

**IN-SERVICE TRAINING OF SCIENCE
TEACHERS IN OKLAHOMA**

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By

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Bachelor of Science

EAST CENTRAL STATE TEACHERS COLLEGE

1936

Submitted to the Department of Secondary Education

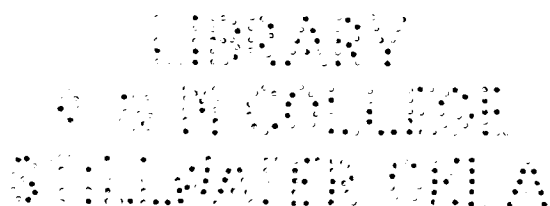
Oklahoma Agricultural and Mechanical College

In Partial Fulfillment of the Requirements

For the degree of

MASTER OF SCIENCE

1941



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ACKNOWLEDGEMENTS

The writer wishes to pay tribute to those unnumbered hundreds who have had a part in developing the efficient library system of today, and to those who so graciously administer its services.

The cooperation of those who assisted in this study by returning the questionnaires is appreciated.

Kindly acknowledgement is also given to Dr. Clarence M. Pruitt for his help with this work and his encouragement to further study.

O. M. S.

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CHAPTER I

INTRODUCTION

The purpose of our educational system is the training of a child so he can fit himself into a flexible social order with a minimum amount of adjustment. Consequently, teacher training institutions have the responsibility of helping prospective teachers develop their capacities as educators through sound training in academic subjects, and by instilling in them an appreciation of the philosophy and principles of their profession.

A study of the definition and distinguishing characteristics of a "profession" shows that the word implies a calling answered by someone who has broad training, and yet sufficient specialization to offer service to his society. A delimiting characteristic of a profession, and one with which this study is particularly concerned, is that continuous study and growth are required if the one who professes a specific knowledge and mastery of skills is to be efficient in his field long after his pre-service training period.

In the field of teaching school, this continued self-improvement is necessary because a dynamic society repeatedly formulates a new philosophy of education, or, at least, approves new methods of achieving educational goals which are accepted as desirable.

If a teacher training institution is truly interested in the maximum growth and development of its students, it will not feel that its responsibility ends with the granting of a diploma. Too often this responsibility is resumed only intermittently as the student comes back to a summer session. Such institutions should look upon their relationship to those to whom they give degrees, as one of continuous service, and develop truly professionalized teachers if they expect to continue receiving the confidence and support of the American public, for the essential significance of a teacher is destroyed when his knowledge and skills fail to have social value.

The task of training educators is shared by teachers colleges and by departments of education in universities and other institutions of higher learning. These agencies are not in complete agreement with each other on matters of content requirements and methods of training. However, the importance of continued training of teachers in service is being recognized, and increasing emphasis is being placed on this method of teacher improvement. Requirement by state laws for periodic attendance at colleges as a prerequisite to advancement on the salary scale, and the requirement of a probationary period in some school systems are evidence of the accepted importance of continued teacher growth.

Some teacher-training centers have made valuable efforts to keep in touch with graduates by sending supervisors to them on the job and encouraging them to report to their major

department just how the theories learned there work out in practice. Such practices could profitably be made more general.

The present United States Commissioner of Education, J. W. Studebaker, emphasized the importance of teacher training in service in these remarks:¹

....teachers require the help of systematic plans for training in service, to assure continued growth. The question is not so much how good the teacher is when he enters the school system. Rather the question is how much better has the teacher become each year of his teaching. Only by ingenious devices of in-service training can schools help teachers to keep their minds alert and growing.

In-service training is being directed at shortening the time between the agreement on principles of in-service teacher training by leaders in educational investigation and the application of these findings by administrators and classroom teachers. A great change in the service of our schools would be noticed if all of the schools could be brought to the level of the best schools.

In a teacher training program the incidental development of a few teachers on the school faculty is not adequate. A program of in-service growth should be an organized, planned procedure with the whole staff of teachers, supervisors, and administrators participating. There should be a system of teacher rating which would stimulate self-criticism and

¹J. W. Studebaker, "To Achieve the High Purposes," School Life, 25:65, December, 1939.

improvement. A rating scale which is used only as a basis for promotion and demotion of teachers is of little value to the faculty in general.

In an attempt to improve their qualifications teachers too often pursue college courses with the limited purpose of broadening or adding teaching fields, when there is still needed emphasis on educational principles and methods. While taking summer school or extension classes experienced teachers sometimes recognize and appreciate material which was previously presented to them in undergraduate courses. At the earlier date they saw no significance in the subject matter discussed because they saw no practical application of it.

Advanced training should encourage a teacher to accept new challenges, such as sponsoring clubs, and writing scientific or professional articles. The teacher's concept of education should be extended and he should look for some means whereby he might make a contribution to his field.

It is unquestionably accepted by leaders in the field of education that training of teachers in service by scientific, well-planned procedure is an outstanding need. Some of the principles of such a program have been discussed in this introductory chapter.

Previous Studies

That much study is being done on the subject of in-service training of teachers has already been stated in this introductory chapter. Some of the principles of a good program have been listed by leaders in education but hardly any

work has been done with reference to a particular teaching field. In the state of New York (outside of New York City) a questionnaire study has been conducted to determine qualifications of science teachers, the knowledges and skills used by them, where improvement is believed needed, and means considered best for supplying this needed education.²

Professor Haupt, State Teachers College, Glassboro, New Jersey, has written an article pointing out the need of a training program for science teachers.³ He states that even the small schools are being affected by the extensive study that has been made on the importance of in-service training. However, Haupt emphasizes need for specific study.

The science department of the State Teachers College at Glassboro, New Jersey, is exploring such specificity and has set up a training program with these five distinct services:⁴

- (1) the demonstration lesson
- (2) supervision of teaching
- (3) consultation
- (4) teachers' organizations and meetings
- (5) extension courses

²John F. Hummer, "In-Service Training of Teachers of Ninth-Year Science in New York State Outside of New York City," Abstract in Curtis' Third Digest of Investigations. 1939, p. 365.

³G. W. Haupt, "An Attempt at Specificity in an In-Service Program of Education for Teachers of Science," Science Education, 25:142-3, March, 1941.

⁴Ibid., p. 142.

In a committee report to the National Society for the Study of Education, S. R. Powers discussed a study of the training of science teachers in state teachers colleges.⁵ This study was limited to academic, pre-service training.

In 1932, Griffin made a study of the professional status of secondary school teachers in Oklahoma.⁶

The status of science teachers in the small and large secondary schools of Oklahoma has been studied and reported by Payne⁷ and Smith,⁸ respectively.

Garretson⁹ and Hagar¹⁰ have made a study of the general in-service training of teachers in Oklahoma.

On summarizing previous studies it is found that much

⁵National Society for the Study of Education, Thirty-First Year Book, Part 1. "Program for Science Teaching." 1932.

⁶N. D. Griffin, "The Professional Status of Secondary School Teachers in Oklahoma," Unpublished Master's thesis, Department of Education, Oklahoma A. and M. College, 1932.

⁷J. W. Payne, "The Status of Science Teachers in the Small Secondary Schools of Oklahoma 1939-40," Unpublished Master's thesis, Department of Education, Oklahoma A. and M. College, ____.

⁸A. F. Smith, "The Status of Science Teachers in the Large Secondary Schools of Oklahoma 1939-40," Unpublished Master's thesis, Department of Education, Oklahoma A. and M. College, 1941.

⁹O. K. Garretson, "In-Service Training of Teachers in High Schools in Oklahoma," School Review, 39:449-50, June, 1931.

¹⁰W. E. Hagar, "In-Service Training of Secondary Teachers in Oklahoma," Unpublished Master's thesis, Department of Education, Oklahoma A. and M. College, 1932.

remains to be done with respect to the formulation of a definite program for in-service improvement. All available studies point to the inadequate in-service teacher training programs now in operation. As a result of this limitation there is a lack of definite procedures.

Purpose of This Investigation

Before a working program for the improvement of science teachers now employed in our high schools, and for those of the future, can be formulated, a picture of the nature and extent of some of the major existing practices affecting their continued growth is needed. This study proposes to provide this information, and evaluate the findings in the light of existing standards and expert opinion. Particular reference has been given to, (1) continued academic training through various agencies, (2) teacher participation in professional meetings and organizations, and (3) travel and educational reading.

An attempt has also been made to ascertain what deficiencies are felt by the teachers as they apply their factual knowledge and their understanding of methods to the problems of science teaching.

Method of Procedure and Limitations

In order to obtain the information which was necessary before the purpose of this investigation could be realized a contact with the individual teachers was imperative. It is accepted that personal conference is more valuable as a method of securing data from individuals than the use of a

questionnaire, but the infeasibility of the former method necessitated the use of a questionnaire.

The value of the questionnaire as a method of research has been the topic of much discussion by writers in that field. In defense of this "checking list" method a statement is given here from one of the most extensive manuals dealing with the questionnaire and its use in educational research.¹¹

One who undertakes serious and well-considered investigations by questionnaire is typically rewarded by an acceptable proportion of sincere and well intended response.

In a study of 143 questionnaire investigations Koos found,¹²

....the astonishing fact ... is the almost negligible proportion which could have originated in any other method of investigation.

Because of the nature of the present investigation it is evident that the questionnaire method of securing data was the most practical. A copy of the check list used is placed in the Appendix at the end of this report.

The mailing list and size of school, were obtained from the application blanks for accrediting of the high schools, on file in the state education office.

In the school year 1940-1941 there were 819 public high schools in the state of Oklahoma. A copy of the check list

¹¹L. V. Koos, The Questionnaire in Education. 1928.

¹²Ibid., p. 64.

used in this study was sent to a representative list of 418 of these schools. There was a return of 216, or a return of 51.7 per cent. Of those returned 58.3 per cent of 126 replies, were from schools which had enrollment of 150, or fewer than 150 pupils in the four upper grades of their school (ninth, tenth, eleventh, and twelfth grades). The other 90 replies were from schools having over 150 in those four grades. This division is referred to in the body of this report.

Organization of the Study

In this introductory chapter have been given a general discussion of the importance of in-service training and its trends, a report on previous studies, a statement of the problem, and an explanation of the method of procedure with a defense of the method of obtaining data.

Chapter II deals with teacher growth through academic advancement and improvement of method. In Chapter III teacher participation in professional meetings and organizations is studied. Chapter IV considers the in-service training value of travel and educational reading. A general summary of findings, with conclusions, is given in Chapter V. In the Appendix is a copy of the check list used in this study. The Bibliography is a list of books and periodical references which were cited in the report or found to contain important material related to some phase of the study.

CHAPTER II

GROWTH THROUGH ACADEMIC
ADVANCEMENT AND IMPROVEMENT OF METHOD

Certification

Seldom does one hear of a teacher securing a position in the public schools who has taken only two or three years of training above his high school work. The explanation of this lies in the fact that minimum training, and, in some instances, retraining, requirements are being set up by state laws or policy-making boards. Although some teachers may be found who meet retraining requirements principally to qualify for certain positions, the willingness of others to grow professionally makes these increasing demands possible.

In a study by Zora Klain, of the New Jersey College for Women, replies from state departments indicate,¹

....a marked trend throughout our nation, both in State Departments of Education and in institutions undertaking to educate teachers for the secondary school, to set forth some requirements beyond the traditional four years of college education.

In this report² the State Department of Education of Oklahoma replies, "We are on the verge of inaugurating such a plan."

¹Zora Klain, "Beyond the Traditional Four Years," Summary in School and Society, 45:860-2, June, 1937.

²Ibid., p. 861.

The extent to which Oklahoma science teachers are continuing academic training after they begin teaching is shown in Table I.³ In the group of 216 teachers reporting, there were 155 who had only one degree, 52 had master's degrees and two had received a doctor's degree. There were seven who reported that they had no college degree.

TABLE I
NUMBER OF SEMESTER HOURS OF SCIENCE TAKEN
BY 216 OKLAHOMA SCIENCE TEACHERS

Number of Semester hours		0	1 to 19	20 to 39	40 to 59	60 to 79	80 to 99	100 or above	Total
Number of teachers taking science courses	Before beginning science teaching	1	19	87	74	28	7	0	216
	After beginning science teaching	84	94	23	9	3	2	1	216

It is accepted that subject matter courses should be taken at the first of the college training period. The time, then, for the presentation of all but a minimum amount of professional training is during the last year of a four or five year training program. Since junior and senior undergraduates are given "professional training" before they begin teaching they find that there is a need for returning to

³Studies by Payne and Smith (references in this report, Chapter I, page 6) give detailed statistics on academic preparation and subject combinations of Oklahoma Science teachers of 1939-40.

college to take more work in their subject matter fields. This is indicated by the observation that of the eighty-four teachers of science who had not taken courses in that field since they began teaching, all but fourteen reported that they were teaching at least one other subject. Eight of these fourteen were teaching their first year and had had no opportunity to take more college work, and the other six had not attended college since college graduation. All teachers who were teaching only science classes, and who had gone to college since beginning teaching had taken some additional science courses.

On the check list which was sent out in this study the answers to the questions concerning certification were indefinite. This ambiguity made statistical treatment of them of doubtful importance. There was an indication, however, that the respondents held certificates covering the field in which they were teaching, as was required by the State Department of Education.

Much commendable progress has been made in increasing requirements for teaching certificates during the last two decades. However, in the field of science there is need of further revision of existing policies. One widely criticized practice is that of "blanket" certification permitting a teacher to teach any of the science courses in a high school curriculum upon completion of a too limited number of semester hours in academic science courses.

Table II shows in what fields the reporting teachers felt

a need for further training. More teachers reported a deficiency in knowledge of the physical sciences than in the field of biological science.

Another certification practice which is declining in the esteem of education experts, is the issuing of life certificates. These broad permits may encourage professional complacency on the part of the teacher. They should be granted only to teachers who have had some in-service experience and who have thereby shown a promise of continued professional growth.

TABLE II
SUBJECTS IN WHICH SCIENCE TEACHERS NEED TRAINING

Subject	Number of Teachers	Per Cent of Teachers
Chemistry	57	26.8
Physics	55	25.1
Biology	53	24.5
Astronomy	25	11.6
Geology	23	10.6
Meteorology	5	2.3

Subject Combinations

The modern trend toward integration of high school subjects has thrown new light on the study of subject combinations. In this area of study small schools present a difficult problem because it is often necessary for their teachers

to teach in two or more "departments".

Some subjects, as mathematics and science, have many related fields of thought. If a pupil has the same teacher in mathematics and science he will be spared the confusion of conflicting procedures in the common areas of these two subjects.

As shown in Table III, mathematics is the subject most commonly taught in combination with science in Oklahoma schools.⁴

TABLE III
DISTRIBUTION OF SUBJECTS COMBINED WITH SCIENCE

Subject combined with science	Teachers having the Subject in their combination	
	Number	Per Cent
Mathematics	106	49.1
History	45	20.8
Home Economics	12	5.5
Commerce	11	5.1
Industrial Arts	11	5.1
English	8	3.7
Music	6	2.8
Physical Education	5	2.3
Foreign Language	3	1.4
Civics or Problems of Democracy	13	6.0
Psychology or Sociology	6	2.8
Speech or Journalism	6	2.8
Grade Work (Other than science)	22	10.2

⁴See footnote, page 11, of this chapter.

The relatively high frequency with which home economics was combined with science was expected because academic requirements for teaching these two subjects list some science courses in common.⁵

One of the facts revealed by Table IV is that a large proportion of teachers had combinations of science with only one other subject. This would be expected because of the inclusive definition given to the term "science" in this study.

TABLE IV
NUMBER OF SUBJECTS IN COMBINATION WITH SCIENCE

Number of subjects taught with science		0	1	2	3	4	More than four	Totals	
								No.	%
Teachers in high schools of 150 pupils or less	Number	3	60	39	14	8	2	126	
	Per Cent	2.4	47.4	31	11.1	6.3	1.6		100
Teachers in high schools of more than 150 pupils	Number	11	59	18	2	0	0	90	
	Per Cent	12.2	65.6	20	2.2	0	0		100
Teachers in high schools regardless of size	Number	14	119	57	16	8	2	216	
	Per Cent	6.5	55.1	26.4	7.4	3.7	0.9		100

The teachers in the larger high schools who were teaching in two or more fields were probably not teaching all of the science courses offered in the curriculum of their school.

⁵The frequency of the occurrence of history and its closely related subjects has no particular explanation by the present writer.

(No provision was made in the planning of the questionnaire to include information necessary to decide this point.) This situation would add to the wide distribution of subject combinations found among the majority of the responding science teachers. A combination of science with two of the many subjects offered in Oklahoma schools could be made in hundreds of different ways.

No teacher training program can be expected to supply the demand presented by the unusual and infrequent subject combinations which teachers are now teaching. As a result of this situation, high school teaching positions are often filled by inferior workers just because they can fit into the other required fields.

Efforts to raise the quality of the teaching staff of our schools can not be most effective until steps are taken to simplify and, if possible, standardize the combinations of subjects which teachers prepare to teach.

Summer School

No one acquainted with the history and problems of education in America can doubt the importance of the part summer school has played in the past or the contribution it is now making. The extent to which they are now attended is further evidence of the need of training in service.

Summer schools are serving more science teachers in Oklahoma than any of the other agencies considered in this chapter. Table V shows to what extent these teachers are using the various agencies as a means of further study. Of the fifty-one

respondents who had not attended summer school eighteen were serving their first year as a teacher and had not had the opportunity. Five-sixths of the teachers who had already taught at least one year had gone to summer school.

In summer school a teacher comes in contact with people who are interested in the same work that he is, and who are willing to talk with him and advise him if possible. Here he can learn what is new in education from leaders in the field. A better perspective on his job inspires him anew to be of greater service to his community and to live a fuller life.

The in-service training offerings of the summer schools should not be mere credit-providing courses alone, but should provide guidance and practice in working on meaningful problems.

A recent step in bringing the training institutions and their field of service into closer relationship is the formation of work shops where specific problems, encountered in teaching situations, are brought in and attacked with the guidance of specialists from the college faculty. Many students share in the use of the findings of these studies.

Another worthwhile characteristic of these work shops is their interest in improving a teacher as an individual and as a member of society.

TABLE V
EXTENT TO WHICH IN-SERVICE TRAINING
AGENCIES HAVE BEEN USED

Activity	Number Reporting	Per Cent of Total
Attending Summer School	165	76.4
Attending Saturday Classes	37	17.1
Taking Extension	33	15.3
Taking Correspondence	28	13.
Visiting Other Teachers at Work	Number of visits 1 - 9 2 - 21 3 - 17 4 or more 43	 90 41.7
Having Leave of Absence	3	1.4
Taking Course in Methods of Teaching Science	Before beginning teaching 57 After beginning teaching 33	 26.4 15.3

Saturday Classes

Saturday classes rank second in importance as an individual crediting agency which has aided Oklahoma science teachers in continuing their training. Their curriculum offerings are limited, however, to courses which promote professional interest rather than give extensive training in laboratory courses in science.

Saturday classes can become an avenue through which new trends in teacher education may function by including more demonstration teaching and work on individual and personal problems of the teachers.

Extension and Correspondence

Sixty teachers, or twenty-eight per cent of the respondents, have taken work in extension classes or by correspondence, the off campus aids to teachers in service.

In the extension aids of a teacher training institution is found the advantage of working near the place where the teachers encounter their problems. They can be offered at less expense to the student than work taken on the campus.

Correspondence courses meet a specific need of some teachers. Their offerings are particularly attractive to teachers who live in areas a great distance from colleges and their extension centers.

Teachers enrolled in these courses make occasional personal contacts with advisors and visits to libraries, thereby gaining confidence in themselves and their mission. This item of self reliance is of particular importance to teachers in the smaller schools of rural areas.

Teacher Visitation

Science teachers should find the observation of other teachers at work a very effective way to consider different methods and techniques of teaching, both in laboratory and theory work.

Returns from the check list show that ninety science

teachers have visited other teachers at work since they began teaching science. Forty-three of these have done this observing four or more times. Some respondents added that teacher visitation was an annual practice in their school.

In theory the revision and extension of the teacher supervision program should limit the practice of teacher visitation. However, 41.7 per cent of the reporting high school science instructors have, while in service, visited another teacher at work.

To a question asking if there was a felt need for a course in methods of teaching science there were sixty-four affirmative answers. One hundred forty two teachers felt a need of more effective classroom techniques, such as laboratory work, class demonstrations, field trips, use of visual aids, etc.

Leaves of Absence

It is difficult to set up a desirable plan of granting leaves of absence to teachers. Should a teacher agree to remain in the system granting the leave, for a certain number of years? Should he be paid in full while studying in absentia? Can we find an efficient fill-in teacher? These are some of the questions which confront the school administrator.

In this study only three teachers reported that their schools had granted a leave from work to take additional training. The schools where these teachers taught were in large cities.

Methods Courses

The ever changing concepts of the function of education

call for constantly revised methods of arriving at these ends. The existence of science teachers will be justified if they can show that their work is directly helping to reach these objectives.

The great swing to an age of industrialism has been largely through the work of the experimenting scientist. A great task of educating the public to adjust themselves socially and economically now lies before the teaching scientist. He should become a more active force in the community in which he works and use his classroom and laboratory methods in solving vital socio-economic problems.

Less than half of the teachers who returned the check list used in this study had taken a course in the methods of teaching science. (See Table V.) Of these 57.9 per cent took the course before they had accepted the full responsibility of a teaching situation.

It is true that a teacher needs some pre-service training in methods, but such courses which deal with experiences in the abstract often are meaningless to the "teacher" who has not taught.

CHAPTER III

GROWTH THROUGH
PROFESSIONAL MEETINGS AND ORGANIZATIONS

Teachers Meetings

Within the school. It will be quite difficult for teacher growth in service to even approach the desired situation if the teacher does not have genuine interest in, and feel that he is a part of, the program in which he is working. Too often a beginning teacher finds himself making adjustments so that his views and activities will fit into the non-progressive program already existing in a school.

This situation is the exact opposite of what it should be. Only in an organized body with definite aims and a democratic spirit can the best interest of the group be fostered.

One small, but important, unit in the teaching profession is the teachers' meeting within a school. Regardless of the intricate organization above it, a properly conducted plan of the correct type of teachers' meetings is needed to help teachers work out their problems. Through these meetings initiative is encouraged and creativeness is developed.

If a science teacher recognizes a problem which he thinks is of interest to other teachers in the system, let him work on a committee with them in solving the situation. A general weakness in spelling, or a deficiency in ability to apply the mathematics of the lever to science problems, are typical examples of areas of common interest.

The scientific method of procedure should be applied to the study after a problem is recognized, and results should be measured if possible. A little practice at this type of cooperative endeavor should make it very effective and valuable, although there may be some difficulty at first in getting the teachers to function.

This participation in their own meetings would be putting into practice some of the procedures teachers recommend for the students under their direction. Reference is made here to democratic student self-government. Teachers should profit by taking an active part in their meetings, just as high school students do. This procedure would surely stimulate reading and study, and would thus result in professional growth.

If at all possible these teacher committee meetings should be held during the regular school day. In many schools, hall duty and similar administrative tasks could be rotated among the faculty members to make these meetings possible.

It must be remembered that, even in running a school, democracy does not just happen, but must be planned. Intelligent supervisors should guide the program as a whole and the teachers individually. The reticent teacher needs encouragement and guidance just as that type of student does.

This transition from the strictly "bulletin board" type of faculty meeting should break down any existing departmental barriers and be a valuable aid in training teachers in service.

District and State Teachers' Meetings. With correct planning the district and state teachers' meetings can be instruments of great influence in directing teacher growth. In this study it was found that 94.9 per cent of the reporting teachers attended these meetings with varying degrees of frequency. The results, tabulated in Table VI, show that almost half of them always attend these meetings.

TABLE VI
ATTENDANCE AT STATE AND DISTRICT
TEACHERS' MEETINGS AND SCIENCE SECTIONAL MEETINGS

Number of teachers attending state and district teachers' meetings	Always	101
	Frequently	96
	Seldom	8
	Never	11
Number of teachers attending science sectional meetings		161

Of the 161 who attend the meetings of the science section at the state and district meetings, eighteen qualified their answers with some work like "sometimes," or "occasionally".

This drop to 74.5 per cent attendance at the science section of the meetings is probably explained by the previous observation¹ that 119 were teaching in at least one field other than science.

Another explanation of the poor showing in number attending science sectional meetings may be that the discussions

¹See Table IV, Chapter II, p. 15.

given there do not concern problems of sufficient interest to teachers of that area. However, the idea that teachers' conventions are just another college classroom is giving way to participation by classroom teachers with projects or discussions which they consider of importance to them. Then too, there are the "professionally disinterested" who account for too large a number of absences at professional meetings.

Professional Organizations

A group of workers must become an organized body, with standards and common aims, if that group is to be effective in carrying out a program. When this organization impresses society in general with its valuable services the social and economic status of the individual members of the organization improves. With these principles in mind the first teachers' organizations were formed.

In its struggles to become a profession teaching has been set back by many highly involved handicaps. Probably the most important of these is the heavy and rapid turnover within its ranks. By many, teaching is used as a "stepping stone" to other professions. When women teachers get married they often leave the field, sometimes at the request of the local board of education, thereby requiring the initiation of a new teacher into the profession.

This situation would exist to a smaller degree, however, if higher salaries were paid for teaching services. Present teachers are in a sense "martyrs to the cause," in advancing teaching to the plane of a profession.

We see that much has already been done through organization when we are reminded that

....at the beginning of the nineteenth century most teachers were employed in "keeping school" only a few months during the year and that some outside occupation was necessary to enable them to eke out an existence.²

A picture of the participation of Oklahoma science teachers in professional organizations is given in Table VII.

Eighty-nine per cent of the 216 respondents are members of

TABLE VII
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

Association	Number of Teachers
Oklahoma Education Association	192
Oklahoma Academy of Science	18
Kappa Delta Pi	7
National Education Association	6
American Association for the Advancement of Science	6
National Association of Biology Teachers	2
Wildlife Society	2
American Microscopical Society	1
American Ornithologists Union	1
American Society Amateur Microscopists	1
Limnological Society of America	1
National Audubon Association	1

²W. S. Elsbree, The American Teacher, 1939. p. 209.

the state education association, but only 18 have membership in the Oklahoma Academy of Science.

In May, 1940, eight per cent of the public school teachers in Oklahoma were members of the National Education Association. This representation placed our state in seventh place when compared with other states and United States possessions.³

In the same report Oklahoma ranked twelfth in the percentage membership of its teachers in the state education association. One hundred per cent of the 20,507 teachers were reported as members. This report is not strictly accurate because of the inclusion of some members enrolled among laymen, and teachers in private schools and institutions of higher learning.

A glance at the limited participation in other science and general organizations shows that our teachers are not capitalizing in the fact that "in union there is strength." A few societies in which membership was reported by teachers with majors in fields other than science are not listed in the table.

There is some encouragement from a report in a recent issue of The Oklahoma Teacher,⁴ which gives the paid membership in the National Education Association of Oklahoma in March, 1941, as 1,829. In that report the state director

³National Education Association Journal, Statistical Report, 29:178, September, 1940.

⁴The Oklahoma Teacher, 22:11, May, 1941.

gave the explanation that,

This increase (12.6 per cent over the number in March of the previous year) in N.E.A. membership is indicative of increased loyalty to the profession and increased faith in group activities to improve education services and teacher welfare.

By non-participation in professional organizations teachers detract from a program designed to improve teacher status. They also fail to benefit by the direct offerings of these associations, such as teaching aids and materials, help with science club organization and activities, etc.,--services of the Oklahoma Academy of Science.

Publications of the organizations discussed in this chapter are of importance to teachers in general and sometimes to science teachers in particular. These, along with other publications, and travel as an educational factor, are discussed in the next chapter.

CHAPTER IV

GROWTH THROUGH
TRAVEL AND PROFESSIONAL READING

Travel

Our present network of improved highways, and railway systems makes travel an important phase of cultural and professional growth. Even the motion picture with its color film, leaves much to the imagination. Only by visiting a place can a person have all of this imagination displaced by the impressive thrill of realism.

Travel is a stimulus to cultural growth. Probably no other activity is so broadening. It makes one wish he had spent more time studying his history and geography courses. The importance of knowing something about art appreciation is impressed through travel more than ever before. Even the traditionally important book-learning is supplemented by travel, the first-hand method of gaining accurate knowledge of a place.

Teachers of geography, in particular, can profit by taking advantage of travel opportunities. In their classroom they may have much difficulty in describing, in an impressive way, the climate and physical features of an area with which they are not personally familiar. Wrong impressions are often corrected by travel, with the result that teachers are made generally more broad minded.

During his travels a teacher should collect teaching aids, such as booklets, pictures, and rocks, for use in enriching classroom procedures. Pictures should be taken by the traveler en route and later arranged as a permanent record of the trip. Transparencies made for classroom projection are always enjoyed by high school classes, and, if properly integrated and accompanied by discussions, can be used as a valuable teaching aid.

On the questionnaire used in this study about one-fifth of the teachers reported that they had not traveled outside the state since they began teaching science. As shown in Table VIII, traveling in the western states had been the choice of most of the other teachers.

TABLE VIII
TRAVELS OF SCIENCE TEACHERS
SINCE BEGINNING TEACHING

Place Visited	Number Reporting	Place Visited	Number Reporting
West	56	Mexico	13
Gulf of Mexico	32	Canada	7
East	18	Museums	132
Chicago	14	Industrial Plants	83
Carlsbad Caverns	12		

Table VIII also shows that 132 teachers had visited at least one museum, and that industrial plants had been objects of visits by eighty-three. The most frequently visited plants are listed in Table IX. Many ideas for exhibits and projects should originate from such visits.

To be most effective a trip should have definite planning. Reading literature about the place to be visited makes the trip more profitable. Such materials can be obtained from tourist bureaus, air lines, railroads, chambers of commerce, etc., and make valuable future reference material.

TABLE IX
MUSEUMS AND INDUSTRIAL PLANTS
MOST FREQUENTLY VISITED

Museum	Number of visiting teachers	Industrial Plant	Number of Visits
Oklahoma City	31	Oil refinery	24
Denver	27	Lumber mill	14
Washington, D.C.	15	Packing plant	11
San Antonio	13	Auto assembly	9
Chicago	11	Flour mill	6
St. Louis	9	Coal mine	6
San Francisco	8	Cotton gin	4
Shawnee	4	Bottling works	3

The rapid growth of tours for teachers and travel courses for which college credit is given are evidence that educators recognize the value of travel as a means of teacher improvement.

Professional Reading

Any one who is acquainted with the reading habits of high school teachers will agree to the statement that far too many teachers do not use the valuable material which is offered to them in books and periodicals.

TABLE X

 PERIODICALS RELATING TO SCIENCE
 OR TEACHING TAKEN BY SCIENCE TEACHERS

Name	Fre- quency	Name	Fre- quency
Popular Science	43	Science	2
Popular Mechanics	26	Science Education	2
Science Digest	24	Audubon Bulletin	1
National Geographic	23	Chemical and Metal- lurgical Engineering	1
Nature	15	Engineering and Mining Journal	1
Science News-Letter	10	Journal of Wild Life	1
Science Leaflet	8	School Science and Mathematics	1
Clearing House	3	Science Classroom	1
Science Teacher	3	Transactions of the American Micro- scopical Society	1
American Biology Teacher	2		
Journal of Chemical Education	2		

A large number of these teachers are not aware of the nature and scope of the material or of its application to their teaching. A chemistry teacher may be having difficulty in teaching the concept of valence and not know that a recent periodical contained an article discussing the use of

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valence blocks as visual aids in the teaching of valence. A general science teacher may need help in organizing and sponsoring a science club. That need could be supplied by a number of books and periodicals if the teacher knew just how to find the information.

A comparison was made (See Tables X and XI), of the number of science teachers taking magazines relating to that subject or its teaching, and those taking magazines not related to that field. More teachers subscribed to the eight most popular periodicals in the former classification than to the corresponding number of non-professional publications. It was found, however, that thirty-six individuals who were not taking magazines relating to science were receiving at least one periodical of a more general nature.

TABLE XI
 PERIODICALS NOT RELATED TO
 SCIENCE OR TEACHING TAKEN BY TEACHERS

Name	Fre- quency	Name	Fre- quency
Readers' Digest	33	Time	11
American	22	Liberty	10
Colliers	21	Saturday Evening Post	9
Life	16	Look	7

Most of the magazines taken by the teachers gave a popular treatment of science and very few of them dealt with technical or professional aspects of the subject.

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As would be expected, the science periodicals reported as being taken by the high school libraries were also of the type which popularize the subject. The eight most frequently listed science related and non-related magazines taken by the school libraries are given in Table XII.

TABLE XII
PERIODICALS TAKEN
MOST FREQUENTLY BY HIGH SCHOOL LIBRARIES

Related to Science or Teaching	Number of Schools	Not related to Science or Teaching	Number of Schools
Popular Science	64	Readers' Digest	51
National Geographic	57	American	25
Popular Mechanics	53	Life	22
Current Science	18	Time	21
Nature	15	News Week	17
Science Digest	15	Saturday Evening Post	15
Hygeia	9	Colliers	12
Science Leaflet	8	Look	9

Due to the small number of city libraries near the schools in which the respondents taught, there was a very limited response to the question concerning reading of magazines taken by those libraries. Table XIII gives the eight periodicals that were most frequently listed.

In the field of medicine the need of keeping informed on current developments in theory and practice is quite evident,

and probably more universally needed, than in any other profession. Although teaching school is less of a "life and death" proposition it is quite as important for teachers to keep professionally up to date and prevent themselves from falling into the rut of routine.

TABLE XIII
PERIODICALS TAKEN BY CITY
LIBRARIES AND READ BY SCIENCE TEACHERS

Name	Fre- quency	Name	Fre- quency
Readers' Digest	14	Harper's	6
Nation's Schools	10	Scholastic	5
Saturday Evening Post	10	Clearing House	4
Science News-Letter	8	School Board Journal	4

The data secured in this questionnaire study definitely indicate that Oklahoma science teachers are doing a negligible amount of reading which will promote their professional growth. Table XII shows that less than five per cent (ten out of 216 teachers) of the science teachers are taking any professional magazine relating at all to the teaching of science.

Surely the explanation does not lie in the fact that library resources are too limited, for 1928, Terman¹ made the statement that,

Today there is less justification than ever before for a teacher's failure to carry on professional reading.

¹L. M. Terman, "Growth Through Professional Reading," National Education Association Journal, 17:138, May, 1928.

Rather the explanation is that we have a too limited program for training in the use of books and libraries.

A prospective teacher should be given a course dealing with the literature of his field, and should have definite problems assigned which would teach him the value and techniques of educational research. Many capable teachers are working far below their capacity because of their limited knowledge of current literature and its benefits.

It should be kept in mind that reading should not be an end in itself but should be used as a means of acquiring useful knowledge, or serve as a stimulus to greater living in the general and professional world. The present use of periodicals and books is not as extensive as the amount and value of their offerings would justify.

CHAPTER V

GENERAL SUMMARY AND CONCLUSIONS

Summary

The problems of this study have been: (1) to ascertain the nature and extent of existing practices in the state of Oklahoma which affect the in-service growth of science teachers; (2) to evaluate these findings in the light of existing standards and expert opinion; (3) to find what deficiencies are felt by the teachers as they apply their knowledge and skills to the problems of teaching science.

A questionnaire was used in collecting data for the report. The limited dependability of this method of securing information, as set forth in the introductory chapter, was again indicated. However, almost all of the check lists portrayed that careful and sincere attention had been given them. The questionnaire could have been more carefully planned, making the answers less subject to questionable interpretation.

Whenever possible the findings of this study were evaluated with respect to expert opinion. Standards for comparison of findings with other situations were not found, except in the matter of attendance of teachers at professional meetings. These statistics related only to teachers in general, and for only the National Education Association and the state educational organization.

The data collected show that (1) most science teachers continue academic training in their subject matter field after they begin teaching, (2) science teachers of Oklahoma are teaching an almost unlimited number of subject combinations, (3) summer schools are the most used of the agencies of in-service training, (4) Saturday classes and extension and correspondence courses are extensively used as teacher-growth agencies, (5) teacher visitation is a common practice, (6) leaves of absence are not commonly granted, (7) less than one-half of the teachers have taken a course in methods of teaching science, (8) district and state teachers meetings are well attended, (9) few science teachers are members of professional organizations other than the general state education association, (10) the educational possibilities of travel and professional reading are being largely neglected, (11) lack of school funds and inadequate teacher's salaries are factors which limit the effectiveness of science teaching in Oklahoma.

Conclusions

The importance of in-service training of teachers is being recognized. Much study on the subject is being done by expert committees and general recommendations are being made.

The next step should be the installation of these carefully planned procedures. If the best methods of measurement show that a program is achieving the objectives of education accepted by experts in the field of educational philosophy,

then that teacher training program should be applied generally. The effectiveness of this new program to train more efficient teachers should be constantly measured in the light of shifting concepts of education which are inevitable in a dynamic society.

In academic preparation there is a felt need for more courses in the field of physical science.

Professionally the major need is an effective program to encourage professional reading and study.

The majority of the comments added at the end of the questionnaire implied that if higher salaries were paid to the school teachers more professional reading and in-service growth would result. Yet, possibly this is more of a self-excuse than an actual justification for the negligible amount of professional reading done by science teachers. It is quite questionable whether a raise of \$200 or \$500 a year in salary would materially increase the amount of professional reading done by science teachers. The cause of the negligence lies deeper than that and the writer is not in a position to really state the fundamental cause for this negligence.

Growth does not always result because of some outside application of knowledge or suggestions. A program for improvement of teachers is successful to the extent that it results in an inward expression, a desire to know better, plan better, and do better. A more personal approach by conscientious supervisors would result in a more effective program for training teachers in service.

APPENDIX

Dear Science Teacher:

Will you please fill out and return, at your earliest convenience, the following questionnaire? A stamped return envelope is enclosed for your convenience.

The information obtained from it is to be used in preparation of a thesis which might give some useful information to those who plan and effect the training of the science teachers of our state.

I thank you very much for your gracious cooperation in filling out this questionnaire.

Sincerely yours,

Olen Self

APPENDIX

A QUESTIONNAIRE ON IN-SERVICE TRAINING OF SCIENCE
TEACHERS OF OKLAHOMA

Name _____ School _____
 Size of school (9, 10, 11, and 12 enrollment) _____

Science classes taught	Number pupils in each class	Number of years teaching this subject
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Other subjects taught: (1) _____ (2) _____ (3) _____
 Do you have a college degree? What? _____ Where? _____ When? _____
 Science teaching certificates held (List fields) _____

Science courses you have taken	Semester hours before beginning teaching	Semester hours since beginning teaching	Total
Chemistry			
Botany			
Zoology			
Physics			
Astronomy			
Geography			
Geology			
Biology			

Since beginning teaching science have you attended summer
 school? _____ taken Saturday classes? _____ had leave of absence
 to study? _____ taken correspondence or extension classes? _____

Does your school make arrangements for your observing other
 teachers at work? _____ Since beginning teaching have you
 visited other science classes? _____ Frequency of this obser-
 vation (underline one) once, twice, three times, four or more
 times. Have you taken a course in methods of teaching science?
 _____ If so, was this since you began teaching science? _____

Do you attend state and district teachers' meetings (underline one) always, frequently, seldom, or never? Do you go to the science sectional meetings there? _____

Of what professional organizations are you a member:

- (1) Oklahoma Education Association _____
 (2) Oklahoma Academy of Science _____
 (3) _____
 (4) _____

Since beginning teaching science have you:

- (1) Traveled outside the state? _____ Where? _____ (2) _____
 (2) Visited museums? _____ Where? _____ (2) _____
 (3) Taken biology field trips? _____
 (4) Visited industrial plants? _____ List (1) _____
 (2) _____ (3) _____ (4) _____

List magazines relating to science or science teaching taken by your school _____

List magazines relating to science or science teaching taken by you _____

List other magazines taken by your school _____

List other magazines taken by you _____

List magazines you read that are taken by your city library _____

Have you felt any deficiencies in your science teaching due to: (1) Insufficient science courses? (Check fields)

- (a) Biology _____ (b) Chemistry _____ (c) Physics _____
 (d) Astronomy _____ (e) Geology _____ (f) _____ (g) _____

- (2) Lack of methods course? _____
 (3) Too limited classroom techniques (as laboratory work, class demonstrations, field trips, use of visual aids, etc.) _____
 (4) _____

Qualifications and Remarks:

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