THE CONTRIBUTION OF SCIENCE TO THE GENERAL EDUCATION PROGRAM IN TULSA

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Bachelor of Arts

University of Tulsa

Tulsa, Oklahoma

1930

Submitted to the Department of Educational Administration

Oklahoma Agricultural and Mechanical College

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

1941

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ACKNOWLEDGMENTS

The writer wishes to express his grateful appreciation to Dr. Clarence M. Pruitt for his helpful criticism and expert guidance during the preparation of this study.

Acknowledgment is also made to Miss Katherine Moran, a teacher of English at Will Rogers High School who is in charge of collecting and organizing material for a report of the Eight Year Plan in Tulsa, for copies of bulletins and reports which were of great value in the preparation of this thesis.

The writer also wishes to express his gratitude to his sister, Mrs. W. Wayne Blackhall, for reading the original manuscript and making many helpful suggestions and criticisms.

Appreciation is also expressed to Mr. C. L. Jester, principal of the Emerson Elementary School in Tulsa, for the helpful suggestions he gave during the preparation of the study.

K. B. S.

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CHAPTER I

INTRODUCTION

A. Statement of the Problem

It is the purpose of this study to show how the field of science has contributed to the General Education Program which has been in the process of development in Tulsa for the past three years. Furthermore, it is hoped that a discussion here of some of the techniques of method, procedure, and evaluation used by the science teachers in connection with this type of program will make this study of interest and help to the reader.

B. History of the Program in Tulsa

The General Education Program, as it is at the present time, is an outgrowth of a plan of study and curriculum development sponsored by the Progressive Education Association and known as the Thirty-School Study. In this study, thirty schools scattered throughout the United States were selected, and Tulsa felt proud to be one of this group. The Progressive Education Association set down no plan to be followed, each school being left to develop the program in its own way. The purpose of the plan was to encourage new and better methods of instruction, and the Progressive Education Association promised aid to any plan which showed promise of improving the educative process for boys and girls. This plan has done much to encourage experimentation, and the Association has always been helpful in its

suggestions and criticisms of any new program attempted. As has been stated before, the Association advocates no special program but supports any program which will help the students reach their maximum efficiency.

Tulsa has made no rapid or radical changes in its curriculum; the process has been gradual and carefully thought out as it went along. During the first years of the plan the program was that of enrichment. It was in 1933 that the plan got under way in Tulsa, although it had been approved by the Commission on Secondary Schools as early as 1930. It was decided that the program would begin on the junior high level, and it was hoped that those students who succeeded best in school might not only finish all of the required work in their junior and senior high years, but might also be offered some junior college work during these six years spent on the secondary level. It was hoped by those in charge that these students might, by the time they graduated from Tulsa Central High School, not only have completed their six years of secondary education, but might also have finished a full year of work above that commonly required for college entrance.

> The tentative proposal called for: careful consideration of the abilities, aptitudes, and interests of students; revision and enrichment of the secondary program of studies; completion of the regular junior and senior high school work in five or five and one-half years

> by superior students thus providing for enrichment during the eleventh and twelfth years in school.[1]

A plan was worked out and submitted to the Progressive Education Association in the spring of 1933. The plan was accepted, and Cleveland, Horace Mann, Roosevelt, and Wilson Junior High Schools were designated as centers for the experiment. Certain criteria were formulated, and great care was taken in the selection of the gifted students who were to be placed in the experiment.

> After the group had been selected, each school was allowed to develop their own plan of procedure. The administration suggested that the teachers of the group feel free to determine methods of instruction, curriculum content, and emphasis without regard to traditional practice, traditional requirements, or to existing administrative and supervisory organization.[2]

The principals of the various schools made such changes as were necessary to the successful operation of the program. Schedules were changed, study programs were formulated, and the experiment got under way in the fall of 1933. Much could be said of the advantages and disadvantages of this phase of the program as it progressed. Such a discussion, however, cannot be treated adequately here.

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[1] Katherine Moran, A Preliminary Report on the Eight Year Plan in Tulsa, May 25, 1940, p. 1.

[2] Report of the Eight Year Study of the Progressive Education Association in the Secondary Schools of Tulsa, Oklahoma, December 22, 1936.

As the program progressed there arose a feeling that some kind of centralized committee was needed to act as an advisory and coordinating body. This feeling gave rise in 1936-37 to the formation of the Curriculum Steering Committee. This committee was made up of representatives of local teachers and administrators without reference to departments or position. This committee had no power except to advise and recommend policies. The second and present phase of the program began when this committee recommended that a group of local teachers and administrators attend the Progressive Education Workshop at Bronxville, New York, during the summer of 1937. Since that time Tulsa has been represented in various Progressive Education Workshops throughout the country each summer, besides holding many conferences in Tulsa during the school term with Progressive Education leaders in the fields of both curriculum construction and evaluation.

This second phase of the study is different in its objectives, in that it tries to meet the needs of all students in the school rather than a chosen few, and that it endeavors to present those concepts that will enable the student to meet his present problems as well as those of the future. This program is designed to meet the needs of the non-college student as well as those who will attend schools of higher learning. It is a program which lends itself well to the problem-solving method, and makes much use of teacher-pupil planning and pupil participation in

the form of discussion and activities of various kinds. Before the workshop in Bronxville, the study was called the Progressive Education Association Experiment, and the groups of students in the experiment were known as the P. E. A. groups. Since that time the program has been known as the General Education Program. This program was introduced first in Woodrow Wilson Junior High School in the fall of 1937. In 1938-39 other junior and senior high schools introduced it into their programs until at the present time it is included, to some extent, in all of the junior and senior high schools of the city. Some of the schools have introduced it throughout the entire school, while others have introduced it into only one grade of the school.

This program is by no means a Utopia, but it is felt that possibly, on the whole, it does meet the needs of the students better than the old method did. Only a small part of the students in our high schools are in the program now. This can probably be attributed to two main factors: first, the teachers have to be trained in the new program, and second, that new courses have to be developed. The whole situation as to the future of the movement in Tulsa may be summed up by the statement of Eli C. Foster, Assistant Superintendent in charge of Secondary Schools, and principal of Tulsa Central High School, when he says,

> We have purposely moved slowly, and much work is yet to be done before a recommendation to the Board of Education will be made to place the whole secondary program on the General Education Plan. No such recommendation will be made until the teachers approve it and we have more objective evidence of its value over the old plan.[3]

The movement has gone forward in Tulsa during the past three years and the present indications are that it is a sound program and is worthy of continued development.

C. Statement of the Philosophy Behind the Program

The Tulsa Program is based upon the philosophy that the school is engaged in the process of educating the whole child, and that American Public School education is a social process designed to promote the fullest possible development of the individual to a democratic way of living. It has been said that "education is life." Life then, is living, and living is meeting and solving the problems that confront one.

> The school, therefore, is the agent through which society seeks to develop in the individual those understandings, ideals, attitudes, abilities, and behavior necessary for happy, constructive participation in democratic social living.[4]

It then becomes necessary that the student be taught how to recognize and solve his immediate problems. It is the duty of the teacher to encourage, aid, and direct the

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[3] Eli C. Foster, General Statement Concerning Tulsa Secondary School Curriculum, Bulletin, April 9, 1940.

[4] Curriculum Bulletin, Tulsa Public Schools, Report Number II, January 4, 1937.

student in solving his problems in such a way that he will be more adequately orientated into the democratic society of which he is a member.

D. Purposes or Aims of the Program

Believing that "the purpose of the educational program of the American Public Schools is that of maintaining, realizing, and improving the ideals of a democratic order of society, implying the optimum development of the individual together with the optimum development of society, that is consistant with a democratic way of life,"[5] the Tulsa Public Schools have set up the following major aims as a guide in its program:

A. The development of an objective attitude toward self.

B. The development of effective habits of thinking.

C. The development of a social attitude toward the interaction of the individual and society.

It is the duty and obligation of the school to lead the pupil to develop those attitudes and understandings which will enable him to promote his physical and mental well-being, and acquire a more effective personality.

The pupil should be lead to develop those attitudes which will be conducive to the recognition of problems encountered and a desire to work toward their solution.

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[5] Fundamental Principles of the Curriculum Program for the Tulsa Public Schools, p. 1.

It should be the purpose of the school to furnish broad fields of experiences which will meet the educational needs of the pupil in a democratic society.

> The purpose of the curriculum for the Tulsa Schools assumes that learning is more effective and more permanent when the learning experiences grow out of the life needs of the child. That is, the educational program is designed to be a functional program in the sense that the learning experiences in school will be so related to life outside of the school that the child's school experience will enrich, promote and facilitate the child's adjustment to the world in which he actually lives.[6]

The writer thinks that the purpose of the General Education Program in Tulsa could be briefly stated as follows: "The purpose of General Education is to meet the needs of individuals in the basic aspects of living in such a way as to promote the fullest possible realization of personal potentialities and the most effective participation in a democratic society.[7]

E. Definition of Terms

The term "science" as used here denotes a separate branch of learning or a departmental subject. It is used to apply to the natural sciences, such as general science, biology, chemistry, physics, and geology, as differentiated from the social sciences, or the science of mathematics.

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[6] Ibid., p. 4.

[7] The Commission on Secondary School Curriculum, Science in General Education, A publication of the Progressive Education Association, p. 23.

"General Education" is a method of organizing and presenting materials in such a way that they will fit in with the interests and abilities of the pupils, thus giving them a foundation for living a more successful and enjoyable life in a democratic society.

CHAPTER II

ORGANIZATION OF THE PROGRAM

A. City Wide

Acting as the agent of the Board of Education, the Superintendent of Schools is the administrative officer and educational leader of the educational program in Tulsa. Due to his many duties, both educational and civic, it is necessary that he delegate the responsibility for the construction and development of the curriculum program to others. It is for this reason that Tulsa has an Assistant Superintendent in charge of Secondary Schools and one in charge of Elementary Schools. Since we are concerned here mainly with the secondary school curriculum, little mention will be made of the elementary side of the curriculum program.

The curriculum program in General Education progressed so rapidly and became so extensive that there arose a need for a director in charge of the activities of this program. This director acts as an advisor and coordinating head. He is chairman of the Curriculum Council and all committees organized for curriculum development in the program. It is his duty to act as a go-between, so to speak, between the teachers and the administration. He is not a full time director. The one in charge at the present time is also the science director of the city in charge of the science work from grades one through twelve.

Only about one-half of his time is spent in working as director of the General Education Program.

The Assistant Superintendent, and wherever this term is used throughout the remainder of the thesis it will refer to the one in charge of the Secondary Schools unless otherwise stated, meets with the Curriculum Council each month and is considered the advisor of the group, although the director of General Education acts as chairman of the Council. This group is merely an advisory and coordinating body. It is in no sense of the word a policy-forming organization. This organization is made up of one representative teacher from each building engaged in the program, two representative principals, and two representative departmental directors. All of these representatives are elected to this position by the members of their respective groups. The members of the Council are known as Curriculum Council Representatives and are elected for a period of one year. Although, as I have said, this organization is not one to form or adopt policies, it might be mentioned that many of the suggestions offered by this group have been adopted as policies by the Board of Education and the Administrative Staff.

Under the Curriculum Council, and responsible to it, are the committees of grade chairmen. These committees are made up of representative teachers from each building. There is one representative from each grade level in each

school. Therefore, there is a seventh grade committee, eighth grade committee, ninth grade committee, tenth grade committee, etc. The principals and the departmental directors are always welcome to visit these groups, but are not considered members of the committees. It is the duty of the members of these committees to report on the progress of the work being done in their various schools, and to bring from, the teachers working with the program in the field, criticisms of the program and suggestions as to changes which would be helpful or worthwhile in the improvement of the curriculum. These representatives are also responsible for bringing in written reports of the work being done in the various schools. These reports are to be used in the revision of the curriculum from time to time.

For the past several years Tulsa has had directors of the various subject-matter fields, known as departmental directors. It has been their duty to act as the heads of their various departments, such as, science, art, social studies, English, mathematics, etc., and to supervise the instruction of the teachers in their respective fields. They have also worked on the construction of the curriculum in their departments, and have been responsible for the success or failure of this curriculum. With the coming of the General Education Program, the duties of the directors have not changed materially. They have a definite place

in the picture. They do not have quite the freedom to work as individual departments that they did, but they should, and do have a great opportunity to, work hand-in-hand with the director of General Education, the Curriculum Council, and with each other in attempting to build a better educational program.

The principals of the schools in the program have a very important place in the organization. Each principal has complete charge of the administration of the program in his individual school. The degree of success reached by a school will be determined largely by the interest and enthusiasm of the principal in charge. He is responsible only to the Assistant Superintendent, but should, and in most cases does, cooperate with the director of the program and the Curriculum Council. Two members of this group of administrators are members of the Curriculum Council each year, and the others are always welcome visitors. The principal has a great deal to do with the extent to which the program will be introduced into his school, and it will be shown in the next section that this varies greatly from school to school.

All meetings of the various groups in the program, such as, the Curriculum Council, Grade Chairmen, etc., are open meetings. Any teacher or administrator in the city who is interested in the work, is welcome at any time, whether he be a member or not.

In the writer's opinion, this type of organization results in a school system with a highly democratic policy of administration.

B. Individual Schools

There are seven junior high schools and three senior high schools in the city of Tulsa. All of these are now engaged in the General Education Program in varying degrees. The program is not carried out in exactly the same manner in any two of the ten schools. Some of the similarities and differences of the schools may be brought out by the following points.

First, the type of administrator or principal in the school determines its policy. In no case in the secondary schools in Tulsa does one principal have more than one school to administrate. Each principal is allowed, for the most part, to determine the extent or degree to which the program will be adopted by his individual school, as well as the manner in which it will be handled. This in itself causes each school to be different from the others. The principals in the secondary schools in Tulsa vary greatly in their attitude toward the Progressive Education Program. There are those who adopted the program throughout most of their school during the first year, and included it in the entire school by the second year. These principals are the type that feel that it is wise to give a new program a real test, and then if it does not work

discard it. They are very progressive in their ideas. On the other hand there are those more conservative principals who move more slowly into a new program. They can see much good in it but they are not ready to throw out the old method until it has been proven that the new is better. There are those in the system that have not as yet included more than one grade in the program after three years in the experiment. The fact that these principals meet together at regular times with the Assistant Superintendent, enables them to keep some sort of uniformity between the different schools.

Second, each school has representation by teachers on committees. The most important group to which the teachers send representation is the Curriculum Council. This body meets once each month. Each school has one representative teacher in the Council, and it is his responsibility to act in the place of all the teachers in his building, and carry to the Council any suggestions or recommendations made by the faculty of his school. He also has the responsibility of bringing back to his building a complete report of the Council meetings. The second place that the teachers are represented is in the Grade Chairmen Committees. Each school elects a chairman from each grade that they have in the program. These chairmen meet as a city-wide committee, all of the seventh grade chairmen forming one committee, eighth grade another, etc. These

committees meet once each month and discuss the program as it is being worked out in their respective schools. In some of the larger schools where one grade is divided into two blocks, each block has a chairman on the committee. In this case it is possible for that school to have two chairmen from each grade rather than just the one. This contact that the teachers have with one another helps to coordinate the work of the various schools. At least each school knows, from the reports brought back to the building by the chairman, what the others are doing. This is one of the best and most wholesome phases of the program from the standpoint of the teacher, as the chairmanship is passed around during the year so that many of the teachers have a chance to serve in this capacity.

Third, each school in the program is organized on the basis of blocks. A block is really a school within a school. Let us take for example one of the larger schools in the system and use it as an illustration. There are twelve sections of seventh grade, twelve of eighth, and twelve of ninth in this school. In scheduling, six of the sections in each grade are put in one block, and six in another. In this way there are two blocks of six sections each in each of the three grades, making a total of six blocks in the entire school. The purpose of grouping the sections into blocks is that one group of teachers can be assigned to each block, thereby making it possible for all

of the students in the same block to have the same science teacher, the same English teacher, the same social studies teacher, etc. This adds to the value of the program from the standpoint of both instruction and guidance, since the teachers, having the same students in common, will be able to discuss these matters more intelligently in the conference period.

Fourth, all of the schools provide a conference period for the teachers. This is handled differently in the various schools, due principally to two things: first, the size or enrollment of the school and second, the number of sections of the school in the program. In most of the schools the conference period is held the first thing in the morning before school. This seems to be the most popular procedure, and the one that will probably be used by all of the schools before long. This does away with a great deal of trouble in scheduling classes, and makes a more even load possible for all of the teachers in the building. All of the teachers are expected to attend this conference, although they may not all meet together in one group. In some cases the conference is broken up into small working units, usually on the basis of blocks, but at times into subject matter groups. The purpose of this conference period is to give the teachers a chance to plan their work together, so that they will avoid duplication and yet will cover the material adequately. It is in these conference periods that the

teachers of the various blocks set up their purposes and aims for the school, and their objectives for their work. Guidance problems are also discussed at this time. One of the main uses made of this period is in studying the source units and choosing possible problems from them that may be submitted to the classes for consideration. After the problem has been selected, the teachers can use this hour in setting up generalizations to be attained and evaluation instruments to be used. Some time is also given in this conference period for reports by the Curriculum Council representative and the chairmen of the different grades. In some schools where the load is not so heavy, or because there are few sections in the program, an additional period during the day is given to the teachers in the program to be used for individual or group work in planning and constructing teaching units.

Fifth, all of the schools use the same source units for the same grade. The teachers that have worked at the Progressive Education Workshops at Bronxville, Denver, and Chicago, have constructed source units for seventh, eighth, and ninth grades in the junior high school, and the tenth, eleventh, and twelfth grades in the senior high school. Besides these, there have been many source units constructed in the broad field courses in the senior high school, such as physics, chemistry, etc. It is not intended that these source units be used as courses of study and followed

page by page, but rather that they be used as a source of material to which a teacher may go when planning a problem to be undertaken. They are full of a wealth of material and any wide-awake teacher can get much help from them.

These are some of the features of the individual school organization. Although the organizations of all the schools are not exactly alike in every detail, they all have the same purposes or aims; and they are all striving for the one big objective, that of educating the youth of Tulsa so that they will be able to live more enjoyable and successful lives in a democratic society.

CHAPTER III

THE PLACE OF SCIENCE IN THE PROGRAM

A. Contributions of Science to the Development of Source Units

A source unit is not an outline of work to be done by a group of students over a certain period of time. It is rather a study, put down in written form, of a broad problem or topic to determine its teaching possibilities. The source unit may be used in planning a teaching unit, or it may be possible to use several source units in building a single teaching unit. The source unit may be used bit by bit in different teaching units throughout the entire year. It should be kept in mind that the source unit is only one source of information in selecting and formulating a teaching unit. The experiences of the pupils as well as those of the teacher should be utilized. A well equipped classroom will have a wealth of material in the form of books, magazines, visual aids, etc.

The source unit usually contains a statement of the broad problem with an analysis of it. This analysis should show the relationship between the problem and common problems of the pupils and of our society. This will establish the need for the problem or topic. The source unit should list the objectives of the problem under consideration and some of the possible outcomes of the study in relation to pupil conduct and growth. These outcomes

might be listed as habits and skills, attitudes, understandings, and appreciations. All of these will point to the desired behavior-patterns which it is hoped will be formed by the study of the problem. A list of generalizations which it is hoped will be formulated in the minds of the pupils during the study, is useful to the teacher, and should be included in the source unit. In addition to this, a source unit should contain a list of possible activities and experiences which can be used to aid the teacher to obtain the desired results with the pupils. There also should be a bibliography of helpful materials, and suggestions for evaluation.

The source units are to be used by the teacher and should not be considered as instruments to be used by the children. They are constructed for teacher use and are not written in such a manner that they will be of interest to the child.

The source units now in use in Tulsa were all constructed by committees of teachers and administrators while attending the various workshops during the summer. It so happens that in each case the science department of the city was represented. A brief list of some of the units now in use may help to show that they are highly adaptable to the study of science, and that science should have a large part in helping to develop them:

1. How I Can Make the Best Use of My Leisure Time - 7th Grade
2. How I Can Best Become Acquainted with My New School - 7th Grade
3. How Does Home Life Affect My Development? - 7th Grade
4. Individual and Group Adjustment to Our Environment - 8th Grade
5. How Man Used the Natural Environment in Providing the Necessities of Life: Food, Clothing, Shelter, and Recreation - 8th Grade
6. How Man is Changing His Environment and Adapting Himself to New Conditions - 8th Grade
7. How People Earn a Living in the Tulsa Area - 9th Grade
8. How We Protect and Care for the Life and Property in Our Community - 9th Grade
9. Exploring the Community - 9th Grade
10. How Can I Get the Most Out of My High School Experience? - 10th Grade
11. How Do We Make Up Our Minds? - 10th Grade

It can readily be seen that the science department has much to offer in the study of these source units, especially in grades eight and nine. Tulsa did not have a regular course of science in the seventh grade until the introduction of this program, and now it is taught in this

grade in only a few of the schools. As it is used now, the course is based upon the study of the home and the relation of science to it. This is primarily a study of health and personal hygiene. The eighth grade has long been used for the study of general science. It is quite apparent how well this subject would tie in with the source units listed for that grade. Here the science teacher has the whole of the universe for his field of exploration. What teacher could not present an enjoyable and useful program of experiences and activities with such a rich field as a basis? The ninth grade is equally rich in opportunities for the science teacher, as he leads his class in the study of the community with all its wealth of material on health, safety, utilities, industries, recreation, etc. The three source units now in use in this grade give a conscientious teacher a great opportunity to help the pupils to solve some of the most vital problems that they will encounter during their entire secondary school life. The source units for the tenth grade are built for the most part around the social studies. The science implications are few, due to the fact that the study of science is not included in the block in the senior high school. Here the student begins to specialize in his study of science. He must choose two years of science out of the three spent in the senior high school. This choice may be, biology, chemistry, physics, physiology and

psychology, geology, or geography. This is in keeping with the conviction that the program should be general in the lower grades of the secondary school, but as the pupil advances the general education block should be lessened, and the pupil given a chance to select his subjects or to specialize in the field that has become attractive to him. Many senior high school teachers have developed source units in their particular subject. These are called source units for broad field courses. Others are working on some units at the present time. By the fall of 1940 many of these source units should be in use in the science classes in the senior high schools.

The source unit is not a permenent instrument. It is undergoing continual change. After use during the year, the suggestions and criticisms made by the teachers who used it are collected, and a revision of the source unit is made during the summer. As an example, the three source units for the eighth grade were constructed in the Rocky Mountain Workshop in Denver in 1938, and two of them were revised at the same workshop last summer. There are a number of Tulsa teachers attending workshops this summer and working on the revision of source units.

B. Contributions of Science to the Development of Evaluation Instruments

In developing the program in Tulsa, less emphasis has been placed upon this phase of the work than upon the construction of the source units. During the development of

the source units tests were worked out to some extent to cover the work expected in those units, but this was meager and there is a definite need for more work along this line. One of the first efforts toward the building of evaluation instruments was the formation of a committee in the year 1937-38. This group of teachers and administrators met each afternoon for one week with the leaders in the field of evaluation from the Progressive Education Association. At this time several instruments were formulated which have been used to a great extent, and with good results, in the secondary schools. This evaluation or testing has been done principally on the senior high level. The teachers on this committee were chosen from the various fields and no effort was made to make the tests applicable to any one subject-matter field. These tests were built around general topics and can be used in any school to test the child's ability to analyze, his ability to interpret data, or his ability to apply a principle. These tests fall principally into the following groups:

A. Application of Principles

B. Interpretation of Data

C. Attitude

D. Questionnaire

There were science teachers represented on this committee and they contributed materially to these tests by

their efforts and suggestions. Some of the teachers that had an opportunity to work in this group have used the knowledge and skill gained to construct other tests since that time. Some of these tests are now being used throughout the system.

During the summer of 1938 in the Rocky Mountain Workshop in Denver, a number of the teachers who represented Tulsa did some work on tests, although the principal job to be done at the workshop was the construction of source units. These teachers had to work independently and at such times as they were not called upon to meet with the groups on source units. In spite of this handicap under which they worked, they did a good job, and as a result Tulsa now has several more tests available.

Perhaps the most important step that has been taken by the school in the development of evaluation instruments was the sending of a group to Chicago during the summer of 1939. The workshop in Chicago was divided into two parts and one of these was concerned entirely with evaluation. Tulsa sent four representative teachers to this evaluation workshop. The work of this group was to build new instruments, revise the old ones, and to learn the technique of interpreting the tests after they are given. On their return, this committee met with the teachers in the various buildings and instructed them in the use of the instruments. As a result of this instruction, a new interest in

evaluation has been stimulated. During the past year, additional teachers have worked individually on the construction of such instruments, principally as they applied to the problems in their own respective buildings. This is a beginning from which a great deal of good may come.

The group of teachers sent to the Chicago Evaluation Workshop from Tulsa brought back a list of recommendations from which the following is quoted: that, "an Evaluation Council be organized to cooperate with the Curriculum Council."[1] This has not as yet become a reality, but if it does, it should aid materially in building a more adequate testing program for Tulsa.

Thus far the science department has done relatively little to develop evaluation instruments for the testing of material presented by the science teachers in the various buildings. There have been individual science teachers working on tests of their own, but these tests have not been printed and made available to the other science teachers in the city. The science department was represented on the committee that worked in the Evaluation Workshop in Chicago during the summer of 1939 and, as has been said, has been represented on all groups working in Tulsa on evaluation instruments.

In concluding this chapter, the writer wishes to quote from a source unit for the eighth grade in the Tulsa Schools:

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[1] Recommendations of the Evaluation Interpreters, Chicago Workshop, July 20, 1939.

> Evaluation should not be left until last but should be a vital part of the teaching process in every phase of the work. An evaluation program is necessary in order to discover the points at which difficulties are encountered so the modification or revision of the curriculum may be made. It is important to discover the effective aspects of the program which help boys and girls to develop rich and many-sided personalities, to practice the scientific method of thinking and problem solving and to develop toward mature participation in our democratic society. In order to measure pupil growth in those personal characteristics which are requisite for desirable behavior it is necessary that we have evidence concerning their growth toward such objectives as: functional information, attitudes, appreciations, social sensitivity, clear thinking, work habits and study skills, interests and purposes, and social adaptability.[2]

On the following pages are presented samples of two types of tests now being used in the General Education Program in Tulsa.

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[2] Source Unit - How Man Used the Natural Environment in Providing the Necessities of Life: Food, Clothing, Shelter, Recreation, for Eighth Grade Classes in the Tulsa General Education Curriculum, August, 1938, p. 74.

Sample Test

Application of Principles

Problem I. James finds a new notebook full of paper. There is no name or other identification marks on the book.

DIRECTIONS: Below are three conclusions - a, b, c. Choose the conclusion which you believe is most consistent with the facts given and the most reasonable in accordance with whatever knowledge you may have. On the line to the left place an (x) before the conclusion thus selected.

CONCLUSIONS

____A. He should return the notebook to the lost and found.

____B. He should keep the notebook and use the paper, as if it were his own.

____C. He should advertise the finding of the notebook but it would be all right to use it until it is claimed.

Directions: Which of the following statements would you use to explain or support your conclusion? Mark those statements by placing an (x) on the line to the left.

Reasons

____1. The carelessness of the owner in not marking his property entitles the finder to keep it.

____2. The school rules specify that all articles found must be turned in to the lost and found bureau.

____3. Inserting a notice in the school bulletin is sufficient effort on the part of the finder.

____4. The finder was unobserved when he made the find.

____5. Carelessness by the loser places no responsibility on the finder.

____6. You should do unto others as you expect to be done by.

A Source Unit on Individual and Group Adjustment to Our Environment, for Eighth Grade General Education Classes, Tulsa, Oklahoma, Summer, 1939, p. 45.

GENERALIZATION TEST

A generalization is a statement which combines the truths found in several other statements. This is a test to find out your ability to draw sound generalizations from definite statements. You are given below a list of statements concerning food, shelter, and clothing. Read the statements carefully and then follow the directions on the accompanying sheet.

1. Sod houses were common on the treeless plains of western Kansas and Oklahoma during pioneer days.

2. Garments made of fur are popular in Greenland.

3. In the upland area of Brazil there is produced more coffee than in any other region in the world.

4. Gas is commonly used to keep the houses in Tulsa warm in winter.

5. Many beef cattle are raised on grassy plains.

6. Natives of the tropical Amazon Basin usually leave the upper part of the body uncovered.

7. Many families in Ireland cook their food and heat their houses with peat dug from near-by peat bogs.

8. Log houses are common in the forest covered mountains of Kentucky and Tennessee.

9. The people of Norway and Sweden use many woolen materials during the long cold winters there.

10. Rice is grown in the warm regions near the Gulf of Mexico in Texas and Louisiana.

11. Coal is the most commonly used fuel in Pennsylvania.

12. Many frame houses are found on the wooded slopes of the Cascade Mountains in Washington and Oregon.

13. The people of Iowa wear cotton in the summer and wool in the winter.

14. The Plains Indians of early days burned "buffalo chips" for cooking and heating.

15. Many houses in Arizona are built of adobe, a clay common to that region.

16. Spring wheat, which will ripen during short summers, is grown in Canada.

17. Most people of our Southern States wear cotton fabrics.

18. The Eskimos live in ice igloos during certain seasons of the year.

19. Many people in the well-wooded Appalachian Highlands burn wood for fuel.

20. The Corn Belt extends through Iowa, Indiana, and Illinois, where the days are hot and the rainfall is plentiful.

Below are some possible generalizations concerning food, shelter, and clothing in relation to soil, climate, and other factors which could be drawn from the statements. Some of the generalizations given below are not true and have no statements to support them. Place check mark (V) before each generalization that you think can be drawn from the statements. After each true generalization write the numbers of the statements that support it. Be sure that each statement you check can be drawn from the list of statements above.

1. Climate plays an important part in determining the kinds of clothing people wear.
   (Based on statements numbered _____)

2. Cotton is grown in every state in the United States.
   (Based on statements numbered _____)

3. The food products of a region depend largely on the surface, soil, and rainfall of the region in which they are produced.
   (Based on statements numbered _____)

4. The raw materials easily available are important in determining the kinds of houses people live in.
   (Based on statements numbered _____)

5. The Dust Bowl is a forested region.
   (Based on statements numbered _____)

6. The natural resources of a region are important factors in determining the kind of fuel used for heating and cooking in that area.
   (Based on statements numbered _____)

Final - After the test has been completed, checked and discussed in class, write a generalization in your own words, that will include all the correct generalizations given above.

Source Unit - How Man Used the Natural Environment in Providing the Necessities of Life: Food, Clothing, Shelter, Recreation, for Eighth Grade Classes in the Tulsa General Education Curriculum, August, 1938, pp. 79-80.

CHAPTER IV

METHODS AND PROCEDURES IN SCIENCE INSTRUCTION

A. Use of Source Units, and Other Materials

In order to do an efficient piece of work in instructing the pupils, the teacher must have the proper equipment in the classroom. A properly equipped science room is absolutely essential in any situation where effective teaching is desired, but in a program where a great deal of freedom is given the boys and girls in using their own initiative in forming the activities and discussions in which they will engage, it is felt that the physical equipment and reading materials must be more varied than under the traditional type of classroom situation.

It is essential that the teachers become familiar with the source units for the grade with which they work. The source units in Tulsa are mimeographed and distributed to the teachers. It is possible for the teachers to procure copies of all of the source units from grades seven through the senior high school. In this way they may become familiar with the work that the pupils have covered previous to reaching them, and also be able to better prepare the pupils for the work to follow. The copies of the source units for their particular grade must be in constant use by the teachers if the best work is to be accomplished by the study. Most teachers have their copies

punched and keep them in a loose-leaf notebook. In this way they are always in order and easily used.

The multiple-text plan is used in the General Education classes. In this plan the class has one text which it considers the basic text and then several others that are used as supplementary texts. In some of the science classrooms as many as seven or eight different textbooks are used. The purpose of this plan is to furnish as wide a field of available material as possible to the pupil as he searches for the solution of the problems that are selected. Each teacher is responsible for the selection of the books that are used in his classroom, and it is his task to see that these textbooks do not duplicate each other too much. A great deal of work is necessary upon the part of the teacher in teaching the pupils how to use so many books effectively and efficiently. Otherwise, the pupil will become lost in his search for the solution of his problem.

In connection with the multiple-text plan many of the science teachers use a part of the funds available for books in the purchase of single copies of good books pertinent to the problems which may arise from the study of the source units. In this way good sized private libraries have developed in several of the individual science rooms.

Although the use of the dictionary is taught in the English class, it becomes necessary for the pupil to use it constantly in his work in science. Therefore, it is essential that a good unabridged dictionary be available in every science room if the student is to receive the most good from his work.

Another valuable source of reading material is the current magazines. There are any number of good magazines adaptable for use in connection with the work in science, and often some of the best material to be found on a problem comes from the magazines in the room. Due to their recent publication the material found in the magazines is more recent and up to date. Care should be used in the selection of the magazines to be placed in the classroom, but with the proper consideration and choice, current magazines can be made one of the most valuable aids of the teacher. There are cases in Tulsa where as many as fifteen or twenty different magazines are used.

There are many companies that will gladly send free material to any teacher desiring them, and others that have material for which they make only a nominal charge. A good teacher will take advantage of this source of material for it helps the student a great deal in many cases.

All of the above mentioned reading material should be arranged in an attractive manner and located in the

room where it will be easily accessible to the pupils. Material arranged in this manner will tend to stimulate the interest of the student and the teachers will find that it requires less effort on their part in getting the pupils to use the material.

The science teacher in this type of program finds continual need for the use of physical equipment in the form of apparatus, chemicals, electrical supplies, etc. This is especially true in the physical science classes. In most cases in the junior high school, and to some extent in the senior high school, it is necessary that the teacher use these materials in presenting a demonstration to the class. This is made necessary by the large number of students in the classes. It is better, however, for the teacher to have the students perform the demonstrations whenever it is possible to do so. This can be done by having individual pupil presentation or committee presentation. Many desirable demonstrations and experiments have been worked out and presented in class by the students in the various science classes in the city. Of course,in the regular classes in physics and chemistry the students are furnished the materials and most of the work is done individually, supplemented by teacher lectures and demonstrations.

B. Formulation and Presentation of a Teaching Unit

1. Problem-Solving Method Used

Education should be concerned with helping the child meet his present problems and it should be so organized that it meets the pupils' needs at the present time. The program should be such that the pupils will enjoy it and gain a maximum amount of satisfaction from taking part in the activities. On the other hand it should not be mere play. The pupils should be made to feel that the activities engaged in are worthwhile endeavors which will prove of value to them both at the present time and in the future.

It is felt that the source units adopted for use in the Tulsa Schools are broad enough in their scope to challenge the thinking of the students. From this material it should be possible to choose large problems which will be of vital interest to the majority of the pupils and will cause them to want to explore the problem for possible solutions. Tulsa has set up certain criteria for the selection of problems to be used in the secondary schools. These were approved in October, 1937, and are still in use. The following is the list of criteria as chosen.[1] The problem should

1. Grow out of the interests and needs of the pupils.
2. Be common and recurrent in the lives of large numbers of pupils.
3. Provide integrating experiences for pupils.

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[1] Building a Core Curriculum in the Tulsa Public Schools, Tulsa, Oklahoma.

4. Provide a variety of experiences suited to pupils of different abilities and needs.
5. Aid pupils in developing socially desirable behavior patterns.
6. Contribute to a continuous growth in knowledge and understanding which will enable pupils to cope successfully with the issues and problems encountered both inside and outside of school.
7. Be such that materials and facilities can be made available for teachers and pupils.
8. Permit a large degree of planning by the pupils as a group, by the pupils with teachers, and by pupils working alone.
9. Be suited to the maturational level of the pupils who are to develop them.
10. Be of sufficient range and scope that it justifies consideration by pupils and teachers.
11. Permit creative and pupil initiated work on the part of individuals.

This is the theory behind the problem-solving method in use at the present time. During the course of the year each grade engages in the study of perhaps three or four large or main problems. These problems are broken down into smaller sub-problems in each class that the students attend. In other words, from the same large problem the students will formulate several sub-problems in

science, another set of sub-problems in English, and still another set in social studies. This is possible because the large problems chosen are such that they have implications applicable to the various subject-matter fields. It is then the duty of the teacher of a subject, say science, to work with the pupils for the solution and evaluation of the sub-problems chosen for study in that subject. At the end of a unit or problem the pupils have a pretty concise picture of the problem from all angles, and are then ready to formulate some individual generalizations drawn by them from their study. It is not asserted by the Tulsa Schools that this is the best procedure. It is felt that it is only another way of doing the same thing that good educators have always tried to do, but it does seem that it has possibilities and is worthy of consideration.

2. Pre-Planning by Teachers

Many people have a mistaken idea of an activity program such as this one. They feel that there is not enough control of the group by the teacher in charge. Many people feel that unless there is silence in the classroom there is a let down in authority on the part of the teacher, but this is not necessarily so. There can be constructive work being done in a room that to the outsider seems noisy. It is noisy, but what industry does not have some degree of noise when work is being done? There is a good chance for the student to get out

of line and loaf unless the teacher is on guard against it. Therefore, it takes a capable teacher to handle this type of program efficiently. It also takes a great deal of planning on the part of the teachers in preparing themselves in order to adequately approach the class with a problem. Time is given to the teachers out of the school day in order that they may meet together and plan their work. The teachers also spend a great deal of time in preparing for their work, outside of school hours. The teachers choose the large problem that is to be used as a basis for study in all the classes. This is done only after much discussion on the part of those teachers involved in the study, and after weighing the suggested problems in the light of the foregoing criteria. This choosing of the large problem by the teachers is justified upon the ground first, that it will save much valuable time in the classroom, and second, that the pupils must have a problem for consideration which will be of interest to a majority of the group. This would be a hard thing to find by classroom discussion. After deciding upon the statement of the large problem, the teacher's next concern is material which can be used by the pupils. This should be prepared ahead of time by the teachers in order that they may guide the pupils more intelligently in their work. The teachers should have formulated ahead of time a list of the possible generalizations to be

arrived at by the students in the study of the problem. This list should be kept from the students, and should be used to help the teacher in guiding the group. Some form of evaluation of the problem is desirable before the teacher approaches the class, although it may be revised or changed entirely during the study of the problem.

Sections one and two in the second part of this chapter have had little to say directly about the science instructor. This is due to the fact that the work discussed under these two headings, problem-solving method and pre-planning by teachers, is a cooperative process of all of the teachers in the block working together in the formulating of problems to be used. In the next section, that of teacher-pupil planning, more mention will be made of the method used in relation to the science classroom situation.

3. Teacher-pupil Planning

The pupils in the individual classrooms are given a voice in the procedure to be followed. They have a voice in the formulating of the sub-problem, in suggesting purposes for the study, and in determining to some extent the activities to be engaged in by the group. This procedure is called teacher-pupil planning and it is one of the most important parts of the program.

After the science teacher has submitted to the class the statement of the source unit and also the statement

of the large problem which has been decided upon, an opportunity is given to the class for discussion of the problem with consideration of the possible sub-problems that could be developed from it with reference to the science implications. From this discussion, a large list of problems is compiled. Since the average science teacher in Tulsa teaches six different groups of students it is necessary that he approach each group in the same manner, letting each group formulate their list of possible problems. These class lists are then compiled into one large list and the groups begin the consideration of them. Of course, it is not possible to attack all of the problems that are suggested, so it becomes necessary to decide upon those that are most desirable. The classes must sort, classify, and eliminate, and in this way they bring into action cooperative planning, critical thinking, and the exercise of judgment. All of these are worthy objectives in education. After the desired sub-problems have been decided upon they are listed upon the board and usually left until the completion of the problem. Following are some examples of the results obtained from teacher-pupil planning in the science classes of the eighth grade in the Roosevelt Junior High School:

Source Unit - Individual and Group Adjustment to Our Environment.

Large Problem - How Can We Get the Most Out of Our Everyday Experiences?

Science Sub-problems - What Factors Contribute to a Successful Life?

A. How does a healthy body and mind contribute to success?

B. How can we build a healthy body and mind?

Source Unit - How Man is Changing His Environment and Adapting Himself to New Conditions.

Large Problem - How Has the Machine Age Influenced the Progress of Man?

Science Sub-problems - 1. What effect has the simple machine had on the development of the modern machine?

2. What use has man made of natural resources in the construction and operation of machinery?

3. How have recent inventions and discoveries helped in the development of machinery?

4. What has led man to use different types of power in his machines?

5. How has the invention of machinery influenced transportation and communication?

The next step in classroom procedure is the consideration of available materials in the science room. The pupils are given as much time as the teacher feels is needed to look through the textbooks, magazines, supplementary books, etc., for all material pertaining to these sub-problems. Each student keeps a copy of his own bibliography in his notebook for future use. In some cases the teacher compiles the bibliography of the class by using a committee of students for this purpose; this then is given to each person in the room.

Many of the teachers discuss with the pupils the objectives which the pupils hope to attain through the study of these sub-problems. These are listed on the blackboard or on a chart and are left where the students can refer to them during their study. Still other teachers discuss with the students desirable behavior patterns and assist the students in setting up those that they hope to establish by the study of the problem.

It is felt that this phase of the program in Tulsa is one of the most important in that it develops a wholesome relationship between the teacher and pupil and makes the pupil feel that this is his program because he has had a part in developing it.

In connection with section two on pre-planning of teachers, it was stated that the teachers set up or decide upon the large problem to be studied by the classes.

This was justified upon the grounds that it would save time in the classroom. The following is the result of the effort of one teacher in working with five groups in deciding upon the large problem to be used.

The time spent upon this effort was four days. Dealing with five classes each day it took a total of twenty hours of school time to arrive at the adoption of a problem that seemed to be most desired. The process used was this: Each class discussed the title of the source unit and tried to decide upon the meaning of it in relation to themselves. Each group was then asked to list on the blackboard some large problems which were of interest to them and could be included under the title of the source unit. After each class had made its contribution, independently of the other groups, the list of problems suggested by all groups was compiled and placed on the board for consideration. The classes voted upon the problems independently of each other and the final tabulation of the vote at the end of the day was placed upon the board. In this case there were two questions which seemed to receive a large number of votes and since they were so close it was decided to vote between these two. The results showed:

Suggestions for a problem to be used by the General Education Classes in Roosevelt Junior High School in Tulsa.

1hr	3hr	4hr	6hr	7hr	Total	
4			4	2	10	1. How has machinery changed the world?
	4		2	3	9	2. In what ways has machinery changed the living conditions of man?
1		1		2	4	3. How does transportation and communication help man?
	1	1		7	9	4. How does different machinery help man provide his daily needs?
3	7	2	28	2	42	5. How have recent inventions and discoveries helped man?
5			2	1	8	6. How has modern machinery helped man's living conditions?
22	15	28	1	13	79	7. How has the machine age influenced the progress of man?
				2	2	8. How has modern man improved his inventions?
		3		1	4	9. How does the manufacture of machinery help to improve our way of living?
				1	1	10. What effect does communication have on the world today?

On the final vote between numbers 5 and 7 the majority of pupils decided in favor of 7. The exact vote in this case is not available.

4. Development of Activities Related to Problem

First of all, the activities engaged in must be purposeful. An activity without a purpose is a waste of time on the part of both the teacher and the pupils. Activities should be directed by the teacher. This does not mean that the teacher should become a dictator, but rather should make himself a member of the class. He should act as a guide. The activities should be of such a nature that they appeal to the pupils and should arise from pupil interest. Activities that are teacher-motivated rather than pupil-motivated will fall short of the desired goals.

This part of the procedure might have been included under the heading of teacher-pupil planning for it brings into play the cooperative effort of the teacher and the pupil. During class discussion the science teacher should try to lead or guide the pupils in their thinking, so that they will suggest many good, purposeful activities for the group. These should be listed and evaluated to determine their suitability to the problem under consideration. The material and equipment available should be considered before the final activities are decided upon by the group.

Activities fall generally into two groups. Those that have to do with a group of students and those that must be worked out individually. Some of the types of activities that should come under the heading of "group activities" are:

Excursions to plants and industrial centers

Excursions to the airport, weather bureau, parks, etc.

Panel discussions

Debates

Committee reports

Moving pictures

Committee participation in work on posters, scrapbooks, etc.

Some of the activities that should be considered as "individual activities" are:

Reports (written and oral)

Experimental demonstrations

Posters

Charts and graphs

It is necessary to include a variety of activities in the teaching unit while it is being formulated for there are many types of individuals in the classroom and there should be an opportunity for each child to engage in some activity to his liking and his capability.

After the class has selected the activities which they feel will enable them to best attain their objectives (and it is not necessary that each class have the same activities), it then becomes a cooperative enterprise between the teacher and the pupils in finding the materials and working out the activities that will help in the solution of the problem. The teacher must keep continually in mind that he is a guide for the group and should be

ready at all times to aid the students in their work. This may take the form of lectures if a number of the group are having the same difficulty, or it may be that his services are required in helping a single student in some phase of his work. Whether it be one or the other of these the teacher must remember that the success or failure of the program is upon his shoulders, and it is up to him to see that the greatest amount of good for the greatest number of people is secured.

5. Measurements

There must be some form of measurement of results in any undertaking. It therefore becomes necessary that the science teacher adopt some form of evaluation to use at the end of each problem. It has been stated before in this thesis that the teacher should have some type of evaluation instrument prepared before the problem is begun, even if that instrument needs to be revised or entirely made over during the study of the problem. Many of the science teachers have adopted some form of objective test, either the true-false, multiple choice, or completion. These are very good and serve the purpose well if they are well prepared. Of course, this depends upon the ability of the teacher. Another means of testing is the giving of a "generalization test" a copy of which is included in Chapter III. All generalization tests are not alike, but they are all modifications of

the one mentioned. Some teachers ask the pupils to formulate and write out a number of generalizations at which they have arrived from the study of the problem. Both of these types of tests are used for the testing of factual information. There are those teachers that not only want to test for results in informational knowledge but also like to test for attitudes. They want to see if the students have improved any in cooperation, independent thinking, dependability, fair play, or any of dozens of objectives that may have been set up by the group. Many of these tests are now in use in the science and other classrooms in Tulsa.

The degree of success of testing or measurement is in proportion to the ability of the teacher to construct suitable tests and the amount of enthusiasm that he puts into his work.

Following this page there is inserted a copy of a teaching unit in science from the Roosevelt Junior High School. In reading it, it must be kept in mind that the generalizations listed under each sub-problem were for the teachers' use only and were not seen by the pupils. The title of the source unit, the statement of the large problem, and the statements of the sub-problems were kept on the blackboard during the entire study of the problem. The activities as listed were suggested by the pupils during the teacher-pupil planning period, and were approved by both the teacher and the class. The bibliography

was worked out by the cooperative effort of the teacher and class, and compiled for listing by a committee of four students. A copy of the evaluation instruments used on this unit are not available.

SOURCE UNIT - HOW MAN USES THE NATURAL ENVIRONMENT IN PROVIDING THE NECESSITIES OF LIFE: FOOD, CLOTHING, SHELTER, RECREATION.

OBJECTIVES -

1. Cooperation
2. Use of essential skills
3. Independent thinking
4. Dependability and self-direction
5. Respect for the opinion of others
6. Ability to use problem-solving method
7. Ability to organize and plan
8. Ability to evaluate

MAIN PROBLEM - How Does Modern Man Provide and Use His Food Supply?

SCIENCE SUB-PROBLEMS -

1. What part has machinery played in the production and preservation of food?

   GENERALIZATIONS:

   1. Machines preserve food by control of temperature.

   2. The machine has decreased man's labor in producing food.

   3. The machine has increased the quality and quantity of man's food supply.

   4. Methods of canning and packing are constantly being improved by mechanical invention.

2. How does refrigeration help in the transportation of foods?

   GENERALIZATIONS:

   1. There are certain organisms in food which cause decay and can be controlled by heat and cold.

   2. Science has discovered and improved processes by means of which it can control the growth of organisms which cause decay.

3. How does soil and climate help in the production of food?

GENERALIZATIONS:

1. There are different types of soil which control the growth and development of plants.

2. Many natural forces help in the formation of soil.

3. Man has learned to change his soils to serve his needs, by the addition of other materials.

4. Climate is caused by elevation of land, the movement of the earth, and the earth's relation to the sun.

5. Climate determines the types of food which can be raised in certain regions.

4. What part has science played in the improvement of fruits and vegetables?

GENERALIZATIONS:

1. Improved varieties of food have been obtained by scientific experimentation.

2. Scientific methods have enabled man to grow fruits and vegetables out of season and out of their natural habitat.

ACTIVITIES:

1. Trip to a refrigerator sales room by a committee of students. (the students making all arrangements themselves)

2. Trip to a cold storage plant. (all plans to be made by students)

3. Interviews:
   a. Refrigerator salesman
   b. Employee of cold storage plant
   c. Local store manager on meats and fresh vegetables.
   d. Railroad (car refrigeration)
   e. Nurseries (on grafting)
   f. Farmer (on care of soil, crop rotation, etc.)

4. Oral and written reports on interviews and trips.

5. Study and make drawings of refrigerator or ice box in their home. (used for class discussion)

6. Collect pictures of machines which have helped man produce his food, and make small scrap-books.

7. Posters of material studied, both original drawings and pictures cut from magazines.

8. Laboratory experiments.
   a. Place a small piece of meat or vegetable on a plate and leave in air, compare with piece left in the refrigerator the same length of time.
   b. Cool water with ice and then super-cool by addition of salt.

9. Reading from textbooks.

10. Motion pictures on food and refrigeration.

EVALUATION:

The tests given over this unit were of two types: first, a combination of the various types of objective tests, and second, a generalization test.

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C. Evaluation

Considerable mention has been made of this topic previously. It was discussed in Chapter III in dealing with the contributions that the science department has made to the development of evaluation instruments.

Tulsa now has on hand a number of good instruments for use in testing, but a need is felt for much more work along this line. At the present time there has been a great deal of interest shown by the classroom teachers in the construction of such material, and there have been some instruments constructed by the teachers for use in their own schools that have not been made available to the other teachers in the system.

Most of the instruments thus far published have been general in their content, but it is hoped that as other teachers build instruments, more emphasis will be placed upon the various subjects with which they work. Many of these should be finished and ready for use during the year 1940-41.

Tulsa has a very adequate testing program at the present time in so far as testing factual information is concerned. Its program is perhaps as good or better than testing programs in other cities of equal size. But in the General Education Program there is a feeling that there are other things which are of equal or greater importance in the development of the student and for which

he should be tested. These include attitudes; appreciations; understandings; and such personality traits as dependability, cooperation, fair play, leadership, etc. Tulsa has done relatively little along this line of evaluation. Actually only a beginning has been made. This is a weakness in the testing program of the city. This weakness is realized however, and the need for such evaluation is felt. As a result, the classroom teachers have taken a new interest in the construction of this type of evaluation instruments. In the near future Tulsa should have a wealth of available tests which will not only measure the mental ability of the individual, but will measure the development of the whole child.

CHAPTER V

SUMMARY AND CONCLUSIONS

The following conclusions may be drawn from a study of the material contained in this thesis:

First, since this is a new program in Tulsa, no conclusions can be reached as to its ultimate value. So far it seems to be of value in meeting the needs of the students in that it enables them to participate in purposeful activities, to use critical thinking in solving their immediate problems, and to develop correct social attitudes. For these reasons the program seems to merit continuation.

Second, the organization is more democratic in that it provides an opportunity for the teachers and the pupils to engage in the development of the program. Opportunities are also offered for the teachers to work on a city-wide basis in curriculum construction and evaluation techniques.

Third, the program provides for the close association of subject-matter teachers as they work together in the blocks of the various schools. Greater integration of all school subjects is provided in that, through conferences, teachers are better able to organize the program on a unified basis in the individual school.

Fourth, the program provides many unique features, such as the problem-solving method, pre-planning by the

teachers through conferences, teacher-pupil planning in the classroom, pupil participation in purposeful activities, and the evaluation of their own work by the pupils.

Fifth, the program is of value to the science teacher in that the source units adopted are rich in science implications, provide a wealth of purposeful activities to be engaged in by the pupils, and provide for differences in ability by suggested bibliography. This program should be of value to the beginning science teacher in that the source units suggest possible pupil problems and areas of investigation. The organization of the source unit is such that it enables the science classes to remain on a given problem for a longer period of time than was common under previous methods used in Tulsa. This program provides for the breaking down of the main problem into many minor problems, thereby simplifying the areas of investigation for the students.

Sixth, the testing program in Tulsa at the present time is very adequate for the testing of factual information. There is however, a need for evaluation instruments which will test other things which those in General Education feel are important. These include attitudes, appreciations, understandings, and such personality traits as cooperation, dependability, fair play, etc. The classroom teachers have responded to this felt need and work is being done on many such instruments which should be ready for publication in the near future.

Seventh, the program seems to be popular with both teachers and pupils. This implies that there is a justification for its present adoption by the Tulsa Schools.

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How Man Used the Natural Environment in Providing the Necessities of Life: Food, Clothing, Shelter, Recreation, for Eighth Grade Classes in the Tulsa General Education Curriculum. August 1938.

Individual and Group Adjustment to Our Environment, for Eighth Grade General Education Classes, Tulsa, Oklahoma. Summer 1939.

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