational, ray, scale, set and square. These are just a few examples but it should make one realize that the job of teaching the vocabulary will take much effort and a great deal of time. (1:393) Teaching this mathematical vocabulary may well be one of the most important in the teaching of mathematics because one of the characteristics of the slow learner is his inability to read

and comprehend. (17:90) This was backed by a statement by Aaron, (1:395) when he urges the reader to remember what a reader takes with him to the printed page determines to a large measure, what he gets from it.

The following ten points could be used as a check list when presenting a lesson in mathematics to the slow learner. (10:237)

1. Divorce mathematical ideas from symbolism and present them in a variety of settings.
2. Stress basic motions.
3. Appeal to as many senses as possible.
4. Find out about pupils hobbies, activities, and parents vocations. Draw applications from these.
5. Provide for a variety of classroom activities.
6. Give simple, short clear instructions, using basic vocabulary.
7. Use graph paper liberally.
8. Keep pupils work and test papers in individual folders. Pupils take pride in their work if we respect their efforts.
9. Success is of utmost importance; immediate success works wonders.
10. Attempt to stimulate the imaginations.

General mathematics is supposedly mathematics for the slow learner; unfortunately, as an examination of most general mathematics textbooks will show, this is not the case. (31:111) The textbook for general mathematics has a tendency to be advanced arithmetic problems where the prose may be long and involved. If the slow learner could read the problem he still would not be able to solve it. From a survey of mathematics textbooks for the junior high school it was found that the reading level was too high and there was too great a range. (37:291)

Many times the teacher of general mathematics, the course that

most of the slow learners were placed in, was not the most proficient in the field of mathematics and the textbook became the curriculum.

Smith (37:290) states this situation very well with the following.

In some cases, the textbook is the curriculum, this occurs for a variety of reasons; teacher insecurity, lack of proper training on the part of the instructor, or teacher apathy and lack of dedication. It is in this situation that the readability of the material becomes ever more important. For as teacher-direction diminishes, self-direction by the student must increase. The student must in this case, have material he can read.

Course offerings in insurance, income tax and depreciation schedules were considered mistakes for the slow learner. They may seem concrete to adults but to ninth grade slow learners they could be highly abstract.

Perel (32:112) makes a statement that could help when selecting material to teach the slow learner.

There seems to be a standard prejudice that whatever is concrete is easy, and whatever is abstract is difficult. There also is a standard opinion that whatever is obviously applicable to practical matters is concrete, and whatever seems to have no obvious and immediate application is abstract---both in error.

What should be taught in a mathematics course for the slow learner? There have been many answers to this question which could be verified by checking different curricula and textbooks that were used. The courses taught were watered down algebra, advanced sandbox, remedial courses (more of the same), accounting and bookkeeping courses (this is not mathematics), all of which left much to be desired.

Dodes (8:248) tells what ideas he thinks are important in the

following statement:

Some ideas in mathematics are important from the viewpoint of culture, designed to enable the citizen to understand and appreciate the mechanism and the background of his environment. Appreciation is the aim for the topics in this category; topics in this category are:

1. Why and how a formula is developed.
2. Why and how an equation is solved.
3. Meaning of a graph.
4. The use of locus to solve position problems.
5. The use of indirect measurement with instruments.
6. How to unravel certain problems with simple set theory.
7. Problems in finite probability.

Certain skills are important for adequate participation of a citizen in his technological, commercial and industrial civilization. We emphasize, while some degree of skill is desirable in this category, skill is never the primary aim of any second track mathematics course.

In designing a course in mathematics for the slow learner the recommendations of the leaders in the field should be taken into consideration; but it must be remembered that the teacher is usually the key to the success of the program. The teacher should remember that their job is to make important materials interesting; it is not to make interesting materials important.

CHAPTER III

ANALYSIS OF DATA

To determine the general practices and the overall opinions regarding the slow learner in ninth grade mathematics in the small schools of Montana, a questionnaire was sent to 94 small high schools. Section one of the questionnaire pertained to the definition of the slow learner, the enrollments in ninth grade mathematics, the enrollment in the slow learner program, the proficiency of the teachers, the equipment used for teaching, the textbook used, the amount of mathematics that should be required for graduation, and the training of the teacher in respect to teaching the slow learner. Section two pertained to the procedures used to select the students to be placed in the slow learner program. Section three pertained to the provision that were made by each school for the slow learner. A copy of the questionnaire is shown in appendix B.

Sixty-seven of the questionnaires equalling 71.3 per cent were returned. The largest school returning the questionnaire had an enrollment of 150 students and the smallest school and enrollment of 20 students. The average size of these high schools being 72 students. Forty-five schools had a program for the slow learner and 22 did not. The largest school having a program had an enrollment of 150 students and the smallest had an enrollment of 28 students and the average size was 82 students. Of the schools that did not have a program the largest had an enrollment of 119 students and the

smallest had an enrollment of 20 students with the average being 55 students.

Each question of the first section of the questionnaire will be analyzed separately because they are unrelated as to specifics.

Question: Which of the following definitions best defines the slow learner?

- A. A student that is considered below average because he cannot achieve what our society dictates they should.
- B. A student that is not achieving what he is capable of according to testing devices, observation and previous work.
- C. Both (A) and (B).

Response: 32 for (A), 7 for (B), and 25 for (C). Two did not answer.

This indicates that about half of the teachers feel that if a student was doing average work regardless of his abilities he was not a slow learner. The other half felt that the ability factor was more important. If the student was capable of doing average work but was not, he should be classified as a slow learner.

This question was designed and placed first in the questionnaire for two reasons, one was to determine what students the teachers considered to be slow learners and the other was to orient all participants as to the problems with which this questionnaire was concerned.

Question: Enter total number of students enrolled in ninth grade mathematics.

Response: The number of students that took ninth grade mathematics in the schools that had a program for the slow learner was 985.

Question: Do you have a program in mathematics for the slow learner?

Response: 45 answered yes and 22 answered no.

This statistic reveals that two-thirds of the small high schools in Montana provide a formal program in mathematics for the slow learner. Another statistic that had a bearing on this information was that 13 schools that did not have a formal program for the slow learner did make provisions for them. This data was taken from section III, which deals with the provision for the teaching of the slow learner. Thirteen schools that did not have a formal program had filled in this part of the questionnaire. By adding the 13 that made provisions for the slow learner but did not have a formal program to the 45 that did have a formal program the number 58 was reached, which is the total number of schools that made provisions for the slow learner. Therefore, 58 of 67 or 86 per cent of these schools made provisions for the slow learner.

Question: If your answer to three is yes;

- A. Enter the number of ninth grade students in this program.
- B. Enter the number of students in this mathematics that are repeating the course.
- C. What name best labels this program: Algebra, General Mathematics, Business Mathematics, Other (specify).

Response: From part A of this question and from the response of a

previous question the following statistic was derived. There were 985 students in ninth grade mathematics of which 333 were enrolled in a slow learner program. This was 29.6 per cent, which was very close to the figure of 33 per cent found in the literature. (22:233)

In part B, 33 student were repeating the course. This revealed 33 of 333 or 10 per cent of the students taking slow learner mathematics had failed.

In part C, Algebra was named 6 times, General Mathematics 31 times, and Business Mathematics 3 times. Other names that were used were, Everyday Mathematics, Shop Mathematics, Pre-Algebra, Grade Arithmetic, Slow Algebra Class, and Remedial Mathematics.

Question: Is the teacher that is teaching mathematics to the slow learner the most proficient in the field of mathematics?

Response: 34 answered yes and 15 answered no.

This question was contained in the questionnaire because the investigator felt that most of the time this class was assigned rather haphazardly and to anyone regardless of their proficiency in mathematics. This was an erroneous belief according to the statistics.

Question: Which of the following are used in this course: adding machine, calculator, overhead projector, film strips, film, bulletin board, models, paper folding, posters. List any others you feel are important.

On the following paper is a table of the number of schools that use the given devices.

TABLE I

NUMBER OF SCHOOLS THAT USE THE GIVEN DEVICES

Device	Number Using	Device	Number Using
Adding Machine.	6	Bulletin Board.	19
Desk Calculator.	2	Models.	24
Overhead Projector.	30	Paper Folding.	12
Filmstrips.	14	Posters.	5
Film.	11		

In studying this table it was found that, except for the overhead projector, less than half of the schools that make provisions for slow learner used these devices. Other devices that were mentioned by different schools were: charts, construction of polyhedra, protractors, compasses, rulers, volume containers, abacus, cursinaire rods, cross number puzzles, card games, mathematics bingo, and programmed practice books.

Question: Is a textbook used in this course? seldom, about half the time, most of the time.

Response: seldom-1, about half the time-9, most of the time-36.

This conforms with the findings in the literature that many times the textbook becomes the curriculum. (37:290)

Question: If a book is used most of the time what is the title and the publisher of the book?

Response: 23 different books were used. When these were tabulated

it was found that no single title or publisher appeared more than five times. This would indicate that there were a great number of textbooks from which to choose.

Question: If the student takes the mathematics for the slow learner, what does he take for his second credit in mathematics?

Response: 36 of the 47 schools that answered this question stated Algebra was taken for the second credit in mathematics. Some of the other possibilities that were mentioned were Geometry, Pre-Algebra, and General Mathematics II. This indicates that most schools consider Algebra an important part of the curriculum of all students.

Question: Do you think two years of mathematics should be required for graduation from high school?

Response: 61 answered yes and 5 answered no.

This was very interesting in view of the fact that there was a movement in Montana to reduce the requirements for graduation to one year of mathematics. The teachers of mathematics in the small high schools of Montana were overwhelmingly in favor of two years. Two individuals actually stated that three years should have been required.

Question: Did you have any training in your college education that helps you teach the slow learner?

Response: 34 answered no, 29 answered some.

This would indicate that colleges did not require students in the education field to take courses dealing with the teaching of

the slow learner.

TABLE II
PROVISIONS FOR IDENTIFYING SLOW LEARNERS

Provision	None	Schools Using Some	Much
Previous preformance	0	16	29
Arithmetic grades in the elementary	6	24	14
Grade teacher's recommendations	5	24	14
Reading grades in the elementary	20	20	2
Prognostic tests	11	21	12
I.Q. tests	15	25	2
Other tests	12	25	1
Student choice	6	26	9
Other procedure	9	13	1

In examing this table the first information that became apparent was that no single provision was outstanding as far as importance was concerned. The first one, previous preformance, was rated higher than all of the others but that was understandable because the others were engulfed by its meaning.

On examination of the next entry, arithmetic grades in the elementary, it was found that only 14 used this much of the time compared to 29 that used previous preformance much of the time. This statistic indicates that there was not a great deal of importance placed on grades in the elementary when selecting students for slow learner mathematics.

Grade teachers recommendations; the responses indicated that this provision was used some of the time. There was one problem

that may have been the reason that this procedure was not used more and that was the problem of convenience. If the schools were some distance apart it would have been inconvenient for the teachers to get together to discuss the problems of the students. The attitudes of mathematics teachers in high school toward the abilities of teachers in elementary schools could have been a stumbling block as far as this type of cooperation was concerned.

The literature indicates that one of the most important skills needed to succeed in mathematics was that of being able to read and comprehend. Only two schools said this was used much of the time when selecting students for the slow learner mathematics.

Was it necessary to give prognostic tests or could these students have been assigned to the proper place without them? This was possibly the question that many of the individuals that were responsible for placing the slow learner were asking themselves. The decision to use a prognostic test would have depended on their answer. This procedure may have revealed some information that would have made other information less important for the purpose of selecting the right course of mathematics for the student to take.

Evidently intelligence quotient tests were not considered to have an outstanding importance in placing students in slow learner mathematics because only two schools stated that it was used much of the time.

Other tests were used to some degree and this gives this author the impression that educators were concerned and conscientious about the problem. No statements were given as to what tests were

used.

Does the student have a right to choose his subjects? This question could possibly start quite a discussion where educators gather. If he were a good student, certainly. If he were a poor student the feelings might not have been the same. If the characteristics of the slow learner, as found on page 7, are taken into consideration, it would seem that the importance of the decision of the slow learner himself could not be overlooked. He was in trouble already and if he were placed in a situation that he does not like it would aggravate his problem.

Twenty-three schools indicated that they used other procedures but they did not state what those procedures were.

TABLE III
PROCEDURES USED TO EDUCATE SLOW LEARNERS

Procedures	Numbers using		
	none	some	much
Require all students in the same class to do the same work.	3	22	16
Encourages all students to assist the slower student.	6	28	7
Display students work on bulletin.	31	9	0
Emphasis the social use of mathematics.	3	17	21
Plan class activities with the student.	10	23	6
Keep a file of each students work..	19	15	7
Solve practical problems related to students interest.	2	24	15
Encourage students to work at own rate.	9	21	11
Provide for field trips related to class work.	33	8	0
Provide a mathematics laboratory.	32	6	2
Permit students to use class time for other subjects when assignments completed.	9	28	4
Encourage student self-evaluation.	5	24	12
Provide students with experience in group work.	11	24	6
Provide students with experience in evaluating types of reasoning in papers and magazines.	27	11	3
Encourage students to make up their own problems from data they can secure.	17	22	2
Provide problems that are related to the students interest.	1	28	12

When the statistics were examined it was seen that most of the small schools of Montana required all students to do the same work.

The provisions to encourage all students to assist the slower ones was recommended by about half the schools according to the responses.

Very few schools displayed students works. The literature states that one of the problems of the slow learner was that he needed attention and would do anything to get it. This would have been an opportunity to give him the attention he craves and it could have been done in a very constructive way.

From the statistics the small schools of Montana did emphasize the social use of mathematics.

Plan class activities with the class. More schools said that this was done none of the time than those that had done in much of the time. The reason for this could have been the interpretation of the question. Did it mean you plan what concepts you were oing to teach with the student or did it mean you plan what classroom activities you would use to teach these concepts? If the first interpretation was used then it could have been answered as it was. If the second interpretation was used the answer could have been positive, for the student will get a feeling of importance if he could help plan the activities.

The provision of keeping a file for each slow learner was

answered negatively. This was probably true because of the time, work and facilities involved in keeping a file.

Solving practical problems related to the student's interest, most schools indicated that they had done this.

The statistics determined that about half the schools encouraged the student to work at his own rate. This may have been an unfair question because most teachers would encourage students to do more than they were doing.

Provide for field trips related to class work. The literature stated that this was an excellent procedure to use when teaching the slow learner. The schools surveyed indicated that very few of them took field trips. Possibly the factors that limit the use of this procedure were the difficulties of finding the proper problems in a small community. The course material may have been designed in such a way as to make it unrelated to practical examples. If the last were the case probably the course could be redesigned.

In the next provision there were only eight schools that said they had made provisions for a mathematics laboratory.

What do students do with class time when they have completed their assignment? In the small schools of Montana, only nine schools stated they allowed students to do other work.

Most of the schools encouraged self-evaluation.

Provide students with experiences in evaluating types of reasoning in magazines and newspapers. Very few schools said that this procedure was used. Mathematics is supposed to teach logic

and this would give an excellent opportunity to test the theory of the transfer of learning.

Very few schools encourage students to make up their own problems. This could have been true because of the type of student involved. The literature states that the slow learner does not have a great deal of creative ability, therefore, this would be a difficult task.

Most schools tried to provide problems that were related to the students interest.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to get information about the slow learner program in mathematics in the small high schools of Montana and compare what these schools were doing with what research recommends. The study was concerned with two specific areas: that of the procedures used when selecting the slow learner and that of the procedures used when teaching the slow learner.

All high schools with an enrollment of 150 or less students were selected from the Montana High School Directory. Each of these schools were sent a questionnaire. There were 94 schools selected and 67 of these returned the questionnaire. The information on these questionnaires was compiled and the results interpreted. These interpretations were compared with what the literature had to say about the slow learner.

Conclusions

The following conclusions were arrived at:

1. Two-thirds of the small high schools in Montana have a program for the slow learner.
2. In ninth grade mathematics 29 per cent of the students were identified as slow learners.
3. The teachers used in slow learner mathematics are the most

proficient in that field.

4. Very little use is made of teaching devices in the program.
5. Ninety-two per cent of the mathematics teachers in the small high schools of Montana recommended two years of mathematics for graduation.
6. Institutes of higher education do not require students to take courses that teach the skills used to teach the slow learner.
7. Most schools use all of the procedures that were listed when they select the slow learner. It was found that reading performance and student choice were not used as much as the others.
8. Most of the procedures recommended by the literature surveyed, were used to train the slow learner, the exceptions were:
 - A. Display student's work on bulletin boards.
 - B. Keep a file of each student's work.
 - C. Provide field trips that are related to classwork.
 - D. Provide a mathematics laboratory.
 - E. Provide students with experience in evaluation types of reasoning in papers and magazines.
 - F. Encourage students to make up problems that are related to the students interest.

Recommendations

The following recommendations were formed from the conclusions

of this study:

1. The small high schools of Montana ought to be commended for the provisions they are making for the slow learner.
2. Administrators and teachers should be made aware of the importance of reading and students choice when selecting students to enroll in slow learner mathematics.
3. Teachers and administrators should be informed of the importance of teaching devices when educating the slow learner and they should be encouraged to use more of them.
4. Colleges ought to put more emphasis on the techniques used to teach the slow learner when training future teachers.
5. Teachers should be commended for using the procedures they are now using. They should be encouraged to use others especially those listed in section eight of the conclusions.
6. A similar study should be made in the larger high schools of Montana.

APPENDIX

TO: TEACHERS OF MATHEMATICS IN SMALL SCHOOLS OF MONTANA

RE: QUESTIONNAIRE ON THE SLOW LEARNER IN MATHEMATICS

In order to complete the requirements for a Masters Degree in Education I am writing a paper on the SLOW LEARNER in Mathematics in the small schools of Montana. I would appreciate it very much if you would fill in the accompanying questionnaire and return it to me.

It is my desire to determine the general practices and the overall opinion regarding the SLOW LEARNER in high school mathematics. With this information I hope to come to some conclusions and make recommendations that will benefit the SLOW LEARNER.

Your name will in no way be connected with the study, for I am only concerned with the general practices and opinions in the small schools of Montana.

Your effort and cooperation in this project is greatly appreciated,

Leonard L. Amundson

QUESTIONNAIRE ON THE SLOW LEARNER

IN MATHEMATICS

Fill in the blanks with check mark, number, word/words.

1. Which of the following definitions best defines the SLOW LEARNER?

___a. A student that is considered below average because he cannot achieve what our society dictates he should.

___b. A student that is not achieving what he is capable of according to testing devices, observation and previous work.

___c. Both (a) and (b).

2. Enter the total number of students enrolled in ninth grade math. ___

3. Do you have a program in math for the SLOW LEARNER? ___yes ___no

4. If the answer to three is yes,

___a. Enter the number of ninth grade students in this program.

___b. Enter the number of students in this math that are repeating the course.

___c. What name best labels this program? Algebra___, General Math___, Business Math___, Other (specify) _____.

5. Is the teacher that is teaching mathematics to the SLOW LEARNER

the most proficient in the area of mathematics? ___yes ___no.

6. Which of the following are used in this course: adding machine___, desk calculator___, overhead projector___, filmstrips___, film___, bulletin board___, models___, paperfolding___, posters___. List any others you feel are important:_____.

7. Is a textbook used in this course? seldom___, about half-time___, most of the time___.

8. If a book is used most of the time, what is the name and publisher of this book?_____.

9. If a student takes the math for the SLOW LEARNER what does he take for his second credit in math?_____.

10. Do you think two years of math should be required for graduation from high school? ___yes, ___no.

11. Did you have any training in your college education that helps you teach the SLOW LEARNER? _____nine, _____some, _____much.

12. Which of the following procedures are used for the selection of students to be placed in the SLOW LEARNER program?

NONE SOME MUCH

- | | | | |
|-------|-------|-------|--|
| _____ | _____ | _____ | 1. Previous performance |
| _____ | _____ | _____ | 2. Arithmetic grades in the elementary |
| _____ | _____ | _____ | 3. Grade teachers recommendation |
| _____ | _____ | _____ | 4. Reading grades in the elementary |
| _____ | _____ | _____ | 5. Prognostic tests |
| _____ | _____ | _____ | 6. I. Q. tests |
| _____ | _____ | _____ | 7. Other tests |
| _____ | _____ | _____ | 8. Students choice |
| _____ | _____ | _____ | 9. Other procedures |

13. Provisions for the SLOW LEARNER:

NONE SOME MUCH

- | | | | |
|-------|-------|-------|--|
| _____ | _____ | _____ | 1. Require all students in the same class to do the same work. |
| _____ | _____ | _____ | 2. Encourage all students to assist slower students. |
| _____ | _____ | _____ | 3. Display students work on the bulletin board. |
| _____ | _____ | _____ | 4. Emphasize the social use of math. |
| _____ | _____ | _____ | 5. Plan class activities with the students. |
| _____ | _____ | _____ | 6. Keep a file of each students work. |
| _____ | _____ | _____ | 7. Solve practical problems related to the students interest. |
| _____ | _____ | _____ | 8. Encourage students to work at own rate. |
| _____ | _____ | _____ | 9. Provide for field trips related to class work. |

- ___ ___ ___ 10. Provide a math laboratory.
- ___ ___ ___ 11. Permit students to use class time for other subjects when math assignments are completed.
- ___ ___ ___ 12. Encourage student self-evaluation.
- ___ ___ ___ 13. Provide students with experience in group work.
- ___ ___ ___ 14. Provide students with experience in evaluating types of reasoning in magazine and newspaper articles.
- ___ ___ ___ 15. Encourage students to make up their own problems from data they can secure.
- ___ ___ ___ 16. Provide problems that are related to the students interest.

LITERATURE CITED

1. Aaron, I. E. "Reading in Mathematics." Journal of Reading. 8:391-5, May, 1965.
2. Adler, Iwring. "Mathematics for the Low Achiever." NEA Journal. 54:28-30, February, 1965.
3. Albery, E. J. "Math. in General Education." Mathematics Teacher. 59:426-31, May, 1966.
4. Cotten, Katherine C. "The Roots of Failure." NEA Journal. 55:33-6, April, 1966.
5. Cohin, Elizabeth W. "The Shadow Children." Saturday Review. 50:72, December 16, 1967.
6. Dentsch, Pat and Deutsch, Ron. "Some Retarded Children Are Not." Readers Digest. 88:92-6, March, 1966.
7. DeWitt, Gerald. "The Potential Dropout; Individual Care Produces Results." Clearing House. 42:428-30, March, 1968.
8. Dodes, Irving Allen. "Some Comments of General Mathematics." Mathematics Teacher. 60:246-51, March, 1967.
9. Dunn, Lloyd M. "Can a Childs I. Q. be Raised?" Instructor. 75:58, June, 1966.
10. Elder, Florence. "Math for the Below Achievers." Mathematics Teacher. 60:235-40, March, 1967.
11. Folsom, Mary. "New Math to Verbal for the Disadvantaged." Instructor. 76:26, March, 1967.
12. Foster, Lis E. "Why Not Math Field Trifs?" Arithmetic Teacher. 11:319-22, May, 1969.
13. Freedlander, Bernard Z. "Todays Innovation in Teaching." NEA Journal. 55:10-14, March, 1966.
14. Fremont, Herbert. "Some Thoughts on Teaching Math to Disadvantaged Groups." Airthmetic Teacher. 11:319-22, May, 1969.

15. Haberman, Martin and Raths, James D. "High, Average, Low- and What Makes Teachers Think So." Elementary School Journal. 68:241-5, February, 1968.
16. Hammitt, Helen. "Evaluating the Teaching Slow Learners." Arithmetic Teacher. 14:40-1, January, 1967.
17. Hoffman, Ruth Irene. "The Slow Learner-Changing His View of Math." Bulletin National Association of Secondary School Principals. 52:86-97, April, 1968.
18. Johnson, Donavon A. "Enjoy the Math You Teach." Arithmetic Teacher. 15:328-32, April, 1968.
19. Lanning, Dr. Frank and Robbins, Dr. Russell. "Children in Trouble." Instructor. 77:183, October, 1967.
20. Lanrita, Raymond E. "The Slow Learner: A Convenient Label." New York State Education. 55:14-17, November, 1967.
21. Lehman, E. F. and Hall, R. E. "Who Is This Child?" American Educations. 2:10-12, April, 1966.
22. Lerch, Harold H. and Kelly, Francis J. "A Math Program for Slow Learners and the Junior High Level." Arithmetic Teacher. 13:232-6, March, 1966.
23. Levine, Shirley. "Pragmatism and the Slow Learner." Education. 87:338-40, February, 1967.
24. Lowe, Linda. "How to Get Help for Children in Trouble." Grade Teacher. 85:65-6, October, 1965.
25. Meserve, Brace E. "The Teaching of Remedial Mathematics." Math Teacher. 159:437-43, May, 1966.
26. Mills, James D. "Try the 'Filz Gerald Method' for Slow Learners." Clearing House. 42:56, September, 1967.
27. Mintz, Natalie and Fremon, Herbert. "Some Practical Ideas for Teaching Mathematics to the Disadvantaged Children." Arithmetic Teacher. 12:258-60, April, 1965.
28. Morphet, Edgar L. and Ryan, Charles O. "Designing Education for the Future, An Eight-State Project." Implications for Education of Prospective Changes in Society.

29. Mueller, Francis J. "The Several Revolutions in Elementary School Mathematics." NEA Journal. 57:53-4, January, 1968.
30. Noar, Gertrude. The Junior High School Today and Tomorrow. New Jersey: Prentice Hall Inc., 1953.
31. Olson, Edward G. "Teacher Education for the Deprived: A New Pattern." School and Society. 95:232-4, April, 1967.
32. Perel, W.M. and Vairo, Philip D. "What is General Mathematics." Journal of Secondary Education. 43:109-12, March, 1968.
33. Pines, Maya. "A Pressure Cooler for Four Year Old Minds." Harpers. 234:55-61, January, 1967.
34. Saterlie, Mary Ellen and Loraditch, Bernnard G. "Forty Who Tried: A Study of Slow Learners." Bulletin of the National Association of Secondary School Principals. 51:36-45, September, 1967.
35. Sandel, Danidlt. "Teach So Your Goals are Showing." Arithmetic Teacher. 15:320-3, April, 1968.
36. Shelton, Baker O. "Our Stigmatized Youth." Education. 87:341, February, 1967.
37. Smith, Frank. "The Readability of Junior High School Mathematics Textbooks." The Mathematics Teachers. 62:289-291, April, 1969.