

THE ROLE OF THE CLASSROOM TEACHER  
IN MEETING THE NEEDS OF  
THE SUPERIOR STUDENT  
IN SCIENCE AND  
MATHEMATICS

By

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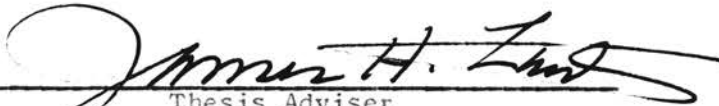
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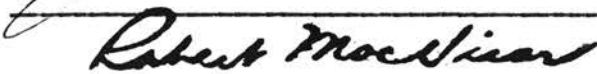
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## PREFACE

This paper was undertaken due to an interest gained from a workshop attended by the writer at Western State College, Gunnison, Colorado, in the summer of 1955.

Since that time I have attempted to see the superior student's needs and to help him meet those needs by encouraging him to make enrichment his individual problem.

I feel that writing this report will enable me to do a better job not only for the superior student, but for all the students in my classes.

Acknowledgement is given to my superintendent, Mr. Raymond Harvey, for his assistance in finding material on the subject; and, Dr. James H. Zant, for his guidance.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION . . . . .	1
II. THE TEACHER'S ROLE IN THE IDENTIFICATION OF THE SUPERIOR STUDENT . . . . .	2
Physical Traits . . . . .	5
Mental Traits . . . . .	5
Social-Emotional Traits . . . . .	6
III. THE ROLE OF THE TEACHER IN THE CLASSROOM . . . . .	10
Primary Grades . . . . .	10
Intermediate Grades . . . . .	14
The Role of the Teacher at the Secondary Level . . . . .	17
IV. SUMMARY AND CONCLUSIONS . . . . .	22
BIBLIOGRAPHY . . . . .	24
APPENDIX . . . . .	27
VITA . . . . .	29

## CHAPTER I

### INTRODUCTION

In today's world there is probably no problem of education that has received so much attention as the provision for the needs of the gifted. Much has been written and said concerning the administrative procedures that can best do the job. Having seen so many able students, in my many years of teaching, reach junior and senior high school with their imagination and curiosity stifled, the role of the classroom teacher from the primary through high school appealed to me.

The purpose of this paper is an attempt to point up the role of the classroom teacher in meeting the needs of the superior pupils. It is the belief of many teachers with whom I have talked that the most important part of the school program takes place in the classroom.

The problem includes the role of the teacher regardless of the administrative set-up. Whether the plan is homogeneous grouping in separate classes, acceleration on an individual basis, or meeting the needs individually in the regular classroom, the role of the classroom teacher is to be considered.

This paper includes material taken from the prevailing literature on the subject, and what the writer has learned from discussing the problem with other teachers who are interested in better meeting the needs of all their students.

Before going further there are certain terms, whose meaning need to be clarified:

1. By able, gifted, superior, or talented is meant the upper 15% to 20% of the student populations of all schools. Some schools may have more or less than 15% due to type of homes, educational backgrounds of parents, etc.
2. The term, "curriculum," includes all the learning experiences that contribute to the overall educational growth and development of the child.
3. The term, "classroom teacher," will be used to refer to teachers at all levels of instruction from primary through high school.
4. Needs of the able student are to include the imperative needs of all children, but also an area of special needs which apply to those students with exceptional ability. These are:
  - a. Acceptance of their mental ability: Gifted children need to develop a realistic acceptance of their mental ability and to recognize the fact that such ability carries with it responsibility for standards of achievement that are in direct proportion to the ability involved. Able students need learning experiences that will challenge their mental growth qualitatively, as well as quantitatively. Offering them more of the same can never meet this need.
  - b. Acceptance by others: Talented children are faced with the problem of how to develop an acceptance of other people as unique individuals. While this is true of all children, mentally gifted children have a problem when making judgments about others in the school situation where general intelligence and ability to verbalize are highly valued.

- c. Establishment of life work goals: Because gifted pupils in general have a large range of interests and are capable of succeeding in many areas, the problem of vocational choice is often a difficult one.
- d. Variety of experiences: Many able children, like all children, need a variety of experiences for developmental purposes. Gifted children, however, may need special direction in achieving a balanced activity program. On one hand, the exploitation of these children by the school must be avoided. On the other hand, care should be taken to insure broad experiences in many areas, rather than early specialization in just one area of particularly strong interest.
- e. Positive home and family relationships: The school can contribute to the development of positive home relationships by working with the parents of these children to bring about co-operative action in the guidance.
- f. Effective citizenship: If the gifted children are to make the contribution to society of which they are capable, training in citizenship must be planned carefully and executed in terms of the potentialities involved.

## CHAPTER II

### THE TEACHER'S ROLE IN IDENTIFICATION OF SUPERIOR STUDENTS

Before anything can be done to help the gifted child to a better fulfillment and use of his potentialities, there is the problem of his identification. It is generally agreed that early identification is highly desirable from the standpoint of the full development of his abilities and personal adjustment. <sup>1</sup>Leta Hollingsworth states that the highly intelligent child needs for "a supplement to the standard curriculum" is the greatest at the primary and elementary level, and that his personal problems pertain chiefly to the periods prior to twelve years of age.

Who are the able students and how are they to be identified? Identification is perhaps the most experimental and most essential part of any school program for superior students.

There has been much controversy regarding just what should be used as criteria for such selections. Some rely on intelligence tests with those making above a certain score being automatically set apart in the superior group. Other schools combine these with other testing techniques, independent judgments by teachers, and school marks. The last mentioned are used in upper elementary and junior-senior high schools.

Use of intelligence tests as the sole criteria for selection of the able student is questionable. The results of the recent studies show that

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<sup>1</sup>American Association for Gifted Children, The Gifted Child, ed. Paul Witty (Boston, 1951), p. 2.



the IQ score is not fixed. Also, difference in cultural backgrounds and reading ability may account for those with superior intelligence being overlooked.

A combination of tests, intelligence, reading, and aptitude along with teacher judgments have come to be thought as the best means for designating those pupils of superior ability.

Since we are interested in the teacher's role in identification of the able, here are check lists that may be helpful:<sup>2</sup>

#### I. PHYSICAL TRAITS

1. Tend to be stronger, taller, and healthier than average.
2. Do not become fatigued so readily as the average.
3. Dislike routine and repetitive tasks.
4. Tend to mature earlier than others of the same age.
5. Manual and motor abilities not so superior as are the intellectual abilities.

#### II. MENTAL TRAITS

1. Possesses intellectual curiosity.
2. Possesses large and picturesque vocabulary which they use accurately--originality of expression.
3. Have long attention span.
4. Show keen power of analysis, synthesis, and reasoning.
5. Are able to work with abstractions.
6. Learn rapidly, do well in academic work; they often master a standard assignment in about one-half the usual time.
7. Have a good memory, recalls details.
8. Show an outstanding degree of originality, resourcefulness, initiative, and imagination.

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<sup>2</sup>The Philadelphia Suburban School Study Council, Guiding Your Gifted, Educational Service Bureau, (University of Pennsylvania, 1954), pp. 2-5.

9. Display a wide range of interests.
10. Have a capacity for self-appraisal.
11. Like to read, both intensively and extensively.
12. Require less detailed and repeated instructions, often resists suggestions.
13. Are capable of planning and organizing.
14. Have a great sensitivity to cultural stimuli.
15. Show an ability to see qualitatively as well as quantitatively.

### III. SOCIAL-EMOTIONAL TRAITS

1. Tends to associate with those of same mental age.
2. Are enthusiastic about activities, tend toward those which require thinking.
3. Are generally good citizens.
4. May appear boastful due to positiveness of knowledge.
5. Tend to enjoy individual activities.
6. Have potential for leadership.
7. Possess acute sensitivity to normal problems of adolescence.
8. Responds quickly to feelings of others.
9. Are concerned about school marks, feel parental pressure.
10. Have a cheerful disposition, tend to be optimistic.
11. Are emotionally healthy.
12. Show a keen sense of personal responsibility.
13. Are superior morally, high in honesty.
14. Make an easy adjustment to new situations.
15. Strive for group recognition.
  - a. Rejected by peers.
  - b. Evokes imaginary playmates.

These are suggested characteristics for aid in identifying the gifted student. From the list the teacher can find help in compiling one of her own. A word of caution in checking, they indicate a matter of degree rather than difference.

Not all of the superior group will seem to have all of the traits mentioned. It may be that some are more easily identified by the problems that the pupils have. Boredom, lack of acceptance by his peers, air of superiority, impatience with slower learning pace of others, and lazy work habits, can often be tied in with superior ability.

In order for the teacher to be able to use any check list to the best advantage she must be aware of her own biases. Often it is difficult to list a trait after a pupil's name if it is not a good trait. To be honest and objective is the best way to be of help to the student involved.

As our problem deals with meeting the needs of the gifted in mathematics and science, it would help if the teacher had some means of identifying those who had special aptitudes in mathematics and science.

Some identifying characteristics that can be used for gifted students in math are:

1. Have ability to read one to two years ahead of his class.
2. Like problem solving.
3. Have ability to see and determine relationships in quantitative measurements.
4. Able to grasp abstract ideas and see abstract relationships.
5. Make progress without need of much rote drill.
6. Look for new and better ways to solve problems.
7. Interested in reading history of mathematics and biographies of famous men in mathematics and science.
8. Like to solve mathematic puzzles.

The above list has been used by the writer and has been found effective, if used in conjunction with results of aptitude tests.

In selection of the student with scientific ability, some of the things to be considered are:<sup>3</sup>

1. Expresses himself clearly and accurately either through writing or speaking.
2. Reads one to two years ahead of his class.
3. Is one to two years ahead of his class in mathematical ability.
4. Has greater than average ability to grasp concepts and see abstract relationships.
5. Has good motor co-ordination, especially eye-hand co-ordination. Can do fine, precise manipulations.
6. Is willing to spend time beyond the ordinary assignments or schedule on things that are of interest to him.
7. Is not easily discouraged by failure.
8. Wants to know the causes and reason for things.
9. Spends much of his time on special projects of his own, such as making collections, constructing a radio, making a telescope.
10. Reads a good deal of scientific literature and finds satisfaction in thinking about and discussing scientific affairs.

Some of the above statements contain more than one identifying characteristic. If a student can be described by all or a part of a statement he qualifies for scientific ability.

Since the classroom teacher is in a position to observe the student better than the counselor or any member of the administrative staff, she is a very important individual in the identification of the superior student. Her position in this important task is one of co-operation with

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<sup>3</sup>Robert F. DeHaan and Jack Kough, Identifying Students With Special Needs (Science Research Associates Inc., 1956), p. 30.

all others involved in making such a selection. But since tests and cumulative records can often be misleading, she should not hesitate to make herself heard.

Systematic observation is necessary to make sure that the superior child is not missed. This can be done in the routine of class activities using the check lists that are available. Remember that not every bright child will rate well on every trait, but every superior pupil will give the teacher some means of discovering his abilities. The teacher's job is to remember specific instances in which the student revealed a trait rather than to deal in generalities.<sup>4</sup>

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<sup>4</sup>Cutts and Mosely, Teaching the Bright and Gifted (Prentice-Hall Inc., 1957) pp. 17-18.

### CHAPTER III

#### THE ROLE OF THE TEACHER IN THE CLASSROOM

##### PRIMARY GRADES

Regardless of the administrative procedures set up, if any, to meet the needs of the able student, the teacher has the final responsibility in attaining the goals set. Since in so many instances there is no effort on the part of the administration to aid in this problem, the teacher may find that she has the sole responsibility for the task.

The first grade teacher is probably the most important for the future progress and optimum education of the able child. Proper observation, close contact with parents, and the use of tests give her the opportunity to identify such children early in the school year.

Even though grouping is used in almost every primary classroom, this alone will not suffice. Enrichment is necessary in providing for the superior child.

In talking with teachers and administrators, the writer has found many different ideas as to the meaning of enrichment. <sup>5</sup>Cutts and Mosely, in Teaching the Bright and Gifted, have defined it as "The substitution of beneficial learning for needless repetition of harmful idleness." The qualifying adjectives are necessary because not everything that goes under

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<sup>5</sup>Ibid., p. 37.

the name of enrichment is beneficial, much drill may be necessary and not all idleness is harmful.

Acceleration may not be possible in the primary grades due to administrative policies. Enrichment then is the only means the teacher has.

<sup>6</sup>Birch and Williams, in Challenging the Gifted, have set forth several ideas that have been used by primary teachers: (1) Be careful not to create boredom for the superior pupil. (2) Move him along in the skill subjects as fast as he is capable in order that he may use them to learn on his own with proper guidance and direction.

Suggested primary activities are:

Reading:

1. Allow extra time for reading.
2. Help children organize a lending library of their own books from home.
3. Introduce at least one new topic on which free reading might be done each week.
4. Encourage short book reports to the class on more difficult reading material.
5. Prepare poetry and plays to be read to the class.
6. Compile bibliographies around topics of interest or for special subjects or events.
7. Organize a reading fair for the community.
8. Visit community libraries and learn how to use them.
9. Write descriptions of the work of the class for a record or class scrap book.

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<sup>6</sup>Jack W. Birch and Earl M. McWilliams, Challenging the Gifted (Prentice-Hall Inc., 1957), p. 37.

**Arithmetic Activities:**

1. Collect and budget a fund to feed class pets.
2. Record and count books and pages read.
3. Develop class and individual records of height and weight.
4. Measure rainfall and snowfall.
5. Make a class project time schedule.
6. Estimate distances in the neighborhood.
7. Make a list of pairs, sets, and groups in everyday living.

**Science Activities:**

1. Plans and organization for the control of local pests.
2. Trips to local geological and physiographic points of interests.
3. Growing plants.
4. Collections of local insects, minerals and plants.
5. Protective activities and coloration of local wildlife.
6. Conservation plans for local resources.
7. How animals rear their young.
8. Preparation and presentation.
9. Constructing and drawing backgrounds for class museums.
10. Development and management of an aquarium.

**Social Studies Activities:**

1. Development of a classbook of children's games and mathematic puzzles.
2. An illustrated map of the school grounds or neighborhood.
3. How many people in our neighborhood play.
4. Organization of a favorite toy exhibit.
5. Planning and managing a pet show.
6. Visits and interviews at the post office or fire station.



7. Organization and operation of a class government.
8. Development of rules for school safety.
9. Class discussions with members of the school patrol.
10. Organization and management of class parties.

All of the foregoing activities are included since it is generally recognized that there is a need for a broad base for the able children in mathematics and in science, if he is to make his proper contribution to society.

The primary teacher may wonder just how effectively she is meeting the needs of the superior child. There are several prepared check lists that can be used, or she may want to make one herself. Below is one which has been used effectively by a good many teachers:<sup>7</sup>

Problem	Solution
The child is mentally superior, but	Have you worked out the answer? (Yes or No Comment)
1. His class work is inferior	_____
2. He is unpopular	_____
3. He appears bored	_____
4. He annoys me with his impudence	_____
5. He has a narrow range of interests	_____
6. He has a superior attitude	_____
7. He is a poor reader	_____
8. He seems unsure of himself	_____
9. He tries to bluff instead of working	_____
10. He can't remember arithmetic facts	_____
11. He is glib instead of thoughtful	_____

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<sup>7</sup>Ibid, p. 23.

## INTERMEDIATE GRADES

In the primary grades the major problem of the teacher was not so much what is done with the bright children, but how it is done that makes their education special. When the intermediate grades are reached the teacher should make sure that the able student learns how to apply himself to difficult tasks. If this is not accomplished, he is easily discouraged and tends to pass them over. Learning should be thorough with constant attention to the higher level skills in language arts and arithmetic.

It is this part of his school life that he either learns the independent work habits that will enable him to distinguish himself in later years, or he acquires the bad study habits, and improper attitudes that make him a problem in junior and senior high school. He must be made to realize that enrichment is the individual's obligation.<sup>8</sup>

A gifted child begins life with an innate curiosity. In the preschool years and the primary grades he is full of questions as to the why and how of the things he sees in his environment. By the time he reaches the junior high school level he has most of that curiosity taken from him. Why? He is told that curiosity killed the cat and the tone used implies that if he has any of this quirk in his nature, he may do well not to let it be known. He is admonished to get on with his regular assignments and let idle curiosity alone.<sup>9</sup>

If the administration is not co-operative, the teacher often is rebuffed if an attempt is made at enrichment or grouping in the regular

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<sup>8</sup>Robert Hendon, "Enrichment: The Individual's Obligation," The Oklahoma Teacher, March, 1960, p. 12.

<sup>9</sup>Lydia Jenks, "At What Age Does Curiosity Die," The Oklahoma Teacher, April, 1960, p. 9.

classroom to better meet the needs of the superior students. The writer has been criticized by principals for not following the textbook exclusively in science and mathematics classes. The result is teaching for mediocrity and the able student begins each school year at a level far below his capacity and all he can expect is boredom.

The teacher at the elementary level often shies away from any questions concerning science and mathematics, since she feels her incompetency due to lack of adequate training. Enrichment to her for the able pupil is just more of what the average in the class is doing. If such teachers would develop the attitude that she can learn along with the student, then the child learns more than the teacher teaches. The instructor who acquires this viewpoint is one before whom the student is not afraid to reveal his curiosity.

Regardless of organizational set-up for meeting the needs of the superior students at the elementary level, the problem of enrichment activities for those with mathematical and science aptitudes must be met. In schools using the platoon or some form of departmentalization grouping, trained teachers in mathematics and science offer a better solution to the problem. But enrichment activities are essential in all situations.

Activities that can be used are:

Arithmetic

1. Using number concepts and skills for a higher grade level.
2. Making and working mathematic puzzles.
3. Carrying on research for the class. (How our number system was developed, what is meant by tolerance in weights, other number systems, etc.)
4. Measuring and computing for real purposes.
5. Making various graphs.

6. Figuring expenses involved in field trips, refreshments for parties, etc.
7. Reading the biographies of great men in mathematics.
8. Road map arithmetic.<sup>10</sup>

Science Activities:

1. Demonstrating experiments for the group.
2. Working out scientific problems beyond the grade level.
3. Reading and doing research on topics of special interest to the particular child.
4. Entering contests.
5. Making excursions to a science museum with others especially interested in science, perhaps rapid learners from another class or school.
6. Studying geography and climate of own community in more detail than others in the class.
7. Making and using weather instruments.
8. Engaging in a science hobby, such as bird watching, collecting wild flowers, rocks, insects, etc.

It is during the elementary grades that the scientific method can be made real to the student. To do this the teacher must understand it herself. She must realize that the scientific method refers to an attitude of mind, a way of thinking. It guides the scientist in his search for knowledge, but it does not restrain him. This method consists of two major steps: asking questions and answering them.<sup>11</sup> It is as simple as that.

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<sup>10</sup>Robert F. DeHaan and Jack Kough, Helping Children With Special Needs (Science Research Associates, Inc., 1956), p. 36.

<sup>11</sup>Ibid, p. 41.

The questions grow out of ordinary curiosity, out of the kind of observing and wondering that anyone can do. The answers come through experimentation, which follows this order: Making a preliminary guess, selecting the right instruments to test the guess, stating the purpose of the experiment, eliminating all possible causes for the phenomenon under study but one (where possible), and finding an answer to the original question.

#### THE ROLE OF THE TEACHER AT THE SECONDARY LEVEL

There has been considerably more done toward meeting the needs of the superior student at the junior and senior high school level. The problem is easier here due to departmentalization and elective courses available. If adequate steps have been taken in the elementary and primary grades, the able student through proper guidance and enrichment can be brought at graduation to the point where he is ready for advanced standing in college or university.

Since the process of identification should be continuous in order not to overlook any of the superior group, the teacher must be alert to their discovery. Those discovered at this level often have acquired bad study habits, have developed improper attitudes, are unable to read, are mentally lazy, and have become leaders of groups, the members of which are discipline problems. But he makes himself known at rare intervals by his ability to reason, and attacking of problems in which he is particularly interested.

It is this interest that can be used to an advantage to motivate him to developing his capacity to where it should be. If learning can be made purposeful to him, he can be guided to remedy the deficiencies that he has.

Some activities that have been found to be helpful for the able student with aptitudes in science and mathematics are:

1. Allow him to set up and demonstrate an experiment in which the outcome has a particular interest to him. (A creditable job will give him the attention he needs and detract from the influence of his particular group.)
2. Make him chairman of a group who are doing a particular project in some phase of mathematics or science.
3. Arrange for him to come in contact with adult members of local community who are specialists in the field in which he has evinced an interest.
4. Encourage him to enter projects in science fairs and other contests.
5. Make available reading material concerning career opportunities in mathematics and science.
6. Help him to set up a daily time schedule to be used by him to improve work and study habits.
7. Make him a laboratory assistant.
8. Make him responsible for bulletin board displays.

The writer has found the above helpful to awaken the superior student to achieve at more nearly their optimum in junior and senior high school. Each classroom teacher may have methods or activities that will work better for her. The main thing is to try.

In the high school years, the problem of conformity often is a deterrent factor in the development of the potentialities of the superior student. There necessarily must be conformity. But, conformity without foregoing activities that are necessary for developing the superior child's potential.<sup>12</sup>

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<sup>12</sup>Jack W. Birch and Earl M. McWilliams, Challenging the Gifted, (Public School Publishing Co., Bloomington, Illinois, 1955), p. 2.

Here again proper motivation will be helpful. Guide the student in selection of his goals. Make him understand what is needed in the accomplishment of same.

Providing for the superior student's needs in mathematics and science cannot be done by his teachers in those fields alone. The gifted student in science can be encouraged by his English teacher to prepare themes and essays on great scientists, read their biographies or autobiographies, or write a paper on some experiment he has done. He can learn to use the library resources to help him in doing research for science projects.

Social study classes offer various ways the able science student can pursue his special interest. He can relate scientific discoveries to world progress. An example of such would be the influence of atomic power on society, and how it has affected our lives.

The mathematics and science teachers must of necessity emphasize the other's field in order to aid the superior student. The mathematics teacher can give special problems, such as measuring sound waves or determining the best design for a container of minimum bulk but maximum volume. Laws of science can be demonstrated by mathematics teacher and thus showing the part mathematics plays in science.

Art and music classes offer an opportunity for learning more about the theories of color and light, and of sound and its reproduction.<sup>13</sup>

Enrichment in the regular classroom in the junior and senior high schools is still of prime importance. Some suggestions of enrichment are:

1. Encourage library research.
2. Set high standards of achievement; including acquiring of such skills as graph reading and interpretation of table, a scientific

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<sup>13</sup>Jack Kough and Robert F. DeHaan, Helping Students With Special Needs, (Science Research Associates, 1957), p. 35.

- vocabulary, and to understand experimental methods. Insist that experiments be performed carefully and reported accurately.
3. Encourage experimentation both at school and at home. Keep before them a constant reminder that their experiments are a basis for further questions, further problems to be explored.
  4. Have students study the various branches of science. They will need to know how the branches differ from each other and how they are related. For example:
    - a. Define and describe the major natural sciences: Mathematics, physics, chemistry, botany, zoology, biology.
    - b. How are these sciences combined to make specialties?  
For example: Physical chemistry and biochemistry.
    - c. What other sciences are related to the above major sciences?
  5. Get others to stimulate the able student's scientific interest. Make a file of all the men and women of the community who are working in the science fields and contact them to see if their assistance of individual pupils can be counted on when needed. Meeting and talking to these people will increase the interest of the superior student in choosing a career in science.
  6. Acquaint the student with opportunities outside the school. These include science fairs, contests, and scholarships available for college education.
  7. Contact the student's family to be sure that they are aware of the potential of their child. Enlist their aid in encouraging the development of this potential.<sup>14</sup>

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<sup>14</sup> Ibid, pp. 36-38.



Evaluation of the efforts of the teacher during junior and senior high school are not fully shown at graduation. The future alone will tell the story.

## CHAPTER III

### SUMMARY AND CONCLUSIONS

The most basic problem in strengthening science and mathematics programs in the elementary and secondary schools is that of improving instruction. Since the classroom teacher has the final responsibility for what goes on in the classroom, her role in any improvement of instruction is very important.

In almost any level of instruction there can be found superior students. The teacher's judgement is necessary in their identification. To prevent overlooking any of the able pupils, she must be continually alert to recognize any evidence of superiority displayed.

Regardless of the administrative plan for meeting the needs of the superior student, the actual meeting of those needs is the responsibility of the classroom teacher. If she is to be effective, advantage should be taken of every in-service opportunity for self-improvement. The high school teacher has Academic Institutes in the fields of science and mathematics available. At present, the elementary teacher has to rely mostly on her own efforts as there are only a limited number of institutes for elementary teachers available. However, she can develop the proper attitudes toward the superior pupil and his problems; an understanding of what constitutes enrichment; the skills and tools required by the able child early in his education. Also, an attitude of learning with the students, if she feels inadequate in mathematics and science.

The teacher who has kept pace with the rapid change has the responsibility of making her voice heard. She owes it to the children she teaches. So many of the administrators are not aware of the new things in science and mathematics.

The challenge of meeting the needs of our superior students is ever present. It should be a co-operative project of all concerned. Consider what would happen if:

All teachers made a systematic attempt to identify all bright and talented children.

All teachers used methods that helped all children make the most of their abilities.

All teachers continued to think, study, and experiment with a view to improving the teaching of superior children.

All parents and communities organized all of their resources with a view to providing the best schooling for the bright and talented.

All the superior students were educated to apply their gifts in the service of humanity.

## SELECTED BIBLIOGRAPHY

- American Association for Gifted Children. The Gifted Child. Paul Witty, ed. Boston: D. C. Heath and Co., 1951.
- American Council on Education. Selection and Guidance of Gifted Students for National Survival. Arthur E. Traxler, ed. Washington, D. C.: The Council, 1956.
- Birch, Jack W. and McWilliams, Earl W. Challenging Gifted Children. Bloomington, Illinois: Public School Publishing Co., 1955.
- Brown, Kenneth E. and Johnson, Phillip G. Education for the Talented in Mathematics and Science. Washington: U. S. Government Printing Office, (Office of Education Bulletin, 1952, No. 15).
- Bulletin of the National Association of Secondary School Principals. The Education of the Handicapped and Gifted Pupils in the Secondary School. Washington, D. C., Vol. 39, No. 207, January, 1955.
- Cutts, Norma E. and Mosely, Nicholas. Teaching the Bright and Gifted. New York: G. P. Putnam's Sons, 1953.
- DeHaan, R. F. and Havighurst, Robert J. Educating Gifted Children. Chicago: University of Chicago Press, 1957.
- DeHaan, R. F. and Kough, Jack. Identifying Children With Special Needs. Teachers Guidance Handbook (Secondary School Edition, Vol. I). Science Research Associates Inc., 1956.
- DeHaan, R. F. and Kough, Jack. Helping Children With Special Needs. Teacher's Guidance Handbook (Elementary Edition, Vol. II). Science Research Associates Inc., 1956.
- Educational Policies Commission. Education of the Gifted. Washington, D. C.: National Education Association, 1950.
- Educational Policies Commission. The Contemporary Challenge to American Education. Washington, D. C.: National Education Association, 1958.
- Gallagher, James J. The Gifted Child in the Elementary School. Dept. of Classroom Teachers, American Educ. Res. Assn., 1959.
- Kough, Jack and DeHaan, R. F. Helping Students With Special Needs. Teacher's Guidance Handbook (Secondary School Edition, Vol. II). Science Research Associates, 1957.

- Kough, Jack and DeHaan, R. F. Identifying Children With Special Needs. Teacher's Guidance Handbook (Elementary Edition, Vol. I). Science Research Associates, 1957.
- Metropolitan School Study Council (A Committee Report). How to Educate the Gifted. New York: The Council, 1956.
- Suburban School Study Council, Group A. Guiding Your Gifted. Philadelphia: The Educational Service Bureau School of Education, University of Pennsylvania, 1954.
- Witty, Paul. Helping the Gifted Child. Chicago: Science Research Associates Inc., 1952.
- A Symposium. "Accelerating the Academically Talented." The National Education Association Journal, 46 (April, 1960), 21-22.
- Baumgartner, R. A. "A Mathematics Curriculum for the Gifted." The Mathematics Teacher, 53 (November, 1953), 207-213.
- Boyd, James R. "A Mathematics Club for the Able." The Mathematics Teacher, 46 (January, 1953), 43-44.
- Clark, Norman and Lauder, Dick. "An Honors Program." The Mathematics Teacher, 48 (May, 1955), 371.
- Clark, Norman. "Challenge to the Gifted." The Mathematics Teacher, 48 (October, 1955), 434-435.
- Carr, S. "The Gifted Child and His Education." School Executive, 78 (September, 1958), 68-69.
- Chauncey, H. "How Tests Help Us to Identify The Academically Talented." The National Education Association Journal, 47 (April, 1958), 230-231.
- Elder, Florence L. "Providing for the Student With High Mathematical Potential." The Mathematics Teacher, 50 (November, 1957), 502-506.
- Fehr, Howard F. "General Ways to Identify Students with Scientific and Mathematical Potential." The Mathematics Teacher, 46 (April, 1953), 23-24.
- Gebhart, James W. "Providing a Challenging Program in Mathematics and Science for Pupils of Superior Mental Ability." School Science and Mathematics, 52 (May, 1952), 335-338.
- Glennon, Vincent T. "Arithmetic for the Gifted Child." The Elementary School Journal, 58 (1957), 91-96.
- Hendon, Robert. "Enrichment: The Individual's Obligation." The Oklahoma Teacher, 41 (March, 1960), 12.
- MacVicar, Robert. "Quality Teaching for Tomorrow's World." The Oklahoma Teacher, 41 (January, 1960), 16.

- McNally, W. W. "Motivation: Key to Guiding the Gifted." School Executive, 78 (February, 1959), 72-73.
- Norton, Monte S. "What Are Some of the Important Factors To Consider in a Program of Identifying the Gifted Pupil in Mathematics and Science?" School Science and Mathematics, 57 (February, 1957), 103-108.
- Norton, Monte S. "Enrichment As a Provision for the Gifted in Mathematics." School Science and Mathematics, 57 (May, 1957), 339-345.
- Jenks, Lydia. "At What Age Does Curiosity Die?" The Oklahoma Teacher, 41 (April, 1960), 9.
- Lindberg, Lucille. "Self Evaluation Increases Learning." The National Education Association Journal, 48 (November, 1959), 21-22.
- Payne, Joseph N. "Self-Instructive Enrichment Topics for Bright Pupils in High School Algebra." The Mathematics Teacher, 51 (February, 1958), 113-117.
- Reeve, William D. "The Problem of Varying Abilities Among Students in Mathematics." The Mathematics Teacher, 49 (February, 1956), 70-78.
- Ries, Mina. "Modern Mathematics and the Gifted Student." The Mathematics Teacher, 46 (October, 1953), 401-406.
- Snider, Glen O. "The Academically Gifted Child." The Oklahoma Teacher, 41 (April, 1960), 20.
- Stefanko, Joseph M. "Activity Breeds Interest." The Science Teacher, 26 (May, 1959), 225.
- Strang, Ruth. "Reading Development of Gifted Children." Elementary English, (January, 1954), 39.
- Sullins, Forrest. "First Grade Scientists." The Oklahoma Teacher, 41 (March, 1960), 14.
- Stephen, Sister Mary. "The Science Club and Science Projects." The Science Teacher, 24 (April 1957), 126.
- Zant, James H. "The Mathematics Program in the Schools." The Oklahoma Teacher, 41 (March, 1960), 18.

## APPENDIX

### WAYS IN WHICH THE TEACHER CAN ENRICH THE CURRICULUM

1. Organize the curriculum around "problem situations," "centers of interest," or "activity units."
2. Use job contracts.
3. Try workshop and seminar techniques and guide the gifted in research methods.
4. See that each child has a chance to contribute his best to a group enterprise.
5. Arrange for the superior children to receive special guidance from subject area specialists or consultants. (A child interested in science gets help from an engineer on the project he is developing at school.)
6. Inspire the children to use many reference books, not just the textbook.
7. Enlist the aid of resource people living in the community.
8. Provide a wide selection of teaching-learning aids; encyclopedias, magazines, pictures, films, radio, tape recorders, television, etc. See that they are used.
9. Take field trips, using advanced students as guides. Also, have rapid learners do research in preparation for such trips.
10. Arrange for opportunities for gifted children to assume leadership responsibilities, also to be followers-committee activities, contests and etc.

11. Plan to have superior pupils to participate in radio or television programs.
12. See that each child has a choice of subject matter and of club activities.
13. Provide opportunities for gifted pupils to assume special responsibilities for the class, the school, the community.
14. Direct gifted pupils in the holding of special seminars.
15. Make opportunities for the superior student to receive special help in overcoming subject matter weaknesses.
16. Encourage hobbies.



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