DOCUMENT RESUME

ED 053 977 SE 012 300

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TITLE A Survey of Science Teaching in the Public Secondary Schools of the Great Lakes and Far West Regions of the United States in the 1970-71 School Year.
PUB DATE 71
NOTE 396p.; Ph.D. dissertation, Ohio State University

EDRS PRICE EDRS Price MF-$0.65 HC-$13.16
DESCRIPTORS *Curriculum, Doctoral Theses, Equipment, Federal Programs, *Instructional Programs, *School Organization, *Secondary School Science, *Teacher Characteristics

ABSTRACT

This is the first part of a national study on science instruction in secondary schools of the United States. Questionnaires (copies appended) sent to the principal and to a randomly selected science teacher in 2,019 public secondary schools, selected by multi-stage random samples of Great Lakes and Far West region schools, provided information about practices, procedures, policies and conditions concerning science education. Data received by July 1, 1971, (approximately 45 percent response) were analyzed. The results include data on science curriculum improvement project adoption, utilization of federal funds, environmental education programs, science teacher qualifications, teacher attendance at summer and other institutes, teaching methods, availability of audio-visual and science equipment and supplies, and teacher satisfaction. Contingency tables show significant relationships of school enrollment with school organization, utilization of federal funds, use of science consultants, sponsorship of science clubs, type of science course, available equipment, and teacher characteristics and satisfaction. (Author/AL)

A SURVEY OF SCIENCE TEACHING IN THE PUBLIC SECONDARY SCHOOLS OF THE GREAT LAKES AND FAR WEST REGIONS OF THE UNITED STATES IN THE 1970-71 SCHOOL YEAR

By

Long Fay Chin, Ph.D.

The Ohio State University, 1971

Professor Fred R. Schlessinger, Adviser

The purpose of the study was to obtain information about practices, procedures, policies, and conditions affecting science education in the public secondary schools of the Great Lakes and Far West regions of the United States during the 1970-71 school year as part of a national survey of secondary school science.

Data were obtained by means of two questionnaires. The Principal's Questionnaire was designed to provide summative data for all the science teachers, science classes, and science programs in the school. The Science

Teacher Questionnaire was designed to provide data on the characteristics of science teachers, and the specific practices and conditions for teaching science. Questionnaires were mailed to 2,019 schools which had been randomly selected by a multi-stage sampling process. The overall response rate by Jult 1, 1971 was 44.7 percent for the Principal's Questionnaire, and 45.6 percent for the Science Teacher Questionnaire.

A frequency count computer program was used to obtain frequencies, percentages, and totals of item responses with respect to 141 variables in the Principal's Questionnaire, and 135 variables in the Science Teacher Questionnaire. Data were analyzed for each state and region. The BMD02S Contingency Table Analysis program was used to compute two-way frequency and percentage tables as well as chi-squares, using school enrollment size as the base variable.

Approximately 90 percent of schools organized the school day into regular class periods. Homogeneous grouping of science classes was used by 49 percent of the schools.

The criteria most used as the basis for homogeneous grouping were (1) teacher recommendation, (2) marks or grades, (3) aptitude tests, and (4) student interest. Over 39 percent of the schools had annual budgets for science equipment and 56.8 percent of the schools had annual budgets for science supplies. Over 61 percent of the schools had used NDEA funds to purchase science equipment; 31.3 percent of the schools had used ESEA funds for the same purpose. Only 12.7 percent of the schools had used NDEA funds to re-model science facilities.

The science course offered by most schools was Biology, followed by Chemistry and General Science. The BSCS Blue Version was taught in 14.8 percent of the schools, the BSCS Green Version in 19.3 percent, and the BSCS Yellow Version in 21.4 percent of the schools. CHEM Study was taught in 28.6 percent of the schools; PSSC Physics was taught in 27.6 percent, and Harvard Project Physics was taught in 9.4 percent of the schools. Over 60 percent of the schools reported teaching Environmental/Conservation

Education, but only 28.2 percent of the schools had special facilities for teaching the subject.

Over 87 percent of all science teachers were male, and 62 percent were under 40 years of age. The masters' degree was held by 62.8 percent of the teachers. Science teachers were generally better prepared in biological science than in physical science. The majority of teachers had attended summer institutes.

Over 89 percent of science teachers used laboratories or special science rooms to teach science. The three most commonly used learning activities were (1) lecture-discussion, (2) individual laboratory activity, and (3) group laboratory activity. According to the science teachers, the three most important factors for obtaining and maintaining high quality science programs were (1) science facilities, (2) administrative support, and (3) co-opertive staff. Over 94 percent of science teachers reported that they were very satisfied or satisfied with teaching science.

A SURVEY OF SCIENCE TEACHING IN THE PUBLIC SECONDARY SCHOOLS OF THE GREAT LAKES AND FAR WEST REGIONS OF THE UNITED STATES IN THE 1970-71 SCHOOL YEAR

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Long Fay Chin, B.Sc.(Hons), Dip.Ed.

* * * * * *

The Ohio State University
1971

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ACKNOWLEDGMENTS

The present study would not have been possible without the assistance of many people. I wish to express my deep appreciation to the following:

To Dr. Fred R. Schlessinger, major adviser and friend, whose wisdom, encouragement, and direction were instrumental in the successful completion of this study.

To Dr. Robert W. Howe, Chairman of the Faculty of Science and Mathematics Education, who inspired this study, and who provided the counsel and the many resources, financial and otherwise, which made the study possible.

To Dr Arthur L. White, whose advice and guidance were invaluable in many phases of the study.

To Dr. William R. Riley, who assisted me in the pilot phase of the study.

To Dr. Stanley L. Helgeson and Dr. Carl E. Venard, Members of the Reading Committee.

To Mrs. Maxine Weingarth and Miss Judy Dunson who helped in so many ways.

To Arthur M. Lucas, who so generously gave me the benefits of his research experience during the data analysis phase of the study.

To my fellow graduate students in Science Education, especially Jerrold William Maben, James H. Baker, and Ellen C. Buckeridge.

To the many undergraduate students who helped in sampling the schools, typing address labels, and key-punching the data cards.

To my wife, Maria Shu Fah, for her encouragement and help throughout all phases of my graduate program.

To my son, Christopher Chao-Wen, whose sunny smiles cheered me up when my spirits were down.

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PUBLICATIONS

Chin, Long Fay, W. A. Millen, and D. W. Watts. "Octahedral cobalt (III) complexes in dipolar aprotic solvents. I. The substitution of thiocyanate into the cis-chlorodi-methylsulphoxido-bisethylenediamine cobalt (III) ion in anhydrous dimethylsulphoxide and NN-dimethylformamide", Australian Journal of Chemistry, 18:453-461, April, 1965.

FIELDS OF STUDY

Major Field: Science Education

Studies in Science Education. Professors Robert W. Howe, Fred R. Schlessinger, and Arthur L. White

Studies in Educational Research and Development. Professors John J. Kennedy and James B. Gunnell.

Studies in Physics. Professor William R. Riley

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CHAPTER I

INTRODUCTION

Introduction and Need for the study

A concern about the nature of science teaching and learning in the elementary and secondary schools has been the cause of much public debate in the United States during the last decade and a half. This concern, spurred on by the great public interest in science, the space race, and the manpower needs of a great industrial and technological society has expressed itself in the series of science course improvement projects to up-date and alter the orientation of science teaching and learning in the nation's schools. To date, the National Science Foundation and the United States Office of Education have invested over one hundred million dollars in the research, development and testing of the various science and mathematics curriculum projects. Colleges and universities, with support from government agencies, have offered many institute programs to up-date, up-grade, re-orientate and to provide for the advanced training of thousands of secondary and elementary teachers of science (Krieghbaum and Rawson 1969). Many individual schools and school systems have undertaken curriculum development and revision projects.

But as the decade of the 1960's came to a close, educators in general and science educators in particular were asking some basic and searching questions about the impact of these efforts on student learning in science. One vital question concerns "who studies what science in the secondary schools." During the last fifteen years, great emphasis was put upon the academically-able student, especially the science-oriented student, who was being sought for scientific and engineering careers. Now, when the rockets and space satellites have been built and the race to the moon is over, the country's attention is being directed toward the problems of environmental pollution, crime, poverty, urban renewal and youth alienation. Once again, the public is concerned with the education of the average students, many of whom terminate their schooling at or before high school graduation. There is increasing concern about the state of education in the inner-city schools. What might, can and should contribute to the education of the "culturally disadvantaged" urban youth is a fair question to ask. In short, the concern now is for "relevant education," but what is relevant to whom and when has not been clarified.

The problem of relevant education leads naturally to questions about curriculum content and design, and the kind of teaching strategies that may be used. Most of the new science course improvement projects stress the discovery approach to science learning, in which the "processes" of science are emphasized more than the "products" of science. Essentially however, there is not much information about what happens to students exposed to the new science courses. Nor do we even have current and accurate information on total enrollment in science and in the various science courses. One example of the confusion, cited by both Welch (1968) and Watson (1968) is the lack of reliable information about enrollments in the PSSC Physics course. Welch points out the fact that three separate studies, namely those of Haworth (1965), the Educational Services Incorporate (1965), and Watson (1967) have produced three different sets of enrollment figures for PSSC Physics in 1964-65, thus leading one to doubt the accuracy of any of the reported figures. A similar situation appears to exist with the other science course improvement projects. A comparison (Welch 1968) of the enrollment figures for CHEM Study, CBA Project and BSCS Biology reported by the National Science Foundation and the U.S. Office of Education shows that the discrepancy is not confined to physics. Accurate enrollment figures are important, not just as a basis of appraising a particular course, but for estimating the rate of acceptance and impact of any new courses.

The national studies that have been conducted to investigate the status of science teaching and learning in the elementary and secondary schools were completed before the widespread adoption of many of the new science course improvement projects into the regular school curriculum. Thus the researchers had little opportunity to gather and evaluate data concerning the many new high school and junior high school science programs. The National Association of State Directors of Teacher Education and Certification and the American Association for the Advancement of Science (NASDTEC-AAAS 1963) carried out a national survey of the educational and professional backgrounds and the service loads of secondary school science and mathematics teachers during the 1960-61 school year. Obourn and Brown (1963) conducted a study of the total number of science and mathematics teachers in the United States, as well as their distribution according to teaching load, by geographic region, size and type of school in the Fall of 1961. The study by Blackwood (1965) provided valuable information about the status of science in the elementary schools during the 1961-62 school year. Rogers' (1967) study, conducted in 1963, focussed on science instruction in the public junior high schools.

Since these studies, there has been no formal nationwide investigation of science teaching practices in the public elementary and secondary schools. It is important to note also, that none of the above studies had included concurrent investigation of the status of elementary and secondary school science. Thus, there has been no comprehensive basis for answering the many questions about science teaching practices except by opinion based on general observations or on state and local studies. Questions of interest include: (1) What science is being taught in the public schools? (2) Who are the science teachers? (3) How many students are taking the various science courses? (4) What are the conditions for science teaching in the schools? (5) How much background does the average science teacher have in his subject and in related areas?

It was with the expectation that answers could be found for these vitally important questions that the Ohio State University Center for Science and Mathematics Education began the 1970-71 national survey of science teaching in public elementary and secondary schools. The study undertaken by the investigator formed a part of the national survey. Public secondary school principals and science teachers in sampled schools in the Great Lakes Region (comprising the States of Illinois, Indiana, Michigan, Ohio and Wisconsin) and the Far West Region (comprising the States of Alaska, California, Hawaii, Nevada, Oregon and Washington) were requested to respond to structured questionnaires. Other investigators, using the same questionnaires, have surveyed science teaching practices in public secondary schools of other thirty-nine states and the District of Columbia.

The study represented an extension of the earlier studies previously mentioned, and at the same time, provided a base for future work in this field. The information collected and reported would hopefully be useful to science teachers, school and college administrators, and science educators in curriculum development and revision as well as in planning pre-service and in-service teacher education programs.

It may be pointed out that the study had the following unique features: (1) the large sample size, (2) the special sampling techniques which were used to ensure that geographic regions of the country were represented in the sample proportionate to their student enrollment, (3) the fact that questionnaires were sent to both the school principal and a science teacher on his staff, and (4) the fact that the study was designed to be conducted concurrently with a companion study of elementary school science teaching practices which used the same survey design.

The Problem

The purpose of the study was to obtain information about procedures, practices, policies, and conditions affecting science education in the public secondary schools of the Great Lakes and Far West Regions of the United States during the 1970-71 school year.

More specifically, the answers to the following questions were sought:

1. What were the administrative provisions of time and money for teaching science in public secondary schools?
2. How were students organized for science instruction?

3. Who taught science in the public secondary schools?

4. What science courses were taught in the public secondary schools?

5. What was the organization pattern for the teaching of Environmental/Conservation Education in the public secondary schools?

6. To what extent were students involved in science clubs and science fairs?

7. What type of supervisors or consultants were available to science teachers?

8. What science in-service opportunities were available to science teachers?

9. What was the extent of the training and experience of science teachers as reflected by undergraduate and graduate credits in science, science education and the number of years of experience in teaching science?

10. To what extend have science teachers participated in sponsored in-service science institutes in the period 1961-70?

11. What type of special science facilities were available for teaching science?

12. What was the practice regarding the adoption and use of science textbooks and curriculum materials?

13. What were the predominant instructional techniques used by science teachers?

14. What factors were considered important by science teachers for obtaining and maintaining a high quality science program in the school?

15. How satisfied were science teachers with teaching science as a career?

Definitions of Terms

1. Great Lakes Region: This geographic region comprises the states of Illinois, Indiana, Michigan, Ohio and Wisconsin.

2. Far West Region: This geographic region comprises the states of Alaska, California, Hawaii, Nevada and Washington.

3. Public secondary school: refers to an educational institution, operated on public funds, under the principal or head teacher, including

any combination of grade levels from 7 through 12, except any lower grades under an elementary school organization. This definition excludes all private, parochial or dioceseaan secondary schools, correctional schools, technical or vocational schools, and special schools for the blind, the partially blind, the deaf, dumb, emotionally-disturbed, and physically or mentally-handicapped children.

4. <u>Teacher</u>: A person employed to instruct students in a situation where the teacher and the students are in the presence of each other.

5. <u>Science teacher</u>: A teacher who teaches at least <u>one</u> science course or subject.

6. <u>Science course or subject</u>: A course of studies designated as "science" by the individual school or school system.

7. <u>Science course improvement project</u>: A course or program of studies in any area of science developed by a group of individuals, under the sponsorship of the National Science Foundation,

universities, school systems, state departments of education, or educational organizations, to improve instruction in that area of science.

8. Conventional or traditional science course: A course or program of studies in any area of science which is not a science course improvement project.

9. Advanced science course: An enriched and accelerated course or program of studies in any area of science which is specially designed for students with superior achievement, aptitude, or interest in science. It is often a second course in the particular field of science

10. Full-time teachers: Those teachers who occupy teaching positions which require them to be on the job on school days, throughout the school year, for at least the number of hours the schools in the system are in session.

11. Part-time teachers: Those teachers who occupy teaching positions which require less than full-time service.

12. Substitute teachers: Persons who are assigned to teach on a day-to-day basis, temporarily replacing regularly employed teachers.

13. Regularly employed teachers: Those teachers who are placed on the regular faculty salary schedule. This definition includes both full-time and part-time teachers but excludes substitute teachers.

14. Unit population: This is the number of students, both elementary and secondary, that determines the selection of one public secondary school in for each state.

15. School type: Refers to the type of school organization, in particular to the grade levels that are included in a public secondary school. For example, all public secondary schools having only grades 9-12 inclusive will be considered to be one school type.

16. Selection numbers: These are small whole numbers selected from a table of random numbers, and always including the number 1, which constitute the basis of the selection criteria for randomly

selecting science teachers and science classes.

17. Equipment: This refers to non-consumable, non-perishable items such as microscopes, chemical balances, models, telescopes, aquariums, etc.

18. Supplies: These are perishable or easily breakable materials that must continually be replenished such as chemicals, dry cells, glassware, electric bulbs, copper wire, etc.

Design of the study

The study involved both the development of instruments (questionnaires) to ascertain science teaching practices, procedures, policies, and conditions and the multi-stage random sampling of public secondary schools, science teachers and science classes.

The instrument development and pilot study phase of the investigation occupied the period February-April 1970. Based on the results of the pilot study, the questionnaires were revised. Printing of the final version of the questionnaires was completed in January 1971.

The population of the study consisted of all 6,528 public secondary schools (Gertler 1970) in the Great Lakes and Far West regions of the United States. The sample size was 2,019 schools, representing 30.9 percent of the public secondary schools in the two regions.

The sampling design developed involved three stages:

I. Stratified random selection of secondary schools.

II. Random selection of secondary science teachers.

III. Random selection of science classes.

In stage I, the number of schools to be selected from each state was calculated on the basis of the ratio of total state secondary school enrollment to the total United States secondary school enrollment. Comparable steps at county and school district levels, successively, determined the number of schools selected for inclusion in the study at that level. Individual schools were then randomly selected from an alphabetical listing of schools in the respective districts.

Stage II involved the random selection of science teachers within selected schools. Random numbers indicated which teachers were to be selected from an alphabetical listing of science teachers.

In stage III, science classes were randomly selected from the total number taught by the pre-selected science teachers.

Questionnaire sets were mailed to the principals of selected secondary schools during March 16-22, 1971. Follow up postcards were mailed in two batches during May 27-29 and June 18-20 to 792 non-responding schools. July 1, 1971 was set as the cut-off date for the collection of data from questionnaires for this study.

The data on the questionnaires were coded and transferred to computer cards for analysis and summary by standard computer programs. Modifications of the computer programs were made when necessary to accomodate the number of variables and cases included in the study.

Analysis of the data was carried out using mainly descriptive statistics, such as frequencies, sums, maxima, minima, ranges, and percentages. The data were grouped across several dimensions such as state, geographical region, and school size so that comparisons could be made with respect to variables of interest. Chi-squares were computed for variables of interest, and tests of independence between the variables were carried out.

Assumptions

Assumptions relating to the study were:

1. There was a need to obtain accurate, reliable and relevant information regarding science teaching practices, procedures, policies, and conditions in the public secondary schools of the Great Lakes and Far West regions as part of the comprehensive national science teaching survey.
2. The descriptive survey using mailed questionnaires was the most practical way of obtaining the needed information.
3. The questionnaires designed by the investigator were able to elicit the desired information from school principals and science teachers.
4. The sample of public secondary schools was representative of the population of public secondary schools in the Great Lakes and Far West regions of the United States.

5. The sample of secondary school science teachers was representative of the population of secondary school science teachers in the two regions.
6. The sample of secondary science classes was representative of the population of secondary science classes in the two regions.
7. Principals and science teachers answered the questionnaires honestly and accurately to the best of their ability.
8. The method of directing questionnaires to science teachers through their respective principals provided the best means of obtaining responses.
9. The period of three and a half months (March 16 - July 1, 1971) constituted a reasonable time span for the collection of data for the study.

Limitations of the study

The following are considered to be limitations of this study.

1. The population of school districts consisted of

only those school districts in the Great Lakes and Far West regions listed in the Education Directory, 1968-69: Part 2 - Public School Systems (1968).

2. The public secondary schools within school districts were limited to those listed in the respective state education directories.
3. The United States total student enrollment data and the individual state enrollment data used to determine the number of public secondary schools sampled per state, were limited to those given in Fall 1968 Statistics of Public Elementary and Secondary Day Schools (Barr and Foster 1969).
4. The student enrollment data for school districts used to determine the number of public secondary schools sampled per district or combination of districts were limited to those given in the Education Directory, 1968-69; Part 2 - Public School Systems (1968).

5. The data gathered with respect to science teaching practices, procedures, policies, and conditions in the public secondary schools were limited to those prevailing for the 1970-71 school year.
6. The purpose of the study was not to evaluate but to describe the science teaching practices, procedures, policies, and conditions in the two regions.

The investigator recognized the inherent limitations of data obtained from questionnaire returns: the loss of completed questionnaires in the mail; the indeterminate factors that motivate some individuals to respond and others to fail to respond; the possible misinterpretation of the intended meaning of particular items in the questionnaires; the situational factors existing at the time the questionnaires were completed which affected the mental attitude of the respondents; and the tendency for some teachers to respond positively to procedures or techniques which they knew were theoretically sound, but which they did not use in practice. Finally, some involuntary bias on the part of the investigator in interpreting and processing questionnaire responses seemed to be unavoidable.

Overview

The dissertation has five chapters.

Chapter I contains the introduction and general overview of the study.

Chapter II is devoted to a review of relevant national, regional, and state status studies of science teaching practices, procedures, policies, and conditions in public secondary schools.

The design of the study, including procedures used to (1) develop the instruments, (2) select schools, science teachers and science classes, and (3) collect data is discussed in detail in Chapter III.

The results of the analysis of data are presented in Chapter IV.

Chapter V includes a summary of results, a discussion of the implications of the results, and suggestions for further research.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter has three sections. In the first, a number of national studies of science teaching practices, science curricula, secondary science teachers' academic and professional backgrounds, and work loads are reviewed. Sampling methods and major findings of the various studies are summarized. In the second section, the objectives, procedures, and results of two important regional studies of science teaching are discussed. The third section consists of reviews of science teaching surveys at the state level. Reviews of state surveys of science teaching practices and teacher characteristics are more detailed for those states located within the Great Lakes and the Far West regions of the United States. Studies of science teaching practices in the other states are more briefly reviewed. With the exception of one national study, all the studies reviewed in this chapter are limited to those on secondary school science.

NATIONAL STUDIES

According to Obourn (1961), the first national status study in science education was carried out by Johnson (1950), who surveyed 715 public high schools in the 1947-48 school year. The purpose of this study was to determine the offerings, enrollments, grade levels of pupils, and time allotments of science courses, the average size of science classes, and the nature of troublesome problems related to science teaching.

The data were collected by means of a questionnaire sent to a stratified random sample of public junior and senior high schools. Of 23,947 high schools of ten or more pupils, 755 or 3.15 percent were selected. Usable information was received from 715 schools, which represented a response rate of 94.7 percent.

Major findings of the study were as follows:

1. More than 50 percent of high school pupils were enrolled in the four commonly offered science courses of general science, biology, chemistry and physics.
2. The average class size was smallest for physics, where it was 19 pupils, and largest for seventh-grade general science, where it was 30 pupils.
3. The most common practice was to allot five periods per week to each of the science courses. The periods of 45 minutes each were most commonly reported as laboratory time in biology, chemistry, and physics.
4. In the 715 schools reported in this study, there were 827 full-time science teachers, of whom 62.9 percent were men. There were also 1,011 part-time science teachers who taught one or more sections of science along with other teaching or school responsibilities.

Of these, 56.4 percent were men.

5. The troublesome problems reported by science teachers were mostly related to physical facilities, such as equipment and supplies. Also reported frequently were problems with science rooms and teaching staff.

Johnson's survey was followed by Martin's (1952) study of the status of high school biology. The data were collected by means of a questionnaire sent to a stratified random sample of 1,072 public high schools in the United States. Usable questionnaires were received from 786 schools, which constituted a response rate of 73.3 percent. The major findings of this study were:

1. A course with the title "General Biology" or an equivalent course with a different title, was offered in 95.1 percent of the schools.
2. Of the 441,749 high school students in the sample, 21.65 percent were enrolled in a course in general biology.
3. The average class size was 29 students.

4. In 82.1 percent of the schools, the general biology course was scheduled for five single periods (each averaging 52.1 minutes) per week.

5. A single basic textbook was used by 93.6 percent of the schools.

6. One or more science clubs were reported by 33.5 percent of the schools.

7. Combined laboratory-classrooms were used for the general biology classes in 60.6 percent of the schools; separate laboratories and classrooms in 27.5 percent; rooms equipped and used for other subjects in 7.5 percent, and rooms with no special provisions in 4.4 percent.

8. The average annual appropriation for biological equipment and supplies for all schools was $231.03, ranging from $2.28 per pupil in high schools of less than 100 pupils to $0.20 for for schools with 500 or more.

9. There were 1,236 biology teachers in the 786 schools in the sample. The average number of

biology teachers in high schools of less than 500 was 1.0%.

10. Over 58 percent of the biology teachers had majored in biology; 31.2 percent minored in biology, and 10.2 percent were teaching the course without a major or minor in biological science.

11. The average biology teacher had about 10 years of experience.

In the early 1960's a number of national surveys on science teaching in elementary and secondary schools were conducted. One such survey was carried out jointly by the National Association of State Directors of Teacher Education and Certification, and the American Association for the Advancement of Science (NASDTEC-AAAS 1963). The purpose of this study was to ascertain the educational and professional backgrounds and the service loads of teachers of secondary school science and mathematics in the public and private schools of the United States during the school year of 1960-61.

The sample of science teachers was selected by the stratified random sampling method from the U.S. Registry of Junior and Senior High School Science and Mathematics Teaching Personnel, 1960-61, compiled by the National Science Teachers Association. The stratification was designed to ensure proportional representation of these teachers according to geographical region, size of school, grade levels within school, and the number of classes in science and mathematics taught by the individual teacher. The sampling ratio of 1 in 36 applied to each of the strata produced a total sample of 3,957 teachers. A questionnaire was mailed in the spring semester of 1961 to each of these teachers, 3,012 of whom returned usable questionnaires within the allotted time. This represented a response rate of 76 percent. Three followup procedures were directed to non-respondents. Subsequently, interviews by telephone were conducted with half of the non-responding teachers to determine their characteristics.

Some significant and interesting results of this study were:

1. Of the entire sample, 69 percent were men. Half were less than 35 years old, and only a quarter were 45 or older. The report pointed out the fact that the science and mathematics teacher population was surprisingly young meant that these teachers would affect the quality of secondary school education in these subjects for a long time.
2. All but one percent of the teachers had earned at least bachelors' degrees. Thirty-nine percent held master's degrees. More than 75 percent had earned at least 10 hours of graduate credit.
3. The preparation of 73 percent of the biology teachers, 70 percent of the mathematics teachers, 60 percent of the physics teachers in the survey met the minimum standards of

preparation in their subjects as recommended by the AAAS Cooperative Committee on the Teaching of Science and Mathematics (1960).

4. Twenty-six percent of the teachers in the sample had completed at least one National Science Foundation Summer institute.

5. The length of the teachers' workweek averaged 45 hours. Of this, 23 hours were spent in teaching in the classroom or laboratory; 17 hours were spent in activities related to teaching, while the remaining five hours were devoted to non-teaching tasks such as lunchroom supervision and bus duty.

6. More than half of the teachers were full time science teachers; 56 percent were teaching five or six classes in science, including mathematics as a science. Twenty eight percent taught three or four science classes, and 16 percent taught one or two science classes.

7. Nearly every possible teaching combination of science subjects was observed. Of the physics teachers, more than 80 percent taught mathematics, chemistry, or general science, including 28 percent who taught two or three of these subjects. Less expected was that 24 percent of the physics teachers also taught biology. Forty percent of the biology teachers taught general science, while 23 percent of them taught chemistry. Half of the teachers of biology and chemistry also taught general science, and 27 percent of the general science teachers taught five or more classes of their subject.

Rogers'(1963) study focussed on the overall school organization as well as on procedures, practices and conditions affecting science instruction in public junior high schools. The population of her study was limited to those public junior high schools having grades 7, 8, and 9, and no other grades. There were 3133 such junior high schools, of which 882 or 28.1 percent were sampled. The sample design provided for a one-stage stratified random sample. The schools were stratified by three enrollment groups, i.e., (1)1,500 and over, (2)500-1,499 and (3) under 500. Those schools with enrollment size of 1,500 and over were arranged alphabetically by State within each region; after a random start, the schools in each stratum were selected in a systematic manner in accordance with pre-determined sampling ratios.

A questionnaire was sent to each principal of the 882 selected schools; a total response rate of 90.4 percent was reported. Major findings of this study were:

1. All public junior high schools offered science courses at some grade level, but not all offer them in each of the grades.

2. Teachers with science assignments constituted 13 percent of the total instructional staff of all junior high schools, although relatively few of these teachers taught science full time. One-third of them spent 10 hours or fewer per week in science teaching.

3. Seventy-seven percent of the total junior high school students were enrolled in some science class.

4. General Science was the most common science course. It was offered in about 95 percent of the schools, with 67 percent of the total students enrolled.

5. The mean size for all junior high school science classes was 29, although some regions of the Nation reported means for a particular science subject as high as 42.

6. Homogeneous grouping for science instruction

was reported in about 60 percent of the schools, with the frequency of such grouping related to school size and to grade level.

7. A combination classroom-laboratory was the most common teaching facility, although more than one-quarter of the schools did not provide any type of laboratory, and over 40 percent of the large schools reported using nonscience rooms for science instruction.

8. Some schools, including over one-tenth of the small ones, reported no expenditure of money for science equipment and materials. About seven-tenths of the schools prepared an annual budget for these items.

9. The mean expenditure for science equipment and materials per junior high school was about $800, while the median expenditure was approximately $494.

10. School size considerably affected the nature of science instruction. The largest schools appeared to be doing the poorest job of science teaching.
11. Science clubs and science fairs were sponsored by about half of the Nation's public junior high schools.
12. About three-quarters of the schools reported the availability of science specialists to assist teachers working in the field.

A national study by Obourn and Brown (1963) was undertaken to ascertain both the total number of science and mathematics teachers as well as their distribution according to teaching load, by geographic region, size and type of school. The universe from which the sample was selected was all public secondary day schools in the 50 states and the District of Columbia. The sampling plan provided for stratification of the universe of schools by three enrollment size groups and four organizational types, for a total of 12 strata. From the universe of 24,203 secondary schools, a sample of 1,536 schools was selected as follows: Schools were arranged in alphabetical order within each of the 12 strata. After a random start in each stratum, every k^{th} school was selected. The selected schools were sent a one-page questionnaire and 1,514 schools submitted at least partially completed returns - a questionnaire response rate of 98.6 percent.

Among the major findings of the study were:

1. In the fall of 1961 there were 103,666 teachers engaged in teaching one or more periods in science in the public secondary schools. These teachers represented 17.5 percent of the 592,228 public secondary school teachers in the United States at that time.

2. The distribution of secondary school science

teachers by geographic region revealed some interesting patterns: 19,264 or 18.6 percent of of the total were in the Great Lakes region; and 8,998 or 8.7 percent in the Far West region region.

3. The distribution of the science teachers by type of school were as follows: 24.4 percent were teaching in junior high schools, 37.2 percent in junior-senior high schools; 9.9 percent in senior high schools; and 28.5 percent were teaching in regular 4-year high schools.

4. Over 62 percent of the science teachers taught four or more periods of science a day, 22.5 percent taught either two or three periods of science per day and nearly 15 percent taught only one period of science per day.

5. Nearly 22 percent of all science teachers

were new to the school in which they were teaching in the Fall of 1961.

6. Approximately 12 percent of the science teachers had no previous teaching experience other than having had a course in practice teaching while in college.

7. Of the teachers in the study, 21.4 percent taught both science and mathematics.

Maberly (1967) conducted a survey to determine instructional trends and patterns in the teaching of high school chemistry in the winter of 1965. The survey sample consisted of 150 public high schools in various regions of the United States. Of these, 96 responded to a questionnaire detailing the nature and structure of their chemistry curriculum. The major findings of the study were:

1. Chemistry was taught predominantly as an eleventh-grade subject for a total of five periods per week.

2. The modal length of a chemistry period was 55 minutes with one or two double periods per week being the rule.
3. Over 49 percent of the schools were teaching a traditional chemistry course; 23 percent taught the CHEM Study course while only eight percent offered CBA Chemistry.
4. The two most often used chemistry textbooks were Modern Chemistry by Dull and others (36 percent of the schools) and the CHEM Study text, Chemistry - An Experimental Science (20 percent of the schools).

In the fall of 1963, 29 high schools in various regions of the United States responded favorably to an invitation to participate in a standardization program for the revised Nelson Biology Test. Each participating school submitted detailed information pertaining to their biology curriculum pattern and from these data, Maberly and Margolin (1965) determined modal trends in the teaching of high school biology.

Within the schools sampled, biology was most commonly taught in grade 10 for five periods a week, and the length of each period was most often 55 minutes or more. The average school enrollment in conventional biology was 285, compared with the average school enrollment in BSCS biology of 151. The average class size in both conventional and BSCS biology was 26. There was no clear-cut indication of a preference pattern for Yellow, Green or Blue among the BSCS versions offered.

Bila and Bligh (1968, 1969) studied various aspects of high school curricula in general science, biology, chemistry, physics, and earth science, as part of the standardization program for a commercial publishing company. Participating schools were located in communities of 10,000 to 100,000 in population and were proportionately distributed over the United States. The major findings relating to each science area are summarized below.

General Science

The general science survey was conducted in 1963. Ninety-six percent of the seventh-graders, and 89 percent of the eighth-graders who were taking a science course were taking General Science. A noticeable departure from this predominant enrollment in General Science occurred in the ninth grade where only 62 percent of the students taking science were taking General Science, while 14 percent were in Biology, 12 percent in Earth Science, nine percent in Physical Science, and three percent in Life Science.

A variety of general science textbooks were being used at each grade level in the 27 participating schools. The most popular books were those authored by Davis and his associates.

Biology

Courses in biology were offered at grades 9, 10, 11, 12 with 69 percent of the schools scheduling the course at grade 10. Of 7,119 biology students in the survey, only 1,033 or about 14 percent were enrolled in a BSCS program. However one third of all high school biology students were using BSCS textbooks. The investigators reported that the brighter students in the 29 participating schools were generally being programmed for the BSCS Courses.

The most popular Biology textbook was Moon, Otto and Towle's Modern Biology which was used in 54 percent of the 29 schools. The remaining 46 percent was divided among 14 other textbooks, with no book being used in more than six percent of the schools.

Chemistry

In 1965, chemistry was taught predominantly as an eleventh-grade subject for a total of five periods per week. The modal length of a single chemistry period was 55 minutes with one or two double periods per week being the rule, and the average number of minutes per week was 292. A majority of high schools had not yet converted to CHEM Study or CBA materials, but for those who had done so, there was a definite trend in favor of CHEM Study over CBA.

The most popular textbooks were Modern Chemistry by Dull et al and CHEM Study's Chemistry - An Experimental Science.

Physics

The 112 participating schools in 41 States had a total of 4,965 students enrolled in physics. Approximately 77 percent of these schools offered Physics in grade 12, 22 percent offered it in grade 11 and only one school offered physics in grade 10. About 34 percent of the schools offered PSSC Physics. As with Biology (Maberly and Margolin, 1965), Chemistry (Maberly, 1967), the most popular class schedules for Physics was 55 minutes for five times a week.

Two textbooks were used in a combined total of 83 percent of the schools surveyed (Bila and Bligh, 1969). Dull, Metcalf and William's Modern Physics was used in 46 percent of the schools and the PSSC textbook was used in 37 percent of the schools.

Earth Science

Earth Science was being offered predominantly in the ninth grade. However, 29 percent of the 12,000 enrolled in earth science were in grade eight while 11 percent were in grade 10,11 or 12. The earth science course was most frequently given five times a week, 50 minutes each time. Thirty-six percent of the schools offered the ESCP course. About half of the 67 schools surveyed included one or more field trips in the course, and 85 percent included one or more laboratory periods..

Blackwood's (1965) study, although limited to the public elementary schools, had some important implications for science instruction in the secondary schools as well. The purpose of the study was to obtain information about the procedures, policies, practices, and conditions affecting science teaching in the public elementary schools during the 1961-62 school year.

Schools that received a questionnaire were selected through a two-stage sampling process. The first stage consisted of choosing a stratified sample of 1,597 school districts from the 34,040 school districts reported by the Bureau of the Census for the school year 1959-60. The second-stage sample, constituting the list of schools to receive the questionnaire, was drawn from the composite list of 18,866 individual elementary schools in the 1,597 selected school districts. The second-stage sample was stratified by school enrollment size to assure representation in each of these enrollment groups: 800 and over pupils, 400 to 799, 50 to 399, and 49 and under. In all, 1,680 eligible schools received the questionnaire.

Followups by letter, telephone calls, and telegrams yielded a substantial (87.1 percent) return of the questionnaires. A special effort was made to obtain responses from a random sample of one-third of the non-respondents, thus increasing the final rate to a total of 87.9 percent.

Some of the findings that have important implications for secondary school science were:

1. Nearly 83 percent of the schools taught science for more than one-half year to seventh and eighth graders.
2. The median number of minutes devoted to science instruction in the seventh grade was 141; in the eighth grade, the median was 135 minutes.
3. The percent of schools that taught science as a separate subject increased by grade from 24 percent in kindergarten to 79 percent in the eighth grade.
4. Conservation was taught with science in 32 percent of the schools in grades seven and eight.
5. Science was taught by a classroom teacher without the help of an elementary science specialist in over 70 percent of the schools

in grades six through eight.

6. About eight percent of all public elementary schools believed their science equipment and supplies were very plentiful; 46 percent, generally adequate; 35 percent, far from adequate; and 11 percent, completely lacking.

7. The annual per-pupil outlay for science equipment and apparatus ranged from 11 to 14 cents, although 15 percent of all schools spent $1.51 and over per pupil.

8. The two barriers to effective science teaching ranked highest for all public elementary schools were the lack of adequate consultant service and the lack of supplies and equipment.

Thompson (1969) investigated the high school physics education of a sample of 1,312 seniors who took the College Board Physics Achievement Test in

December 1965 or January 1966 and a sample of 706 juniors who took the test in May 1966. The participating students were asked to fill out questionnaires, and 75 percent returned usable questionnaires.

The survey results showed that physics was essentially a masculine subject. Overall, only six percent of the respondents were girls. Physics students were in general the scholastically elite, as evidenced by their ranking (75^{th} percentile) on the Scholastic Aptitude Test (SAT).

In terms of physics topics studied and experiments done, several differences between or among categories were indicated. Differences between PSSC and non-PSSC students were notable in several instances. Using the mean percentage of those who were certain of having studied the topics and done the experiments listed in the questionnaire as the measure, the following orderings within categories were found: juniors surpassed seniors; students from the Northeast and Midwest surpassed those from the West, who in turn, surpassed those from the South; students from independent and public schools surpassed those from Roman Catholic schools.

The two most widely used textbooks were Modern Physics (Dull, Metcalfe, Brooks, and/or Williams) and PSSC Physics (Physical Science Study Committee); 30 percent of the juniors and 42 percent of the seniors reported that Modern Physics was the primary text in their first physics course and 37 percent of the juniors and 28 percent of the seniors said PSSC Physics was the primary text in their first course. Thompson inferred from the data that about 40 percent of the students had studied the PSSC course.

In a study similar to Thompson's reviewed above, Fornoff (1969) investigated the high school chemistry education of 2,395 seniors and juniors who took the CEEB Chemistry Achievement Test in December 1965 and in January, March and May 1966. Data were collected by means of questionnaires filled out by participating students. A response rate of 75 percent was reported.

The results showed that overall, chemistry students were above average students as judged by their scores on the Scholastic Aptitude Test. More than 80 percent of the chemistry students had taken science each of the four high school years. The most widely used sequence of science courses was: general science for freshmen, biology for sophomores, chemistry for juniors, and physics for seniors. About 65 percent of the students in the Northeast and Midwest regions of the United States had either five or six periods of chemistry a week. In the South and the West, 80 percent of the students spent five periods a week in chemistry class. More than 90 percent of the chemistry classes were in the range from 40-59 minutes.

The two most popular chemistry textbooks used were Modern Chemistry.(Dull, Metcalfe and others) and Chemistry: An Experimental Science (Chemical

Education Material Study); they were used by 56 percent and 15 percent of the chemistry students respectively. The CBA textbook, Chemical Systems, was used by three percent of the students. Approximately 13 percent of the students had taken either an Advanced Placement chemistry course or a college-level chemistry course. The three most frequently used textbooks in college-level chemistry courses were Chemistry (Sienko and Plane), Modern Chemistry and Chemistry: An Experimental Science.

Young (1965) reported on the results of a survey on the reasons for low enrollment in high school physics sponsored by the American Institute of Physics. The November, 1964 issue of The Physics Teacher, containing a questionnaire with a tearout reply postcard, was sent to approximately 17,000 physics teachers in high schools. Responses were received from 1,382 teachers.

The data collected furnished overwhelming evidence that in the opinion of their teachers, high school students stayed away from physics because in their school, the course was too difficult to suit their abilities and desires. The data also appeared to show rather conclusively that in many schools the student of physics was expected to work relatively harder than students of other subjects in order to achieve high grades.

REGIONAL STUDIES

Brown and Obourn (1959) conducted a regional study of the qualifications and teaching loads of mathematics and science teachers in Maryland, New Jersey and Virginia. The sample consisted of 1,393 teachers in 369 schools who taught one or more classes in science and/or mathematics in grades 9-12. By category, there were 662 mathematics teachers, 594 science teachers, and 137 mathematics-science teachers.

The highlights of the study were:

1. Of all the science teachers in the sample,

64.3 percent held the baccalaureate degree and 33.3 the master's degree. Nearly half their highest degrees were obtained after 1950.

2. For all types of schools in the sample, 98.5 percent of the science teachers had an average of 47.4 semester hours of college science, and 1.5 percent had none.
3. Training in biology was reported for 78.3 percent, and no training in biology for 21.7 percent.
4. Training in chemistry was reported for 87.0 percent and no training in chemistry for 13 percent.
5. Training in physics was reported for 71.7 percent and no training for 28.3 percent.
6. For all types of schools in the sample, 40.9 percent of the science teachers had

no training in college mathematics and 83.0 percent had none in the calculus or in more advanced mathematics.

7. The total science enrollment in the schools sampled was 71,515. Of this number, 42.6 percent were in general science, 35.4 percent in biology, 12.8 percent in chemistry, and 9.2 percent in physics.

8. The average class size in every science was somewhat above the 1956 national average class size (Brown and Obourn 1956). The comparative figures were as follows:

Subject	National average	Average for Sample
General Science	28.9	31.1
Biology	27.7	29.8
Chemistry	22.6	23.7
Physics	19.9	23.8

9. Of the 594 science teachers in the sample, less than 50 percent taught only science, 22.2 percent only a single science, 27.8 percent more than one science, 15.5 percent taught science and conducted study halls, 14.0 percent taught science and had some administrative duty, and 3.5 percent taught science and physical education.

Another regional study of science teaching in public high schools was conducted by Koelsche (1961). While the main focus of the investigation was on science facilities and equipment, he also determined science enrollments, science offerings and fiscal arrangements for the administrative practices employed in the procurement of equipment and supplies.

The sample consisted of 855 high schools selected at random from the three, four, and six-year high schools operating during the 1958-59 academic year in Florida, Illinois, Massachusetts, North Dakota, Ohio, South Carolina, and Wisconsin. This sample represented 25 percent of the public secondary schools in the seven states during the 1958-59 school year. The data were collected by teams of investigators during school visitations and conferences with high school administrators and science teachers.

The major findings of this study were:

1. General science was offered in 86.8 percent of the schools; biology in 95.5 percent; chemistry in 74.5 percent; physics in 71 percent; and "others" in 23.2 percent. Of the "other" sciences, physical science, advanced general science, and physiology were the most popular.

2. Based upon the 1958-59 enrollment statistics, 63.7 percent of the students were enrolled in science courses. They were assigned such that 19.2 percent of the students were in general

science; 24.5 percent in biology; 10.2 percent in chemistry, 5.6 percent in physics; and 4.3 percent in other science courses.

3. Except for general science, as school size increased, there was a tendency for a larger portion of the high school students to pursue science courses.

4. The most prevalent types of rooms used for science instruction were combination classrooms and laboratories. In approximately 20 percent of the schools, science was taught in regular classrooms.

5. Large high schools had better presentation and laboratory facilities than the small schools. Laboratory space per student was adequate in only 46.6 percent of the schools.

6. About 59 percent of the schools had specific annual budgets for procuring science equipment. The average amount of money

available per school was almost $900.00.

7. Annual budgets for science supplies were found in 51.9 percent of the schools. The average amount per school was $382.00.

8. The amount of money budgetted for science supplies and equipment per science student was $2.66.

STATE STUDIES

Numerous state status studies of science teaching and science teacher preparation have been conducted in the past twenty years. In this section, a number of state studies that have particular relevance to the current study are briefly reviewed.

Gardner (1958) studied the preparation and teaching assignments of senior high school science teachers in Ohio during the 1957-58 school year. Data were collected from the principals' reports for the year and supplemented by information from post-card questionnaires sent to science teachers. A total of 967 public high schools and 2,228 science teachers were included in the study.

Major findings of this study were:

1. The median enrollment range in Ohio senior high schools (grades 10-12) was 100-199.

2. A total of 511 science teachers held life certificates; 1,092 had provisional certificates, and 116 had temporary teaching certificates.

3. The teachers' average classroom experience was 13 years.

4. One-fourth of the chemistry teachers and approximately one-half of the physics teachers did not meet the requirements adopted by the State Board of Education. In the biological sciences, 12.17 percent were below the standard.

5. Over 52 percent of the biology teachers, 73 percent of chemistry teachers, and 84 percent of physics teachers did not have

science credits equal to the standards recommended by the Ohio State University, the National Association of Biology Teachers and AAAS Cooperative Committee on Science Teaching.

6. Diversity of teaching assignment was common and most extensive in the county schools. Fulltime teachers (teaching science courses only) had assignments ranging from one to five different science courses. Part-time science teachers had assignments ranging from one to five different non-science courses plus science.

The academic and teaching backgrounds of secondary science teachers in Ohio were also investigated by Koelsche (1959). Data were gathered by means of the principals' 1957-58 reports and questionnaires returned by 175 high schools.

All but 11 in the sample of 476 science teachers had received their bachelors' degree, and one-third of the teachers held master's degrees. The median age was 35. Two-thirds of the teachers had been on their current jobs for five years or less, and about one-third had had no previous teaching experience. The median number of years of prior experience was five.

Biology was included in the academic background of 80 percent of the general science teachers. The median number of credits earned was 19 semester hours. Approximately 72 percent of the general science teachers had college chemistry; the median number of credits earned was 14. Sixty-one percent of general science teachers had college physics but only 20 percent had any geology.

Biology teachers as a whole had relatively adequate academic backgrounds with an average of 33 semester hours in science, of which 24 hours were in biology. Chemistry teachers had an average of 48 semester hours in science, of which 19 hours were in

Chemistry. Physics teachers had an average of 47 semester hours in science, including 13 hours in physics.

Hughes, (1962) investigated the academic preparation of chemistry and physics teachers in the public high schools of Ohio. Data were collected from the principals' reports for the school year 1961-62. Major findings of this study were:

1. The mean number of years of teaching experience for the 1,164 chemistry and physics teachers was 12.9 years.
2. Most chemistry and physics teachers also taught other courses. The most common of these other course assignments were: biology, junior high science, and mathematics.
3. The majority (62 percent) of the teachers had only a bachelor's degree. Approximately 36 percent held the master's degree.

4. The mean number of semester hours in science was 52.5. The mean number of semester hours in chemistry for a sample of chemistry teachers was 28.4. In physics, a sample of physics teachers had a mean of 21.0 semester hours.

Patterson (1964) investigated the status of PSSC physics in Ohio. Data were collected by means of a questionnaire sent to 107 PSSC physics teachers. Sixty-six, or 61.6 percent of the teachers answered and returned the questionnaire. Major findings of this study were:

1. Approximately 12.6 percent of Ohio secondary schools were using the PSSC physics course in 1962-63.
2. Approximately 77 percent of the PSSC physics teachers held the master's degree or better; however, only 50 percent of the teachers reported a college major in physics.

Six teachers were teaching PSSC physics without a major or minor in that subject.

3. Approximately 80 percent of the teachers had received special PSSC teacher training at one of the NSF institutes.

4. PSSC physics was replacing the conventional physics course in Ohio schools at a slow, steady rate. An accumulated total of 107 PSSC physics teachers in six years in 847 high schools was a rate of change-over of approximately two percent per year.

King's (1964) study was designed to investigate the academic and professional preparation of the teachers of seventh and eighth grade science in the Ohio public six-year and three-year junior high schools. Data were collected from the 1961-62 Ohio principals' reports.

Among the major findings of this study were:

1. Over 76 percent of the teachers held

only the baccalaureate degree; about 21 percent had masters' degrees.

2. Eighteen percent of the teachers had no preparation in science. The average number of semester hours in all science areas was 37.19. Twenty percent of the teachers did not meet the state minimum requirement of 20 semester hours in professional education.

3. Only about 30 percent of the teachers reported preparation in physical science. The average number of semester hours was 8.84. About 46 percent of the teachers reported preparation in biology. The average number of semester hours in biological science was 14.23.

The preparation of earth science teachers in Ohio was investigated by Skinner and Davis (1965). Sixty earth science teachers in 52 high schools were each mailed a questionnaire incorporating items dealing with preparation, course introduction and course components. Fifty-three questionnaires, an 88 percent response were completed and returned. The major findings were as follows:

1. All the teachers held bachelor's degrees. About half held masters' degrees, and the remainder averaged 18 semester hours of graduate credit.
2. Almost one-fourth of the teachers reported undergraduate majors in earth science. Most of the others indicated a major in a science or mathematics.
3. Masters' degree preparation for teaching the sciences was less favorable than the undergraduate pattern. Most of the teachers had majors in school administration or guidance.
4. The mean number of semester hours of credit

in earth science was 21. Course credits in other sciences averaged 45 semester hours per teacher. In the primary fields, the teachers seemed particularly weak in astronomy and meteorology.

5. Twenty-eight teachers reported attendance at NSF Summer Institutes.

Skinner and Davis (1965) also examined the status of earth science in Ohio high schools during the 1963-64 school year. Data were gathered by means of a questionnaire mailed to 60 earth science teachers in 52 high schools. Among the findings of the study were:

1. Nearly 4,000 students were enrolled in earth science in Ohio high schools.

2. Earth science appeared to be offered in three different patterns: to ninth graders in general, to tenth-twelth graders of lower aspiration,

and to high ability twelth graders.

3. The average percent of course time spent on each major area of earth science were: geology, 55 percent; astronomy, 20 percent; meteorology, 14 percent; oceanography, six percent; physical geography, three percent; and other areas, three percent.

4. Most of the schools use one of two textbooks: Modern Earth Science by Ramsey and Buckley (Hott, 1961) or Earth Science: The World We Live In by Namowitz and Stone (Van Nostrand, 1960).

5. Most teachers indicated that an inadequate or unavailable laboratory was their greatest problem. Field trips were popular with 30 teachers, but 19 others indicated that they did not use this kind of on-site study.

Wimberly and Buell studied the status of BSCS Biology in Ohio High Schools in 1966. Questionnaires were sent to a random sample of 65 BSCS teachers;

47 responses were received, constituting a response rate of 72.3 percent. Major findings were:

1. Graduate preparation in biology of the teachers ranged from zero to 107 with a mean of 32.8 semester hours.
2. Mean years of experience equalled 10.4.
3. Sixty percent of all enrolled sophomores were taing biology and 26.7 percent of all grade 9-10-11 students were taking biology. Of the total biology students, 3,768 (34.2 percent of total) were taking some form of BSCS. These were divided as: Blue 1,366 (12.4 percent of total), Green 1,192 (10.9 percent of total), Yellow 1,076 (9.8 percent of total) and Special Material 134 (1.2 percent of total). One hundred and ninety-nine students (1.8 percent of total) were taking a second year of biology.
4. The financial allotment for the biology program ranged from $200 to "unlimited"

per year. The highest responses were at $6,000 to $7,000 levels.

5. A majority of teachers did not have screening by IQ in admission to biology classes.

6. All teachers in the sample agreed that BSCS teaching took more time and effort on the part of the teacher.

The status of the academic and professional preparations of Ohio physics teachers was surveyed by Lucy (1968). Part of the data for the study was obtained from the Principals' Reports. Additional data were obtained from a questionnaire sent to a stratified sample of 275 teachers which was randomly selected from the population of 825 physics teachers in Ohio. One hundred and ninety-seven usable questionnaires were returned for a yield of nearly 72 percent.

Some major findings of this study were:

1. The average preparation of Ohio physics teachers in physics was 22.9 semester hours. But more than one-third of the physics teachers failed to meet the Ohio certification. standard of 15 semester hours in physics.
2. PSSC physics teachers tended to have better preparations in physics and mathematics than conventional physics teachers. More PSSC teachers had masters' degrees and they obtained their degrees more recently.

Lucy concluded that the academic and professional preparation of Ohio physics teachers were seriously inadequate. They especially lacked preparation in optics, heat and thermodynamics and physical mechanics.

Similar studies of the preparation and teaching assignments of Ohio science teachers have been conducted by Baker (1959), Cermak (1960), Cox (1962), Morter (1962), and Stocksdale (1962).

The state of physics teaching in the public and non-public senior high schools of Illinois was investigated in 1967 (Dungar, 1970). A questionnaire was sent to all physics teachers on a mailing list compiled by the Office of the Superintendent of Public Instruction. A final sample of 502 usable responses were received. The major findings of this study were as follows:

1. A total of 17,815 students were enrolled in physics in Illinois high schools.
2. More than 85 percent of physics teachers were male. Over 73 percent of the teachers were between the ages of 25 and 50.
3. Over 56 percent of the teachers had less than 10 years of teaching experience; 68 percent had less than 10 years of physics teaching experience.
4. The PSSC Physics textbook was used by 26.5 percent of the teachers. Modern Physics was used by 47.8 percent of the teachers.

5. Nine percent of the teachers had less than 10 Semester hours in physics which was the minimum for recognition in Illinois.
6. While 78.5 percent of the teachers reported that a laboratory room was always available, 32.5 percent stated that they devoted less than 20 percent of total class time to laboratory work.
7. The major problems in doing laboratory work reported by the teachers were (a) insufficient time for setting up and maintaining laboratory, (b) lack of equipment for individual or small teams, and (c) inadequacy of physical facilities.
8. Over 42 percent of the teachers had not attended any NSF supported Summer institutes in Science or mathematics.

Black's study (1962) was concerned with the status of PSSC Physics in Indiana. The sample consisted of

352 physics teachers in 333 Indiana high schools. Black reported that there were 16 Indiana teachers using the PSSC program in the school year 1960-61. However, 70 teachers in the sample stated that they planned to teach PSSC physics. The average college physics training of the sample was almost 24 semester hours, while that of the PSSC teachers was over 32 semester hours.

Van Koevering (1971) initiated a study to determine if high schools with either high or low percentage enrollments in physics exhibited any distinguishing characteristics that were measurable. The sample consisted of 48 high schools in the state of Michigan which had either high or low percentage enrollments in physics. A visit was made to each school and questionnaires were administered to physics teachers, physics and chemistry students, and guidance counselors.

The results of the study indicated that the characteristics of the physics teacher and the physics class as measured by the instruments used for the most part did not have important influences on enrollment. The mathematics prerequisites for physics of more than geometry as determined by the guidance counselors were directly linked with low physics enrollments. Physics students in both groups of schools received lower grades in physics than they did in their other academic subjects.

The nature of the academic preparation in science of Wisconsin high school teachers of physics, chemistry, biology, and general science was investigated by Pella (1958). Data were collected from reports submitted by the school districts in Wisconsin to the State Department of Public Instruction during 1955-56 and 1956-57, and from the college transcripts of individual science teachers. The following is a summary of the major findings of the study with respect to the academic preparation in science and mathematics of the various types of science teachers.

Physics Teachers

1. There were 258 physics teachers.
2. Ninety-three percent of them had some college preparation in physics.
3. Seventy-five percent of the teachers had earned 10 or more credits in physics.
4. The average number of credits in physics earned was 13.5.
5. Ninety-three percent of the teachers had earned an average of 15.9 credits in chemistry.
6. Ninety-three percent had earned an average of 16.6 credits in mathematics.
7. Schools with more than 300 students generally had physics teachers slightly better prepared in physics and in the broad area of science.

Biology Teachers

1. There were 367 biology teachers.
2. About 98 percent of the teachers had some college preparation in biology.

3. The average number of credits in biology earned by a biology teacher was 20.5. The mean number of credits, in science exclusive of mathematics, earned by the biology teacher was 41.8.
4. Over 59 percent of the biology teachers had an average of 9.9 credits in physics; in chemistry, the average number of credits for 79.8 percent of the teachers was 13.3.
5. Size of school did not seem to be a factor attracting the best prepared biology teachers.

Chemistry Teachers

1. There were 261 teachers of chemistry.
2. Over 96 percent of the teachers had some college training in chemistry.
3. The average number of credits in chemistry was 18.5.
4. Physics was included in the academic pre-

paration of 81.5 percent of the chemistry teachers. The average number of credits in biology was 15.9.

6. Schools with more than 200 students generally had chemistry teachers better prepared in chemistry and in the broad area of science.

General Science Teachers

1. There were 407 teachers of general science.
2. Over 92 percent of the teachers had some college training in three or more science areas.
3. The average number of credits in science was 38.5.
4. Over 76 percent had academic credit in physics; over 87 percent, in earth science; and over 71 percent, in mathematics.
5. Size of school did not seem to be a factor in attracting the best prepared teachers.

Pella (1956) also studied the proportion of the schoolday devoted by Wisconsin public high school science teachers to science teaching and to teaching other subjects. Major findings of this study were:

1. There were 1,139 teachers teaching science in 425 schools during the 1955-56 school year.
2. One-third taught science full-time; two-thirds taught other non-science subjects.
3. 9.4 percent, only of the chemistry teachers taught chemistry full-time; 31.4 percent taught chemistry and some other science; and 59.2 percent taught chemistry and some non-science subject.
4. 5.1 percent, only, of the physics teachers taught physics full-time; 28.5 percent taught physics and some other science; and 69.6 percent taught physics and some non-science subject.

5. 30.3 percent of the general science classes were taught by full-time science teachers, 6.9 percent by full-time general science teachers, and 69.7 part-time science teachers.

6. 28.7 percent of the part-time chemistry teachers, and 40.8 percent of the part-time physics teachers taught mathematics also.

A study to investigate the factors affecting the implementation of new science curricula in California and Nevada schools was conducted by Obradovic (1970). Schools using the new science curricula were first identified; and two questionnaires were developed, one for school administrators and one for teachers.

The Principal's Questionnaire was designed to yield data on (1) the school's general characteristics, (2) the science program and (3) teacher inservice science education available in the area. The Teacher's Questionnaire was designed to yield data on

(1) the teachers' preparation for teaching a specific new science curriculum, (2) the seriousness of specific problems, (3) the extent to which specific features of the curriculum were used or adapted, and (4) the teachers' perception of the effectiveness of the science curriculum.

The questionnaires were sent to all secondary schools in 59 California and Nevada counties. A total of 333 Principal Questionnaires from 335 schools and 950 Teacher's Questionnaires were received.

Major findings of the study with respect to the status of the new science curricula and teachers' preparation to teach them were:

1. The number of California and Nevada school districts using the BSCS versions was: Blue - 62, Green - 61, Yellow - 54, and Special Materials - 34.
2. The number of school districts using CHEM Study and PSSC was 103 respectively.

3. Approximately two-thirds of the intermediate science teachers had less than two years experience, while less than five percent had over five years experience with the new science curricula. However, 50 percent of the Earth Science Curriculum Project (ESCP) teachers and approximately a third of the Time, Space, Matter (TSM) and Introductory Physical Science (IPS) teachers had received over 10 class hours of special preparation.
4. Two-thirds of the BSCS Blue Version teachers and more than half of the Green and Yellow Version teachers had over two years experience teaching their respective versions.
5. Approximately 70 percent of the CHEM Study and PSSC physics teachers, but only 25 percent of Advanced BSCS biology teachers, had over two years experience in teaching

these curricula.

6. The major difficulties encountered by teachers of the new science curricula were: deficiencies in student mathematical, reading and problem solving skills, insufficient time for teacher preparation for laboratory sessions, insufficient time for science classes, inadequate laboratory facilities and equipment, and non-suitability of a particular curriculum.

Many other status studies of science teaching and/or science teacher preparation at the state level have been conducted. The present investigator has identified the following studies from the literature : Anderson (1950) in Minnesota, Anderson and Goode (1965) in North Carolina, Bedwell (1966) in South Dakota, Bennett (1966) in Texas, Brogden (1962) in Georgia, Kercheval (1957) and Porter (1965, 1966) in Iowa, DeLoach (1957) in Tennessee, DeLoach and Boysworth (1957) in Alabama, Engel (1950) in Nebraska, Forster (1956) in Missouri, Gebhart (1966) and Orlich (1967) in Montana, Gorton (1969) and Reed and others (1962) in New Jersey, Grobman (1966) in Pennsylvania, Hunter (1962) and Randall (1957) in Louisiana, Jones (1964) in Arkansas, McCain (1956) in Washington, Olenchalk (1970) in California, Pitluga (1964) and Woodard (1963) in New York, Seeling (1965), and Orlich and Seeling (1968) in Idaho, Stoess (1964) in Kentucky, Swann (1967) in Mississippi, and Wiley (1961) in Delaware. All these studies indicate that there has been a keen and widespread interest in the status of science education in the nation's schools.

SUMMARY

In this chapter the objectives, procedures, and major findings of 12 national, two regional, and 15 state surveys of science teaching practices and science teacher characteristics, conducted over the past 20 years, have been reviewed. Reference was also made to 33 other state surveys of secondary school science and science teachers.

CHAPTER III

THE STUDY - DESIGN AND PROCEDURES

This chapter is divided into four sections. The first section is a description of the development and validation of the instruments used in the study. The sampling design, and the procedures employed in the actual selection of schools, science teachers, and science classes are reviewed in the second section. The third section provides a brief description of the data-gathering phase of the study. In the fourth section, the data analysis procedures are discussed.

Development of the Questionnaires

Once the survey method had been selected for the study, it became clear that implementation of the method would involve knowledge of the development and validation of questionnaire instruments. Steps taken to fulfill this need were :

1. Works on survey research techniques were reviewed in order to establish a series of guidelines for use in questionnaire construction.

2. Research studies in science education using questionnaires were reviewed. Particular attention was paid to questionnaire design and format.

3. Questionnaires used in national, regional, and state studies of science teaching practices, curricula, and science teacher characteristics, academic preparation, and workloads were examined in order to learn more about item construction and phraseology.

After consultation with his advisers, the investigator decided that the scope of the investigation demanded two questionnaires: one for school administrators, and one for science teachers. As a first step in the development of the questionnaires, the problem of the study was reviewed, and all information that had probable relevance to the problem was identified. It was found that breaking up the problem into 15 sub-problems or questions assisted greatly in identifying the variables to be included in the questionnaires. Specific questionnaire items relating directly to the 15 sub-problems were then drafted, revised, and rewritten a number of times by the investigator. Finally, the draft versions of the two questionnaires were submitted to the investigator's advisers and to doctoral students in science education for their comments, criticisms, and suggestions. Further revisions in the instruments were made on the basis of the criticisms and suggestions of this informal panel of judges.

The Questionnaires

The questionnaire designed for school administrators was designated the Principal's Questionnaire.

It was designed to provide summative data for all the science teachers, science classes, and science programs in the school. This instrument had 26 items grouped into seven sections: I. Screening question; II. School organization and scheduling; III. Grouping of science classes; IV. Teaching staff; V. Science budget; VI. Course offerings; VII. Miscellaneous. In all, there were 141 variables in this questionnaire.

The Science Teacher Questionnaire was designed to provide data on the characteristics of secondary school science teachers, and the specific practices and conditions for science instruction. The instrument contained 21 items grouped into six sections: I. School organization; II. Teacher characteristics; III. Teaching load; IV. Special Science facilities and audio-visual aids; V. Science teaching; VI. Miscellaneous. The instrument had a total of 135 variables.

A copy of each of the Principal's Questionnaire and the Science Teacher Questionnaire can be found in Appendices D and G respectively.

Validation of the Questionnaires - Pilot Study

In order to test the validity of the questionnaires, it was decided to distribute (1) the Principal's Questionnaires to a small sample of secondary school principals in the Columbus, Ohio area, and (2) the Science Teacher Questionnaires to a sample of science teachers and science supervisors.

On March 7 1970, copies of the Science Teacher Questionnaire were distributed to 42 secondary school science teachers and science supervisors who attended the annual meeting of the Central Ohio Association of Physics Teachers at the Department of Physics, The Ohio State University, Columbus, Ohio. A total of 19 usable questionnaires were completed and returned; this represented a response rate of 45.2 percent. An analysis of the responses to the questionnaire items resulted in some modifications in the phraseology of items which were vague or ambiguous.

In a similar way, a number of items in the Principal's Questionnaire were revised on the basis of the criticisms, comments, and suggestions of the secondary school principals.

The Population

The population consisted of all public secondary schools in the 11 states of the Great Lakes and Far West regions of the United States. One recent report (Gertler, 1970) stated that there were 6,528 public secondary schools in the two regions under study. In effect, the population was restricted to all public secondary schools listed in the respective state education directories for the 1970-71 school year.

<u>The Sample of Schools</u>

The present study formed a part of the larger national survey of science teaching in the public secondary schools for the 1970-71 school year. The methods used to obtain the sample of schools for this study were also those devised for the national survey. Sample sizes were determined as follows:

1. Based on an operational criterion of a sample of 10,000 public elementary schools in the companion national survey of elementary school science teaching practices, the sample size in the national survey of secondary school science teaching practices was computed to be 6,398 public secondary schools. The respective sample sizes reflected the ratio of the total elementary school enrollment to the total secondary school enrollment in the

country.

2. The number of public secondary schools to be selected from each state was computed on the basis of the ratio of the state total secondary school enrollment to the total U.S. secondary school enrollment.

Thus,

$$n_{state} = \frac{N_{state(S)}}{N_{total(S)}} \times N$$

where n_{state} = number of public secondary schools to be sampled in the state

$N_{state(S)}$ = secondary school enrollment in the state

$N_{total(S)}$ = total U.S. secondary school enrollment

N = sample size in the national survey = 6,398 public schools

<u>Example: State of Ohio</u>

$N_{Ohio(S)}$ = 680,960 secondary school students

$N_{total(S)}$ = 17,543,239 secondary school students

Hence, $n_{Ohio} = \frac{680,960}{17,543,239} \times 6,398$

= 248 public secondary schools.

i.e. 248 public secondary schools were to be sampled from the population of public secondary schools in Ohio.

The sample sizes for the other 10 states were calculated using equation (1) and substituting the appropriate enrollment figures. The sample sizes for all the 11 states in the Great Lakes and Far West region were then summed to give the total sample size of 2,019 schools.

Sampling Procedures

The nature of the investigation required a three-stage sampling process:

1. The selection of the public secondary schools.
2. The selection of secondary school science teachers.
3. The selection of the science classes from which specific data on science teaching practices were desired.

Before schools could be sampled however, it was necessary to determine the 'unit population' for each state. The unit population was defined as the number of students, both elementary and secondary, that determined the selection of <u>one</u> public secondary school in the sub-sample of public secondary school for each state.

The unit population for each state was computed as follows:

$$\text{Unit population} = \frac{N_{state\ (E,S)}}{n_{state}}$$

where $N_{state\ (E,S)}$ = school enrollment (elementary and secondary) for the state.

N_{state} = number of public secondary schools to be sampled in the state

<u>Example : State of Ohio</u>

$N_{Ohio(E,S)}$ = 2,384,160 students

n_{Ohio} = 248 public secondary schools

Hence, the unit population for Ohio

$$= \frac{2,384,160}{248}$$

= 9,613 students per public secondary school sample unit.

Once the unit population for a state had been determined, the number of schools to be sampled per county or school district could be computed for that state. This was done as follows:

1. School districts in each state were first grouped by county. The total school enrollment (elementary and secondary) of all school districts in a county was computed. This number was divided by the unit population for that state to determine the number of public secondary schools to be sampled from the county.

   Example : Franklin County, Ohio

   Total school enrollment in Franklin County = 177,707

   Unit population for Ohio = 9,613

   Number of public secondary schools to be sampled from the population of public secondary schools in Franklin County, Ohio $= \frac{177,707}{9,613} = 18$

2. If the total school enrollment was less than one half that of the unit population, then the

county was combined with one or more neighboring county(ies) so as to give a combined school enrollment which was approximately equal to one, two or more times the unit population. Then the number of public secondary schools to be sampled from this group of counties was determined by dividing the combined school enrollment by the unit population.

Example : Combining Neighboring Counties - Coshochocton and Holmes Counties, Ohio

Total school enrollment in Coshocton Co. = 7,790

Total school enrollment in Holmes County = 4,343

Combined school enrollment in Coshocton and Holmes counties = 12,133

Number of public secondary schools to be sampled in Coshocton and Holmes counties $= \frac{12,133}{9,613}$

= 1, to the nearest whole number.

3. In the case of large school districts within a county, the total school enrollment in each school district was divided by the unit population

to determine the number of public secondary schools to be sampled from each district.

Example : Columbus Public School District, Ohio

Total school enrollment in the Columbus Public School District = 105,123

Number of public secondary schools to be sampled in the Columbus District $= \frac{105,123}{9,613}$

= 11, to the nearest whole number.

4. In the case of small school districts within a county, two or more neighboring districts were combined, and their total school enrollment was divided by the unit population to determine the number of public secondary schools to be sampled from the combined districts.

Example : Combining School Districts - Grandview Heights and Upper Arlington, Ohio

Total school enrollment in the Grandview Heights District = 1,768

Total school enrollment in the Upper Arlington District = 8,487

Combined school enrollment = 10,255

Number of public secondary schools to be sampled from the Grandview Heights and Upper Arlington school districts $= \frac{10,255}{9,613} = 1$, to the nearest whole number.

The names of all school districts within a county of a particular state were entered on forms called FORM I (Appendix H). In addition to district names, the following information was recorded : total county enrollment n_c, state unit population, secondary UPS, the ratio n_c/UPS, the grade span for each district, the total district enrollment N, and the ratio N/UPS for each district. The ratio N/UPS determined the number of public secondary schools to be sampled from each school district. In the case of county school districts, the ratio n_c/UPS was used to determine the number of schools to be sampled in the county.

Random Selection of Public Secondary Schools

Once the information recorded on FORM I for all the counties of a state was completed, the selection of schools began. Individual public secondary schools in each school district were listed in alphabetical order, and numbers were assigned to each school, starting with "1" for the first school on the list. If k schools were to be selected from the district, then k random numbers were chosen from a table of random numbers. The k random numbers were then matched with those that had been assigned to the schools on the alphabetical list. The schools whose assigned numbers matched the k random numbers were selected for inclusion in the sample.

The names and addresses of selected schools were entered in forms called FORM 2B (Appendix I). In addition, each school was given an eight-digit identity code number. When names of school principals, school enrollment, and the number of teachers in a school were given in the state education directories, the information was also recorded in the appropriate spaces on the forms.

The same random selection procedure was used to sample schools in (1) county districts, (2) combinations of county districts, and (3) combinations of school districts within counties.

Random Selection of Science Teachers

Included in the questionnaire packet sent to the principal of a selected school were the directions for randomly selecting a science teacher on his staff to respond to the Science Teacher Questionnaire. The science teacher was selected on the basis of a set of selection criteria associated with a set of selection numbers generated from a table of random numbers. Each principal was requested to (1) list in alphabetical order the last names of all his full-time teachers who taught at least one science course or subject in any grade level or combination of grade levels from 7 through 12, (2) select a science teacher on the alphabetical list, using the given set of selection criteria, and (3) give the Science Teacher Questionnaire to the selected science teacher. A copy of a set of the Science Teacher Selection Criteria is given in Appendix C.

Ten separate sets of the Science Teacher Selection Criteria containing different sets of selection numbers were used in the study. The sets were distributed randomly among the questionnaire packets, so that each packet had one set of the selection criteria.

Random Selection of Science Classes

The Science Teacher Questionnaire contained a special request to the science teacher to respond to several questionnaire items with reference to one of his science classes. The method used by the science teacher in selecting this science class was as follows:

1. The science teacher was requested to order his science classes in numerical order, starting with "1" for the first science class that he taught each day, and so on, ending with his last science class for the day.
2. He was then asked to select one of his science classes on the basis of selection

criteria associated with a set of selection numbers generated from a table of random numbers.

Ten separate sets of the Science Class Selection Criteria containing different sets of selection numbers were used in the study. The sets were distributed randomly among the Science Teacher Questionnaires, and were incorporated as page 6 in each questionnaire. A copy of a set of the Science Class Selection Criteria is given in Appendix F.

A flow chart of the sampling design of the study is given in Fig. 1.

Printing of Questionnaires, Cover Letters etc

A Xerox 3600 Copier was used to print 2,500 copies of each of the following:

1. Letter to the Principal (Appendix A)
2. Directions for the Principal (Appendix B)
3. Science Teacher Selection Criteria (Appendix C)
4. The Principal's Questionnaire (Appendix D)
5. Letter to the Science Teacher (Appendix E)

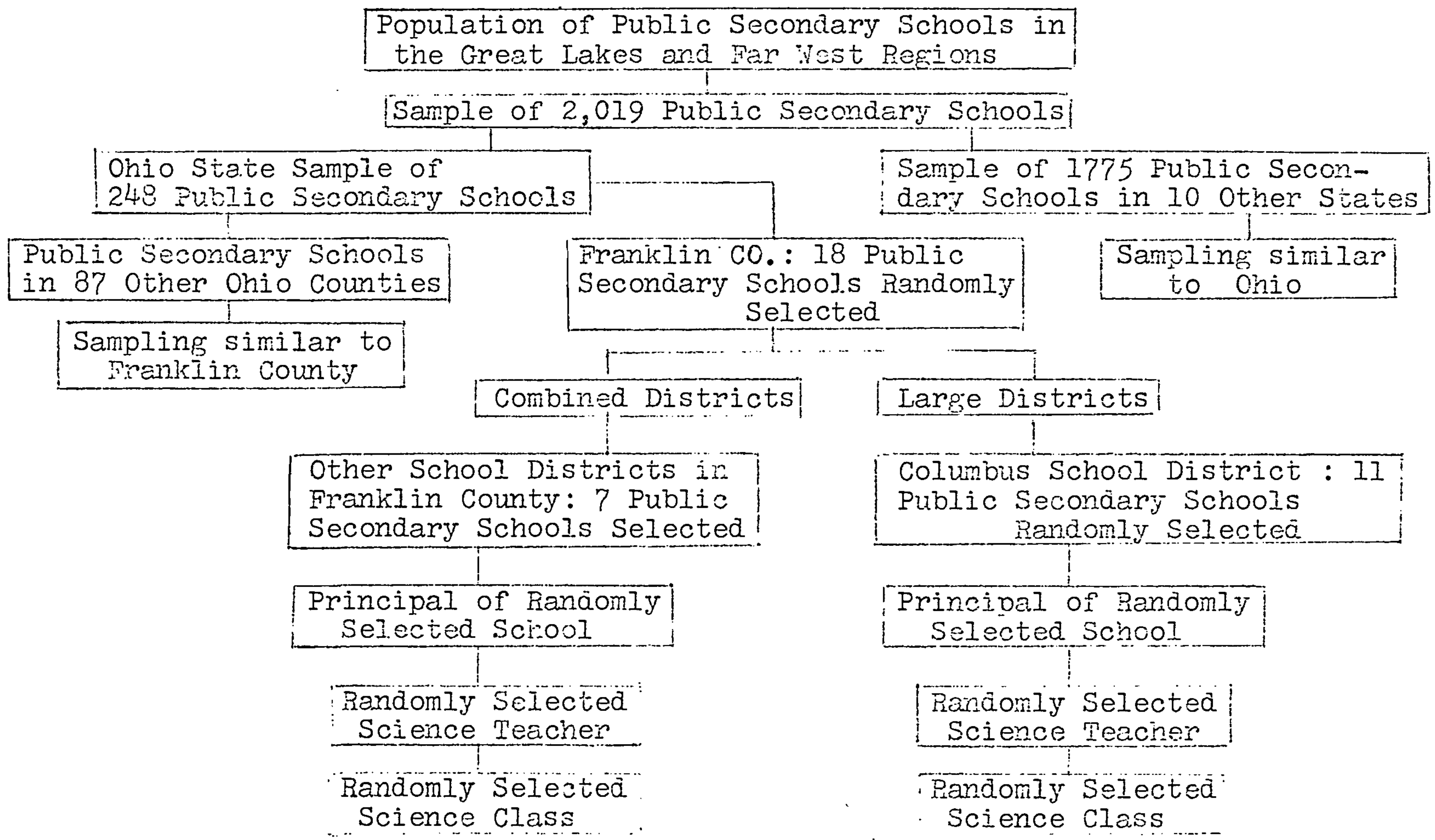

Fig. 1. FLOW CHART OF THE SAMPLING DESIGN

6. Science Class Selection Criteria (Appendix F)

7. The Science Teacher Questionnaire (Appendix G)

Preparation and Distribution of Questionnaire Packets

The pages of the questionnaires were collated by machine, while the cover letters, direction sheets, and selection criteria were collated manually. When the collating process was completed, questionnaire packets were prepared. Each questionnaire packet contained the seven items listed above, together with two pre-paid return envelopes for the use of the principal and the science teacher.

Address labels were placed on the questionnaire packets, which were then sorted and grouped by zip-codes to facilitate handling by third class mail. The questionnaire packets were mailed to the principals of the selected schools during the period March 16 - 22, 1971.

Follow-up Procedures

A record was kept of all completed Principal's and Science Teacher Questionnaires received. School districts and counties which failed to show a response rate of 60 percent by May 25, 1971 were identified. Approximately one-half of the non-responding schools in these districts and counties were selected to receive the first batch of follow-up postcards. During the period May 27 - 31, 402 follow-up postcards were mailed to the principals of the selected schools. A copy of the follow-up postcard used is given in Appendix J.

During the period June 15-16, 1971, the investigator made a number of telephone calls to the Directors of Research in several large school systems from which relatively low response rates were recorded. He explained the purposes of the study to the various Directors of Research, and requested their assistance in getting better responses from the schools in their respective districts. About half of these key personnel expressed their willingness to cooperate as best they could, but the other half maintained it was up to individual principals and teachers to respond as they chose.

Another 392 follow-up postcards were mailed to schools whose principals and science teachers had not responded by June 17, 1971. The mailing period for this second batch of post-cards was June 18-20, 1971.

The cut-off date for return of the questionnaires was July 1, 1971. In the case of the follow-up postcards, the cut-off date was July 20, 1971.

Coding of Questionnaire Responses

Coding keys were developed for both the Principal's and the Science Teacher Questionnaires. Only numeric codes were used for all the questionnaire responses. In addition to the eight-digit identity code number, each questionnaire was assigned three numbers which indicated that (1) secondary schools were being surveyed, (2) the kind of respondent i.e. principal or science teacher, and (3) the particular region i.e.

Great Lakes or Far West. Coding of the questionnaires proceeded as they were received, but this occurred mainly during May-June, 1971.

Key-punching Coded Data

The coded data in the questionnaires were key-punched onto standard computer cards. A total of five computer cards were required to accomodate the data in each Principal's Questionnaire. In the case of the Science Teacher Questionnaire, four computer cards were used.

Data Analysis

All computer programs used during the study were Biomedical Data (BMD) programs prepared by the Health Science Computer Facility, University of California at Los Angeles, or modifications of BMD programs.

A frequency count program, developed at the Ohio State University Computer Center from a BMD program was used to obtain frequencies, percentages, and totals of item responses with respect to 141 variables in the Principal's Questionnaire, and 135 variables in the Science Teacher Questionnaire. Data were analysed for each state, and for each of the two geographical regions in the study.

The BMD02S Contingency Table Analysis program was used to compute two-way frequency and percentage tables as well as chi-squares. School enrollment size was used as the base variable in this computation.

One hundred and sixty-two tables of results pertaining to variables of interest were prepared. These tables and a brief review of the results therein, are presented in Chapter IV.

CHAPTER IV

RESULTS

General data regarding public secondary schools were collected for the study to serve as background for analysis of science teaching practices, procedures, policies and conditions. This information included the number, kind, and distribution of schools, school enrollment size, organization of the school day, length of class period, and the length of the school year. The rest of this chapter consists of a presentation, in narrative and tabular form, of the results of data analyses relevant to the 15 sub-problems or questions previously stated in Chapter I.

Questionnaire Response Rates

In the spring of 1971, there were approximately 6,500 public secondary schools in the 11 states of the Great Lakes and Far West regions of the United States. Two thousand and nineteen schools, or about 31 percent of the total, were in the sample. A total of 902 schools were included in this analysis of the data. The overall response rate by July 1, 1971 for the Principal's Questionnaire was 44.7 percent while that for the Science Teacher Questionnaire was 45.6 percent. The questionnaire response rates by region and state are shown in Table 1. Response rates for the follow-up postcards by state and region are given in Table 2. It can be seen that the highest response rates for both the questionnaires were from the states of Oregon, Washington, and Wisconsin. Data from a total response will be analyzed at a later date.

Types of Schools

Each school was asked to indicate the grade grouping it was organized to accomodate. In this study, the various grade groupings were referred to as types of schools, such as grades seven to nine, grades 10 to 12, etc.

Public secondary schools included a variety of grade groupings. In both the regions, four-year high schools were most prevalent, followed by three-year high schools and three-year junior high schools . These three common groupings accounted for over 94 percent of the public secondary schools in the Far West region and 84 percent of the public secondary schools in the Great Lakes region. (See Tables 3 and 4.)

Schools with enrollments of 1,000-1,999 pupils constituted the single largest group in both regions. (See Tables 5 and 6.) The second largest group of schools in the Great Lakes region had enrollments of 500-999; in the Far West region, the very large schools, those with enrollments of 2,000 and over, constituted the second largest group of schools.

Organization of the School Day

The school day was organized into regular class periods by 92 percent of the schools in the Great Lakes region, and by 88 percent of the schools in the Far West region. (See Tables 7 and 8.) Schools using modular scheduling comprised just over five percent of the schools in both regions. There was no significant association between school size and the kind of schedule used. The distribution of schools using modular and non-modular schedules according to school size is shown in Table 111.

The great majority of schools in both regions organized the school day into six or seven class periods/ modules. (See Tables 9 and 10.) The seven-period day was most frequent (33.8 percent) in the Great Lakes region, followed by the six-period day. In the Far West region, the six-period day was the most popular schedule with over 51 percent of the schools using this organizational pattern.

The small schools (499 and under) were less likely to adopt the "conventional" six or seven period day. (See Table 112.) They were likely to have five or less periods/ modules per day on the one hand, and eight or more periods/ modules per day on the other. The greatest proportion of schools offering six or seven periods/modules per day were the medium-sized (500-999) and the large (1,000-1,999) schools. More than 73 percent of schools in these enrollment groups had a six or seven period/module day, compared with 56 percent of the small schools and 54 percent of the very large schools. The very large schools were also likely to have eight or more periods/modules per day.

Length of Class Period

The majority of schools had class periods within the range 40-59 minutes, with the 55-59 minute range being the most common in the Great Lakes region, and the 50-54 minute range the most common in the Far West region. (See Tables 11 and 12.)

There was a significant association, at the .01 level, between school size and the length of class periods. The small schools were likely to have the shortest class periods (less than 40 minutes), although the majority of them (63 percent) had periods ranging from 50-59 minutes. (See Table 125.) The very large schools (2,000 and over) more frequently had the 50-54 minute range of class periods.

Length of School Year

For about 88 percent of the schools in the Great Lakes region, the range of days in the school year was between 176-185 days, with the most common range being

176-180 days. (See Table 25.) In the Far West region, the most common range was 176-180 days. (See Table 26.)

Administrative Provisions of Time for Teaching Science

In the Great Lakes region, the most common pattern for teaching science at grades seven, eight, and nine was five periods a week. (See Table 13.) Data from the schools of the Far West region were less clear. (See Table 14.) At grades 10, 11, and 12 in both regions, the most common pattern for teaching science was also five periods a week. (See Tables 15 and 16.)

Homogeneous Grouping of Science Classes

Homogeneous grouping of science classes was used by 52 percent of schools in the Great Lakes region, and by 44 percent of schools in the Far West region. (See Tables 17 and 18.) In the Great Lakes region, homogeneous grouping was done most often at grade nine. In the Far West region, homogeneous grouping of science classes was most often used at grade 10.

There was a significant association, at the .10

and .02 levels respectively, between school size and the presence or absence of homogeneous grouping of science classes at grades seven and eight (See Tables 126 and 127.) The smaller the school, the more likely was homogeneous grouping of science classes practised at grades seven and eight. For example, 11.8 percent of the small schools had homogeneous grouping of science classes at grade seven, compared with four percent of the very large schools. This result was expected since most of the small schools were junior high schools with grades seven and eight, while most of the very large schools were combined junior-senior high or high schools with fewer seventh grade classes.

No significant association between school size and homogeneous grouping of science classes was observed at grade nine.

There was a significant association, at the .001 level, between school size and the presence or absence of homogeneous grouping at grades 10, 11, and 12. At all three grade levels, the very large schools were more likely to practise homogeneous grouping of science classes. (See Tables 128, 129, and 130.) The medium-sized schools were less likely to have homogeneous grouping.

Overall, the larger the school, the more likely was homogeneous grouping of science classes to occur. (See Table 113.) Over 62 percent of the very large schools reported homogeneous grouping, compared with 36 percent of the small schools. This was expected since the very large schools were mostly senior high schools with many science classes, particularly at grades 10, 11 and 12.

Criteria for Homogeneous Grouping

The three most important criteria used as the basis for homogeneous grouping of science classes in schools in the Great Lakes region were (1) teacher recommendation, (2) marks or grades, and (3) aptitude tests. (See Tables 19, 21, and 23.) In schools in the Far West region, the three most important criteria used as the basis for homogeneous grouping of science classes were (1) teacher recommendation, (2) marks or grades, and (3) student interest. (See Tables 20, 22, and 24.)

There was a significant association, at the .01 level, between school size and the degrees of importance assigned to teacher recommendation as a criterion for homogeneous grouping. (See Table 134.) The larger the size of the school, the more important was teacher recommendation rated as a criterion for homogeneous grouping.

A significant association, at the .02 level, was observed between school size and the degrees of importance assigned to marks/grades as a criterion for homogeneous grouping. (See Table 131.) The medium, large, and very large schools were more likely to rate marks/grades as a very important criterion for homogeneous grouping than the small schools.

Over 19 percent of schools of all sizes reported using intelligence tests as a criterion for homogeneous grouping. There was a significant association, at the .01 level, between school size and the degrees of importance assigned to intelligence tests as a criterion for homogeneous grouping. (See Table 132.) The large and very large schools were more likely to use intelligence tests as a criterion for homogeneous grouping than the small and medium-sized schools.

There was a significant association, at the .05 level, between school size and the degrees of importance assigned to aptitude tests as a criterion for homogeneous grouping. (See Table 133.) The very large schools were more likely to use aptitude tests as a criterion for homogeneous grouping than the small, medium-sized and large schools.

There was no significant association between school size and the degrees of importance assigned to student interest as a criterion for the homogeneous grouping of science classes.

Science Budget

Over 58 percent of the schools in the Great Lakes region and 60 percent of the schools in the Far West region had annual budgets for science equipment. Over 65 percent of the schools in the Great Lakes region and 83 percent of the schools in the Far West region had annual budgets for science supplies. (See Tables 27, 28, 29, and 30.)

The number and percent of schools in each of several expenditure categories for science equipment are shown in Tables 31 and 32. About 27 percent of all schools in the Great Lakes region spent from $1.00 to $2.00 per pupil on science equipment; in the Far West region, over 25 percent of the schools spent $1.00 to $2.00 per pupil on science equipment.

The number and percent of schools in each of several expenditure categories for science supplies are shown in Tables 33 and 34. Nearly 36 percent of the schools in the Great Lakes region, and 50 percent of the schools in the Far West region, spent from $1.00 to $2.00 per pupil on science supplies.

There was no significant association between school size and per pupil expenditure for science equipment. It was observed, however, that over 43 percent of the very large schools reported budgets for science equipment, compared with 30 percent of the small schools. (See Table 115.)

There was a significant association, at the .001

level, between school size and per pupil expenditure for science supplies. (See Table 116.) The larger the school, the more likely was there a budget for science supplies. Over 65 percent of the very large schools reported a budget for science supplies, compared with 40 percent of the small schools.

Over 90 percent of the schools in both regions allowed their science teachers to purchase science equipment and supplies periodically throughout the school year. There was no significant association between school size and the presence or absence of the practice of allowing science teachers to make periodic purchases of science equipment and supplies. (See Table 117.)

Federal Funds for Science

More than 74 percent of schools in the Great Lakes region, and 41 percent of schools in the Far West region reported that they had used National Defense Education Act (NDEA) funds since September 1968 to purchase science equipment. (See Tables 37 and 38.) These findings were in accord with Rogers' (1963) study which showed that schools in the Far West region had used least NDEA monies for science equipment purchases.

There was a significant association, at the .05 level, between school size and the use of NDEA funds to purchase science equipment. (See Table 118.) The large, medium-sized, and small schools were more likely to have used NDEA funds to purchase science equipment than the very large schools.

Thirty-nine percent of the Great Lakes schools, and 19.6 percent of the Far West schools had used Elementary and Secondary Education Act (ESEA) funds to purchase science equipment since September 1968. (See Tables 39 and 40.) But there was no significant association between school size and the use of ESEA funds to purchase science equipment. (See Table 119.)

Over 15 percent of the Great Lakes schools, and 8.7 percent of the Far West schools had used NDEA funds since September 1968 to re-model science facilities. (See Tables 41 and 42.) There was a significant association, at the .02 level, between school size and the use of NDEA funds to re-model science facilities. The small schools were more likely to have used NDEA funds for this purpose than the medium-sized, large, or very large schools. (See Table 120.)

Conventional Science Course Offerings

The number and percent of public secondary schools which reported student enrollments in various conventional science courses are presented in Tables 43 and 44. The science course offered by most schools in both regions was Biology, followed by Chemistry and General Science. Physical Science was offered by 23.9 percent of the schools in the Great Lakes region, and by 19.9 percent of the schools in the Far West region. Earth Science was offered by 18.4 percent and 8.7 percent of the schools in the Great Lakes and Far West regions respectively. A relatively high proportion (20.4 percent) of the Far West schools reported enrollments in Life Science. Only 9.5 percent of the schools in the Great Lakes region had reported enrollments in Physics; in the Far West region, the corresponding figure was 3.6 percent.

Science Course Improvement Project Offerings

The number and percent of schools in the Great Lakes and Far West regions which reported student enrollments in science course improvement projects are shown in Tables 45 and 46.

In the Great Lakes region, 20.9 percent of the schools reported enrollments in the Introductory Physical Science (IPS) course. (See Table 45.) Eleven percent of the schools reported enrollments in the Earth Science Curriculum Project (ESCP). Of the Biological Sciences Curriculum Study (BSCS) projects, the Yellow version was the most popular, with 20.9 percent of the schools reporting enrollments. The Green version was next with 13.3 percent, followed by the Blue version with 12.4 percent of the schools. Over 21 percent of the schools reported enrollments in the Chemical Education Materials Study (CHEM Study), compared with 1.8 percent for the Chemical Bond Approach (CBA). Physical Science Study Committee (PSSC) Physics was offered in 20.3 percent of the schools, compared with 5.6 percent for

Harvard Project Physics (HPP).

A similar pattern in science course improvement project offerings was observed in the Far West region, except that the BSCS Green version was the most popular of the BSCS curricula, with 28.6 percent of the schools reporting enrollments in the project. (See Table 46.) The respective percentages of schools reporting enrollmets in CHEM Study, PSSC Physics, and Harvard Project Physics were almost double those in the Great Lakes region.

There was a significant association, at the level, between school size and the teaching of the Earth Science Curriculum Project (ESCP). The larger the size of the school, the more likely was ESCP taught in the school. (See Table 139). Nearly 15 percent of the very large schools taught the ESCP course, whereas only 4.8 percent of the small schools taught the course.

A significant association, at the .001 level, was observed between school size and the teaching of the Biological Sciences Curriculum Study (BSCS) Blue Version.

(See Table 140). The very large schools were most likely to teach the course, while the medium-sized schools were least likely to teach it.

There was a significant association, at the .02 level, between school size and the teaching of the BSCS Green Version. (See Table 141). The very large schools were most likely to teach the course, while the other three enrollment groups were almost equally likely to teach the course.

A significant association was observed at the .001 level, between school size and the teaching of the BSCS Yellow Version. (See Table 142). The very large and large schools were more likely to teach the course than the small and medium-sized schools.

There was a significant association, at the .001 level, between school size and the teaching of the Chemical Education Material Study (CHEM Study) course. Almost 50 percent of the very large schools taught the course, compared with 27.1 percent of the large schools, 15.6 percent of the medium-sized schools, and 18.3 percent of the small schools. (See Table 143.)

A significant association, at the .001 level, was observed between school size and the teaching of Physical Science Study Committee (PSSC) Physics. Over 41 percent of the very large schools taught PSSC Physics, compared with 29.1 percent of the large schocls, 15.1 percent of the medium-sized schools, and 18.3 percent of the small schools. (See Table 144.)

There was a significant association, at the .001 level, between school size and the teaching of Harvard Project Physics (HPP). Over 15 percent of the very large schools taught the course, compared with 10.6 percent of the large schools, 3.9 percent of the medium-sized schools, and four percent of the small schools. (See Table 145.)

<u>Advanced Science Courses</u>

The number and percent of schools reporting enrollments in advanced science courses in the Great Lakes and Far West regions are presented in Tables 47 and 48 respectively. In both regions, the most frequently offered

advanced science course was Advanced Biology. Over 35 percent of the schools in the Great Lakes region reported student enrollments in Advanced Biology; in the Far West region, the corresponding figure was 29.1 percent. The second most popular advanced science course was Advanced Chemistry, which was offered by 20 percent of the schools in the Great Lakes region, and by 8.4 percent of the schools in the Far West region. The Honors Science course was offered by 4.5 percent of the schools in the Great Lakes region, and by 7.6 percent of the schools in the Far West region. The BSCS Second Course was offered by 4.5 percent of the schools in the Great Lakes region, and by 6.7 percent of the schools in the Far West region. Enrollments in Advanced Physics were reported by 5.8 percent of the schools in the Great Lakes region, and by 2.0 percent of the schools in the Far West region.
The Advanced PSSC course was offered by only 1.1 percent of the schools in the Great Lakes region, and by 0.6 percent of the schools in the Far West region.

Environmental/Conservation Education

The teaching of environmental/conservation education was reported in over 55 percent of schools in the Great Lakes region, and in over 68 percent of schools in the Far West region.

The number and percent of schools in both regions which taught environmental/conservation education as a separate subject by grade are presented in Tables 49 and 50. Environmental/conservation education was rarely taught as a separate subject in grades seven and eight. At grades 11 and 12, it was taught separately in about nine percent of schools in the Great Lakes region and about eight percent of the schools in the Far West region.

Environmental/conservation education was most commonly taught with science in schools of both regions. (See Tables 51 and 52.) The grade level in which environmental/conservation education was most commonly taught with science was grade Over 23 percent of schools in the Great Lakes region and 37 percent of schools in the Far West region reported teaching environmental/conservation education with science at grade 10.

In the Far West region, environmental/conservation education was often taught with social studies, particularly in grades nine, ten, eleven and twelve. (See Table 54.) The number and percent of schools in which environmental/conservation education was taught with two or more subjects including science are presented in Tables 55 and 56.

Science Clubs and Science Fairs

Over 62 percent of schools in the Great Lakes region and 73 percent of schools in the Far West region reported that they sponsored science clubs. (See Tables 57 and 58.) Approximately 24 percent of schools in the Great Lakes region and 18 percent of schools in the Far West region reported sponsoring science fairs. In both regions, over 44 percent of the schools reported that their students had participated in inter-school science fairs during the 1969-70 school year.

Usage of Specialists and Consultants

A variety of science and general curriculum specialists and consultants were used by the schools. The number and percent of schools in both regions using different kinds of specialists and consultants are presented in Tables 59 - 66. Over 21 percent of the schools in the Great Lakes region had used science specialists from city/county departments. About 25 percent of schools in the Far West region used these science specialists. State department science specialists were used by over 10 percent of schools in both regions. Science consultants from colleges and universities were used by 17.3 percent of schools in both the regions.

Inservice Science Education

A variety of inservice science education activities were available for science teachers. The number and percent of schools participating in the various types of inservice science education activities are presented in Tables 67 and 68. Over 88 percent of the schools in the Great Lakes region reported that their science teachers participated in curriculum development and revision meetings. In the Far West region, the corresponding figure was 90.8 percent. About 70 percent of the schools in the Great Lakes region, and 76 percent of schools in the Far West region had science teaching workshops for their science teachers. Over 53 percent of the Great Lakes schools reported that their science teachers participated in college science courses or work-shops. In the Far West region, the corresponding figure was 71 percent. About 23 percent of the Great Lakes schools reported that inservice science education television and/or radio programs were available to their teachers. In the Far West region, the corresponding figure was 37.7 percent.

Characteristics of the Science Teachers

A total of 921 science teachers responded to the Science Teacher Questionnaire. Of the 371 teacher respondents from Far West schools, 320 (86.3 percent) were male and 50 (13.5 percent) were female. In the Great Lakes sample, there were 488 (88.7 percent) male, and 58 (10.6

percent) female science teachers. A few respondents did not indicate their sex.

The number and percent of science teachers by age group are shown in Tables 69 and 70. In both regions, the age group with the highest percentage of science teachers was 30 - 39 years. On the whole, science teachers in both the samples were relatively young. Over 62 percent of the Great Lakes teachers were below forty years of age. The corresponding figure for the Far West teachers was 52.4 percent.

Highest Degrees Held

The number and percent of science teachers by highest degree held are presented in Tables 71 and 72. The great majority of science teachers in both regions held masters' degrees. The masters' degree was held by 63.4 percent of science teachers in the Great Lakes region, and by 60.7 percent of science teachers in the Far West region. About one third of science teachers in both regions held the bachelors' degree as their highest degree. The doctoral degree was held by 1.3 percent of science teachers in the Great Lakes region, and by 0.8 percent of science teachers in the Far West region. Only two science teachers in the Great Lakes sample reported that they had no degree.

Undergraduate Preparation in Science

The distribution of science teachers by region, state, and by ranges of undergraduate semester hours in biological science, physical science, and earth science is presented in Tables 73 - 78.

Over 56 percent of science teachers in the Great Lakes sample had more than 20 semester hours of biological science. In the Far West region, the corresponding figure was 58.9 percent. Over 46 percent of science teachers in both regions had more than 20 semester hours in physical science. Comparatively fewer science teachers had extensive undergraduate preparation in earth science. In both regions, only 10 percent of the teachers had more than 10 semester hours of earth science.

Graduate Preparation in Science

The distribution of science teachers by region, state, and by ranges of graduate semester hours in biological science is presented in Tables 79 and 80. Approximately 30 percent of the science teachers in the Great Lakes region had 20 or less semester hours in biological science. In the Far West sample, the corresponding figure was 41 percent.

About one-third of the science teachers in the Great Lakes sample had 20 or less graduate semester hours in physical science, while about 17 percent had over 20 hours. In the Far West sample, over 41 percent of the science teachers had 20 or less semester hours in physical science; 20.8 percent had more than 20 graduate semester hours in physical science. (See Tables 81 and 82).

Seventeen percent of the Great Lakes sample of science teachers had 10 or less graduate semester hours in earth science; only 6.1 percent of them had more than 10 hours. In the Far West sample, 25.7 percent of the teachers had 10 or less semester hours of earth science; 7.0 percent had more than 10 semester hours in earth science. (See Tables 83 and 84).

Graduate Preparation in Science Education

One-third of the Great Lakes science teachers had 10 or less graduate semester hours in science education; 10.5 percent had more than 10 semester hours. In the Far West sample, 43.7 percent had 10 or less semester hours in science education, and 19.2 percent had more than 10 semester hours. (See Tables 85 and 86.)

Attendance at Institutes

The number and percent of science teachers by state and region who had attended various kinds of institutes are presented in Tables 87 and 88. Only eight percent of science teachers in the Great Lakes sample had attended academic year institutes; in the Far West sample, 14.0 percent of the science teachers had attended academic year institutes. Over 23 percent of science teachers in the Great Lakes sample had attended inservice institutes; the corresponding figure for the Far West sample was 32.1 percent. The majority of science teachers in both regions had attended summer institutes. Relatively few science teachers had attended research and other sponsored institutes.

Secondary School Teaching Experience

The distributions of science teachers by years of secondary school teaching experience and by state and region are shown in Tables 89 and 90. About half of the science teachers in the Great Lakes sample had 10 or fewer years of secondary school teaching experience. Approximately 30 percent had between 11 and 20 years of teaching experience. In the Far West sample, 41.3 percent had 10 or fewer years of secondary school teaching experience, while 42.7 percent had between 11 and 20 years of such experience.

The number and percent of science teachers by years of secondary school science teaching experience are presented in Tables 91 and 92. As might be expected, the percentages in these tables are very similar to those in Tables 89 and 90.

Classrooms and Laboratories

Over 89 percent of science teachers in both regions reported that they used laboratories or special science rooms to teach science. (See Tables 93 and 94.) Approximately four percent of the teachers used classrooms with portable science kits. Less than two percent of the science teachers used classrooms with no science facilities or kits to teach science.

Special Science Facilities

The availability of selected special science facilities were surveyed in this study. The three most commonly available special science facilities were (1) the science darkroom, (2) greenhouse, and (3) closed circuit television. (See Tables 95-98.)

Land laboratories were available in 17.6 percent of the Great Lakes schools, and in 13.2 percent of the Far West schools. Nature trails were available in 25.6 percent of the Great Lakes schools, and in 14.6 percent of the Far West schools.

Computer terminals were available in 13.5 percent of the Great Lakes schools, and in 8.6 percent of the Far West schools. Auto-tutorial laboratories were available in 8.6 percent of the Great Lakes schools, and in 5.1 percent of the Far West schools.

Learning Activities

The number and percent of science teachers by region assigning degrees of usage to selected learning activities are presented in Tables 100, 101, and 102. The three most commonly used learning activities were (1) lecture-discussion, (2) individual laboratory activity, and (3) group laboratory activity.

Grading Methods

The number and percent of science teachers by region assigning various degrees of usage to selected grading methods are presented in Tables 103 and 104. The three most commonly used grading methods were (1) test scores, (2) student performance in laboratory activity, and (3) written assignments.

Usage of Textbooks and Curriculum Materials

The number and percent of science teachers reporting the usage of various kinds of textbooks and curriculum materials by geographic region are presented in Tables 105 and 106. In the Great Lakes region, the most common practices with respect to the use of textbooks and curriculum materials were: (1) single textbook and separate laboratory manual, (2) single textbook including laboratory manual, and (3) single textbook and locally-prepared materials. In the Far West region, the three most common practices were: (1) single textbook including laboratory manual, (2) single textbook and separate laboratory manual, and (3) single textbook and separate laboratory manual and locally prepared materials.

Importance of Factors for High Quality Science Programs

Science teachers were asked to assign degrees of importance to a number of factors relating to obtaining and maintaining high quality science programs in their schools. In the opinion of science teachers in both regions, the three most important factors were: (1) science facilities,

(2) administrative support, and (3) cooperative staff. (See Tables 107 and 108.)

Satisfaction with Teaching Science

The great majority of science teachers in both regions reported that they were very satisfied or satisfied with teaching science. (See Tables 109 and 110.)

In the Great Lakes sample, 60.4 percent of the science teachers said that they were very satisfied, while 34.0 percent said that they were satisfied.

In the Far West sample, 58.8 percent of the science teachers said that they were very satisfied, and 34.8 percent said that they were satisfied.

Only a very small proportion of science teachers in both regions indicated that they were either dissatisfied or very dissatisfied with teaching science as a career.

TABLE 1

NUMBER OF PUBLIC SECONDARY SCHOOLS IN THE POPULATION AND SAMPLE, NUMBER OF QUESTIONNAIRES RECEIVED, AND RESPONSE RATES BY STATE AND REGION

Region and State	Population	Sample	Number of Principal's Questionnaires Received	Response Rate for Principal's Questionnaire	Number of Sc. Teacher Questionnaires Received	Response Rate for Sc. Teacher Questionnaire
Great Lakes Region	4,057	1,197	544	45.6%	550	45.9%
Illinois	859	288	116	40.3%	122	42.4%
Indiana	613	195	92	47.2%	81	41.5%
Michigan	886	328	141	43.0%	143	43.6%
Ohio	1,073	248	120	48.4%	124	50.0%
Wisconsin	626	138	75	54.4%	80	58.0%
Far West Region	2,471	822	358	43.6%	371	45.1%
Alaska	65	8	3	37.5%	3	37.5%
California	1,429	587	231	39.3%	246	41.9%
Hawaii	82	27	10	37.0%	10	37.0%
Nevada	70	18	9	50.0%	8	44.4%
Oregon	337	54	32	59.3%	34	63.0%
Washington	488	128	73	57.0%	70	54.7%
Combined Regions	6,528	2,019	902	44.7%	921	45.6%

TABLE 2

NUMBER OF FOLLOW-UP POSTCARDS SENT AND RECEIVED, RESPONSE RATES, AND NUMBER OF RESPONSES BY KIND OF RESPONSE AND BY STATE AND REGION

Region and State	Number of Postcards Sent	Number of Postcards Received	Response Rate	Kind of Response: Questionnaires were Returned	Questionnaires would be returned by specified date	Unable to Participate	Send another Set
Great Lakes Region	437	167	40.5%	29	12	82	44
Illinois	108	42	38.9%	11	1	21	9
Indiana	72	25	34.7%	5	1	11	8
Michigan	119	44	37.0%	6	5	22	11
Ohio	96	36	37.5%	3	5	18	10
Wisconsin	42	20	47.6%	4	0	10	6
Far West Region	357	157	44.0%	36	10	70	41
Alaska	5	2	40.0%	0	0	0	2
California	253	112	44.3%	25	8	50	29
Hawaii	15	6	40.0%	1	1	4	0
Nevada	9	3	33.3%	1	0	1	1
Oregon	19	10	52.6%	0	0	8	2
Washington	56	24	42.9%	9	1	7	7
Combined Regions	794	324	40.8%	65	22	152	85

TABLE 3

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY TYPE OF SCHOOL AND BY STATE IN THE GREAT LAKES SAMPLE

Type of School	Illinois		Indiana		Michigan		Ohio		Wisconsin		Great Lakes Region	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
K - 12	2	1.7	3	3.3	0	0.0	0	0.0	1	1.3	6	1.1
1 - 12	1	0.9	0	0.0	0	0.0	1	0.8	1	1.3	3	0.6
7 - 12	6	5.2	18	19.6	7	5.0	5	4.2	7	9.3	43	7.9
8 - 12	1	0.9	0	0.0	3	2.1	0	0.0	1	1.3	5	0.9
9 - 12	84	72.4	37	40.2	62	43.9	64	53.3	27	36.0	274	50.4
10 - 12	10	8.6	16	17.4	38	27.0	45	37.5	17	22.7	126	23.2
7 - 8	4	3.5	1	1.1	3	2.1	0	0.0	1	1.3	9	1.7
7 - 9	4	3.5	12	13.0	25	17.7	3	2.5	16	21.3	60	11.0
Other	4	3.5	5	5.4	3	2.1	0	0.0	4	5.3	16	3.0
No response	0	0.0	0	0.0	0	0.0	2	1.7	0	0.0	2	0.4
Total	116	100.0	92	100.0	141	100.0	120	100.0	75	100.0	544	100.0

Note : Due to rounding, percents may not total 100.0.

TABLE 4

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY TYPE OF SCHOOL AND BY STATE IN THE FAR WEST SAMPLE

Type of School	Alaska		California		Hawaii		Nevada		Oregon		Washington		Far West Region	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
K - 12	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1 - 12	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
7 - 12	2	56.7	2	0.9	2	20.0	0	0.0	0	0.0	0	0.0	6	1.7
8 - 12	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
9 - 12	1	33.3	125	54.1	1	10.0	3	33.3	10	31.3	23	31.5	163	45.5
10 - 12	0	0.0	62	26.8	4	40.0	5	55.6	9	28.1	43	58.9	123	34.4
7 - 8	0	0.0	4	1.7	0	0.0	0	0.0	2	6.3	0	0.0	6	1.7
7 - 9	0	0.0	33	14.3	3	30.0	1	11.1	8	25.0	6	8.2	51	14.3
Other	0	0.0	2	0.9	0	0.0	0	0.0	3	9.4	1	1.4	6	1.7
No response	0	0.0	3	1.3	0	0.0	0	0.0	0	0.0	0	0.0	3	0.8
Total	3	100.0	231	100.0	10	100.0	9	100.0	32	100.0	73	100.0	358	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 5

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL SIZE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	1 to 499	500 to 999	1,000 to 1,999	2,000 and over	No resp-onse	Total
Illinois						
Number	20	14	30	45	7	116
Percent	17.2	12.1	25.8	38.8	6.0	100.0
Indiana						
Number	19	27	34	11	1	92
Percent	20.7	29.3	37.0	12.0	1.1	100.0
Michigan						
Number	10	38	68	23	2	141
Percent	7.1	26.9	48.2	16.3	1.4	100.0
Ohio						
Number	3	30	59	19	9	120
Percent	2.5	25.0	49.2	15.8	7.5	100.0
Wisconsin						
Number	22	21	24	6	2	75
Percent	29.3	28.0	32.0	8.0	2.7	100.0
Great Lakes						
Number	74	130	215	104	21	544
Percent	13.6	23.9	39.5	19.1	3.9	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 6

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL SIZE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	1 to 499	500 to 999	1,000 to 1,999	2,000 and over	No resp- onse	Total
Alaska						
Number	2	1	0	0	0	0
Percent	66.7	33.3	0.0	0.0	0.0	100.0
California						
Number	1	18	116	83	13	231
Percent	0.4	7.7	49.9	35.7	5.6	100
Hawaii						
Number	0	1	4	4	1	10
Percent	0.0	10.0	40.0	40.0	10.0	100.0
Nevada						
Number	2	1	5	1	0	9
Percent	22.2	11.1	55.6	11.1	0.0	100.0
Oregon						
Number	7	13	9	3	0	32
Percent	21.9	40.7	28.2	9.4	0.0	100.0
Washington						
Number	4	15	46	7	1	73
Percent	5.5	20.6	63.0	9.6	1.4	100.0
Far West						
Number	16	49	180	98	15	358
Percent	4.5	13.7	50.3	27.3	4.2	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 7

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY KIND OF SCHEDULE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Period	Modular	Other	No response	Total
Illinois					
Number	104	11	1	0	116
Percent	89.7	9.5	0.9	0.0	100.0
Indiana					
Number	86	4	2	0	92
Percent	93.5	4.4	2.2	0.0	100.0
Michigan					
Number	138	1	2	0	141
Percent	97.9	0.7	1.4	0.0	100.0
Ohio					
Number	107	6	3	4	120
Percent	89.2	5.0	2.5	3.3	100.0
Wisconsin					
Number	66	7	2	0	75
Percent	88.0	9.3	2.7	0.0	100.0
Great Lakes					
Number	501	29	10	4	544
Percent	92.1	5.3	1.8	0.7	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 8

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY KIND OF SCHEDULE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Period	Modular	Other	No response	Total
Alaska					
Number	3	0	0	0	3
Percent	100.0	0.0	0.0	0.0	100.0
California					
Number	200	15	10	6	231
Percent	86.6	6.5	4.3	2.6	100.0
Hawaii					
Number	9	1	0	0	10
Percent	90.0	10.0	0.0	0.0	100.0
Nevada					
Number	9	0	0	0	9
Percent	100.0	0.0	0.0	0.0	100.0
Oregon					
Number	31	1	0	0	32
Percent	96.9	3.1	0.0	0.0	100.0
Washington					
Number	66	3	3	1	73
Percent	90.4	4.1	4.1	1.4	100.0
Far West					
Number	318	20	13	7	358
Percent	88.8	5.6	3.6	2.0	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 9

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY NUMBER OF REGULARLY SCHEDULED CLASS PERIODS/MODULES PER DAY AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Number of Periods/Modules Per Day: 5 or less	6	7	8	9 or more	No response	Total
Illinois							
Number	0	9	45	16	43	3	116
Percent	0.0	7.7	38.8	13.8	37.0	2.6	100.0
Indiana							
Number	3	39	38	3	9	0	92
Percent	3.3	42.4	41.3	3.3	9.8	0.0	100.0
Michigan							
Number	9	87	26	2	15	2	141
Percent	6.4	61.7	18.4	1.4	10.6	1.4	100.0
Ohio							
Number	1	22	39	20	34	4	120
Percent	0.8	18.3	32.5	16.7	28.3	3.3	100.0
Wisconsin							
Number	0	2	36	24	12	1	75
Percent	0.0	2.7	48.0	32.0	16.0	1.3	100.0
Great Lakes	13	159	184	65	113	10	544
Number	2.4	29.2	33.8	11.9	20.3	1.8	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 10

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY NUMBER OF REGULARLY SCHEDULED CLASS PERIODS/MODULES PER DAY AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Number of Periods/Modules Per Day					No response	Total
	5 or less	6	7	8	9 or more		
Alaska							
Number	0	2	1	0	0	0	3
Percent	0.0	66.7	33.3	0.0	0.0	0:0	100.0
California							
Number	19	115	53	20	15	9	231
Percent	8.2	49.8	22.9	8.7	6.5	3.9	100.0
Hawaii							
Number	4	4	1	0	1	0	10
Percent	40.0	40.0	10.0	0.0	10.0	0.0	100.0
Nevada							
Number	11.	5	3	0	0	0	9
Percent	11.1	55.6	33.3	0.0	0.0	0.0	100.0
Oregon							
Number	0	5	14	11	2	0	32
Percent	0.0	15.6	43.8	34.4	6.3	0.0	100.0
Washington							
Number	11	52	6	1	3	0	73
Percent	15.3	71.2	8.2	1.4	4.1	0.0	100.0
Far West							
Number	35	183	78	32	21	9	358
Percent	9.8	51.1	21.8	8.9	5.9	2.5	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 11

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY LENGTH OF CLASS PERIODS AND BY STATE IN THE GREAT LAKES SAMPLE

Number of minutes	Illinois		Indiana		Michigan		Ohio		Wisconsin		Great Lakes Region	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 40	10	8.6	4	4.3	2	1.4	7	5.8	7	9.3	30	5.4
40 - 44	26	22.4	5	5.4	4	2.8	39	32.5	5	6.7	79	14.5
45 - 49	12	10.3	1	1.1	9	6.4	12	10.0	16	21.3	50	9.2
50 - 54	19	16.4	6	6.5	29	20.6	13	10.8	28	37.3	95	17.5
55 - 59	48	41.4	68	73.9	88	62.4	38	31.7	19	25.3	261	48.0
60 or more	1	0.9	6	6.5	9	6.4	4	3.3	0	0.0	20	3.7
No response	0	0.0	22.2	2.2	0	0.0	7	5.8	0	0.0	9	1.6
Total	116	100.0	92	100.0	141	100.0	120	100.0	75	100.0	544	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 12

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY LENGTH OF CLASS PERIODS AND BY STATE IN THE FAR WEST SAMPLE

Number of Minutes	Alaska		California		Hawaii		Nevada		Oregon		Washington		Far West Region	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 40	0	0.0	13	5.6	1	10.0	0	0.0	1	3.1	3	4.1	18	5.0
40 - 44	0	0.0	6	2.6	0	0.0	0	0.0	5	15.6	1	1.4	12	3.4
45 - 49	0	0.0	25	10.8	2	20.0	0	0.0	7	21.9	4	5.5	38	10.6
50 - 54	1	33.3	126	54.2	3	30.0	2	22.2	13	40.7	22	30.1	167	46.8
55 - 59	2	66.7	46	19.8	0	0.0	6	66.7	6	18.8	31	42.5	91	25.5
60 or more	0	0.0	19	3.9	4	40.0	1	11.1	0	0.0	11	15.1	25	7.0
No response	0	0.0	6	3.6	0	0.0	0	0.0	0	0.0	1	1.4	7	2.0
Total	3	100.0	231	100.0	10	100.0	9	100.0	32	100.0	73	100.0	358	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 13

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY NUMBER OF PERIODS PER WEEK OF SCIENCE TEACHING BY GRADE(7,8,9) AND BY STATE IN THE GREAT LAKES SAMPLE

Grade and Number of periods	Illinois No.	Illinois %	Indiana No.	Indiana %	Michigan No.	Michigan %	Ohio No.	Ohio %	Wisconsin No.	Wisconsin %	Great Lakes Region No.	Great Lakes Region %
Grade 7												
Five	9	60.0	25	67.6	19	55.9	6	54.5	11	44.0	70	58.8
Other	6	40.0	12	32.4	15	44.1	5	45.5	14	56.0	49	41.2
Grade 8												
Five	9	60.0	28	71.8	23	59.0	7	58.3	15	53.6	82	63.1
Other	6	40.0	11	28.2	16	41.0	5	41.7	13	46.4	48	36.9
Grade 9												
Five	51	52.6	42	60.0	38	46.0	30	45.4	21	43.0	182	49.9
Other	46	47.4	28	40.0	45	54.0	36	54.6	28	57.0	183	50.1

Note: Due to rounding, percents may not total 100.0.

TABLE 14

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY NUMBER OF PERIODS PER WEEK OF SCIENCE TEACHING BY GRADE(7,8,9) AND BY STATE IN THE FAR WEST SAMPLE

Grade and Number of periods	Alaska No.	Alaska %	California No.	California %	Hawaii No.	Hawaii %	Nevada No.	Nevada %	Oregon No.	Oregon %	Washington No.	Washington %	Far West Region No.	Far West Region %
Grade 7														
Five	1	33.3	13	5.6	3	30.0	0	0.0	3	9.4	2	2.7	22	6.2
Other	1	33.3	15	6.5	2	20.0	1	11.1	7	21.9	4	5.5	30	8.4
Grade 8														
Five	1	33.3	16	6.9	3	30.0	0	0.0	4	12.5	3	4.1	27	7.5
Other	1	33.3	21	9.0	2	20.0	1	11.1	6	18.8	3	4.1	34	9.5
Grade 9														
Five	1	33.3	36	15.6	3	30.0	0	0.0	6	18.8	6	8.2	52	14.5
Other	2	66.7	93	40.0	3	30.0	4	44.4	13	40.7	18	24.7	133	37.2

Note: Due to rounding, percents may not total 100.0.

TABLE 15

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY NUMBER OF PERIODS PER WEEK OF SCIENCE TEACHING BY GRADE(10,11,12) AND BY STATE IN THE GREAT LAKES SAMPLE

Grade and Number of periods	Illinois No.	Illinois %	Indiana No.	Indiana %	Michigan No.	Michigan %	Ohio No.	Ohio %	Wisconsin No.	Wisconsin %	Great Lakes Region No.	Great Lakes Region %
Grade 10												
Five	47	48.5	37	56.1	38	41.8	23	23.2	17	34.0	162	40.2
Seven	11	11.3	5	7.6	3	3.3	13	13.1	2	4.0	34	8.4
Other	39	40.2	24	36.3	50	54.9	63	63.7	31	62.0	207	51.4
Grade 11												
Five	47	51.1	37	53.6	36	39.1	18	17.8	18	37.5	156	39.0
Seven	13	14.1	4	5.8	4	4.3	14	13.9	3	6.2	38	9.5
Other	32	34.8	28	40.6	52	56.6	69	68.3	27	56.3	206	51.5
Grade 12												
Five	48	53.3	35	50.7	41	45.0	18	17.6	17	35.4	159	39.8
Seven	11	12.2	2	2.9	2	2.2	16	15.7	3	6.2	34	8.5
Other	31	34.5	32	46.4	48	52.8	68	66.7	28	58.4	207	51.7

Note: Due to rounding, percents may not total 100.0.

TABLE 16

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY NUMBER OF PERIODS PER WEEK OF SCIENCE TEACHING BY GRADE(10,11,12) AND BY STATE IN THE FAR WEST SAMPLE

Grade and Number of periods	Alaska No.	Alaska %	California No.	California %	Hawaii No.	Hawaii %	Nevada No.	Nevada %	Oregon No.	Oregon %	Washington No.	Washington %	Far West Region No.	Far West Region %
Grade 10														
Five	1	33.3	40	17.3	2	20.0	3	33.3	5	15.6	9	12.3	60	16.8
Seven	0	0.0	5	2.2	0	0.0	0	0.0	1	3.1	0	0.0	6	1.7
Other	2	66.7	120	51.6	3	30.0	5	55.6	13	40.7	50	68.5	193	54.0
Grade 11														
Five	2	66.7	40	17.3	2	20.0	3	33.3	4	12.5	10	13.7	61	17.0
Seven	0	0.0	8	3.5	0	0.0	0	0.0	1	3.1	2	2.7	11	3.1
Other	1	33.3	113	48.6	3	30.0	5	55.6	16	50.0	46	63.0	184	51.5
Grade 12														
Five	1	33.3	46	19.9	2	20.0	4	44.4	6	18.8	13	17.8	72	20.1
Seven	0	0.0	7	3.0	0	0.0	0	0.0	1	3.1	1	1.4	9	2.5
Other	2	66.7	109	46.9	3	30.0	4	44.4	14	43.8	45	61.7	177	49.6

Note: Due to rounding, percents may not total 100.0.

TABLE 17

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WITH HOMOGENEOUS GROUPING OF SCIENCE CLASSES BY GRADE LEVEL AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Grade Level					
	7	8	9	10	11	12
Illinois(116)*						
Number	4	4	69	60	42	38
Percent	25.0	23.5	71.9	60.0	43.3	39.2
Indiana(92)*						
Number	17	17	30	22	11	10
Percent	44.7	43.6	40.5	29.3	14.7	13.3
Michigan (141)*						
Number	11	9	36	39	27	24
Percent	28.2	22.0	36.7	36.8	25.5	22.6
Ohio (120)*						
Number	6	5	40	45	33	32
Percent	60.0	45.5	55.5	40.5	29.7	28.8
Wisconsin(75)*						
Number	8	13	24	17	7	3
Percent	28.6	46.4	46.1	32.7	13.0	5.5
Great Lakes(544)*						
Number	46	48	199	183	120	107
Percent	35.1	35.3	50.7	41.2	27.1	24.1

*State and region sample sizes.

TABLE 18

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WITH HOMOGENEOUS GROUPING OF SCIENCE CLASSES BY GRADE LEVEL AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Grade Level 7	8	9	10	11	12
Alaska(3)*						
Number	0	0	0	0	0	0
Percent	0.0	0.0	0.0	0.0	0.0	0.0
California(231)*						
Number	18	20	59	80	43	43
Percent	7.8	8.7	25.5	34.6	18.6	18.6
Hawaii (10)*						
Number	3	3	3	3	3	3
Percent	30.0	30.0	30.0	30.0	30.0	30.0
Nevada (9)*						
Number	1	1	1	1	1	1
Percent	11.1	11.1	11.1	11.1	11.1	11.1
Oregon (32)*						
Number	2	2	6	6	3	4
Percent	6.3	6.3	18.8	18.8	9.4	12.5
Washington(73)*						
Number	1	1	3	22	8	8
Percent	1.4	1.4	4.1	30.1	11.0	11.0
Far West(358)*						
Number	25	27	72	112	58	59
Percent	7.0	7.5	20.1	31.3	16.2	16.5

* State and region sample sizes.

TABLE 19

NUMBER OF PUBLIC SECONDARY SCHOOLS ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO SELECTED CRITERIA FOR HOMOGENEOUS GROUPING OF SCIENCE CLASSES BY STATE IN THE GREAT LAKES SAMPLE

Criteria and Degree of Importance	Illinois (116)* Number	Indiana (92)* Number	Michigan (141)* Number	Ohio (120)* Number	Wisconsin (75)* Number	Great Lakes Region (544)* Number
Marks/grades						
Very important	13	12	14	25	5	69
Important	25	19	21	22	11	98
Some importance	13	7	5	12	10	47
Intelligence tests						
Very important	12	2	0	3	3	20
Important	12	12	8	10	3	45
Some importance	10	8	5	10	8	41
Aptitude tests						
Very important	19	5	8	3	4	39
Important	15	4	8	10	10	47
Some importance	9	5	6	10	4	34

* State and region sample sizes.

TABLE 20

NUMBER OF PUBLIC SECONDARY SCHOOLS ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO SELECTED CRITERIA FOR HOMOGENEOUS GROUPING OF SCIENCE CLASSES BY STATE IN THE FAR WEST SAMPLE

Criteria and Degree of Importance	Alaska (3)* Number	California (231)* Number	Hawaii (10)* Number	Nevada (9)* Number	Oregon (32)* Number	Washington (73)* Number	Far West Region(358)* Number
Marks/grades							
Very important	0	25	1	0	3	5	34
Important	0	47	1	0	4	9	61
Some importance	0	15	2	1	0	3	21
Intelligence tests							
Very important	0	16	1	0	1	0	18
Important	0	16	1	0	0	2	19
Some importance	0	26	0	1	2	2	31
Aptitude tests							
Very important	0	15	4	0	1	1	21
Important	0	12	1	1	0	3	17
Some importance	0	10	1	0	2	1	4

* State and region sample sizes.

TABLE 21

NUMBER OF PUBLIC SECONDARY SCHOOLS ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO SELECTED CTITERIA FOR HOMOGENEOUS GROUPING OF SCIENCE CLASSES BY STATE IN THE GREAT LAKES SAMPLE

Criteria and Degree of Importance	Illinois (116)* Number	Indiana (92)* Number	Michigan (141)* Number	Ohio (120)* Number	Wisconsin (75)* Number	Great Lakes Region (544)* Number
Reading tests						
Very important	2	1	1	0	1	5
Important	0	0	0	0	1	1
Some importance	1	0	1	1	0	3
Teacher recommendation						
Very important	26	11	21	22	21	101
Important	20	16	19	23	10	88
Some importance	22	9	12	11	4	58
Parents' recommendation						
Very important	0	0	2	0	0	2
Important	1	1	3	1	0	6
Some importance	3	1	7	5	1	17

* State and region sample sizes.

TABLE 22

NUMBER OF PUBLIC SECONDARY SCHOOLS ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO SELECTED CRITERIA FOR HOMOGENEOUS GROUPING OF SCIENCE CLASSES BY STATE IN THE FAR WEST REGION

Criteria and Degree of Importance	Alaska (3)* Number	California (231)* Number	Hawaii (10)* Number	Nevada (9)* Number	Oregon (32)* Number	Washington (73)* Number	Far West Region(358)* Number
Reading tests							
Very important	0	5	0	0	0	2	7
Important	0	3	0	0	0	1	4
Some importance	0	1	0	0	0	1	2
Teacher recommendation							
Very important	0	33	3	1	3	9	49
Important	0	32	2	1	4	8	47
Some importance	0	31	1	0	0	4	36
Parents' recommendation							
Very important	0	2	0	0	0	1	3
Important	0	7	1	0	1	2	11
Some importance	0	9	0	0	2	1	12

* State and region sample sizes.

TABLE 23

NUMBER OF PUBLIC SECONDARY SCHOOLS ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO SELECTED CRITERIA FOR HOMOGENEOUS GROUPING OF SCIENCE CLASSES BY STATE IN THE GREAT LAKES SAMPLE

Criteria and Degree of Importance	Illinois (116)* Number	Indiana (92)* Number	Michigan (141)* Number	Ohio (120)* Number	Wisconsin (75)* Number	Great Lakes Region (544)* Number
Counsellor recommendation						
Very important	7	5	3	4	4	23
Important	5	4	17	10	6	42
Some importance	12	9	18	15	2	56
Student interest						
Very important	4	3	13	9	1	30
Important	6	4	9	12	3	34
Some importance	3	3	10	4	4	24

* State and region sample sizes.

TABLE 24

NUMBER OF PUBLIC SECONDARY SCHOOLS ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO SELECTED CRITERIA FOR HOMOGENEOUS GROUPING OF SCIENCE CLASSES BY STATE IN THE FAR WEST SAMPLE

Criteria and Degree of Importance	Alaska (3)* Number	California (231)* Number	Hawaii (10)* Number	Nevada (9)* Number	Oregon (32)* Number	Washington (73)* Number	Far West Region(358)* Number
Counsellor recommendation							
Very important	0	14	1	0	1	2	18
Important	0	24	0	0	1	6	31
Some importance	0	26	1	0	3	9	39
Student interest							
Very important	0	14	2	1	0	7	24
Important	0	15	1	0	2	4	22
Some importance	0	7	0	0	1	2	10

* State and region sample sizes.

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TABLE 25

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY LENGTH OF SCHOOL YEAR AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Number of Days 175 or less	176-180	181-185	186-190	191 or more	No response	Total
Illinois							
Number	0	64	35	9	4	4	116
Percent	0.0	55.2	30.2	7.8	3.5	3.5	100.0
Indiana							
Number	14	64	11	3	0	0	92
Percent	15.2	69.6	12.0	3.3	0.0	0.0	100.0
Michigan							
Number	0	88	45	7	1	0	141
Percent	0.0	62.4	31.9	5.0	0.7	0.0	100.0
Ohio							
Number	0	72	39	4	1	4	120
Percent	0.0	60.0	32.5	3.3	0.8	3.3	100.0
Wisconsin							
Number	0	48	18	8	0	1	75
Percent	0.0	64.0	24.0	10.7	0.0	1.3	100.0
Great Lakes							
Number	14	336	148	31	6	9	544
Percent	2.6	61.8	27.2	5.7	1.1	1.7	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 26

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY LENGTH OF SCHOOL YEAR AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Number of Days					No response	Total
	175 or less	176-180	181-185	186-190	191 or more		
Alaska							
Number	0	3	0	0	0	0	3
Percent	0.0	100.0	0.0	0.0	0.0	0.0	100.0
California							
Number	27	188	2	5	4	5	231
Percent	11.7	81.4	0.8	2.2	1.7	2.2	100.0
Hawaii							
Number	1	8	1	0	0	0	10
Percent	10.0	80.0	10.0	0.0	0.0	0.0	100.0
Nevada							
Number	0	6	3	0	0	0	9
Percent	0.0	66.7	33.3	0.0	0.0	0.0	100.0
Oregon							
Number	0	23	5	4	0	0	32
Percent	0.0	71.9	15.6	12.5	0.0	0.0	100.0
Washington							
Number	0	70	2	1	0	0	73
Percent	0.0	95.9	2.7	1.4	0.0	0.0	100.0
Far West							
Number	28	298	13	10	4	5	358
Percent	7.8	83.3	3.6	2.8	1.1	1.4	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 27

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WITH BUDGET FOR SCIENCE EQUIPMENT IN THE GREAT LAKES SAMPLE

State and Region	Budget for Science Equipment	No Budget	No response	Total
Illinois				
Number	76	37	3	116
Percent	65.5	31.9	2.6	100.0
Indiana				
Number	53	37	2	92
Percent	57.6	40.2	2.2	100.0
Michigan				
Number	71	68	2	141
Percent	50.4	48.2	1.4	100.0
Ohio				
Number	52	66	2	120
Percent	43.3	55.0	1.7	100.0
Wisconsin				
Number	65	9	1	75
Percent	86.7	12.0	1.3	100.0
Great Lakes				
Number	317	217	10	544
Percent	58.3	39.9	1.8	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 28

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WITH BUDGET FOR SCIENCE EQUIPMENT IN THE FAR WEST SAMPLE

State and Region	Budget for Science Equipment	No Budget	No resp- onse	Total
Alaska				
Number	2	1	0	3
Percent	66.7	33.3	0.0	100.0
California				
Number	129	93	9	231
Percent	55.8	40.3	3.9	100.0
Hawaii				
Number	9	1	0	10
Percent	90.0	10.0	0.0	100.0
Nevada				
Number	9	0	0	9
Percent	100.0	0.0	0.0	100.0
Oregon				
Number	26	4	2	32
Percent	81.3	12.5	6.3	100.0
Washington				
Number	42	31	0	73
Percent	57.5	42.5	0.0	100.0
Far West				
Number	217	130	11	358
Percent	60.6	36.3	3.1	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 29

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WITH BUDGET FOR SCIENCE SUPPLIES IN THE GREAT LAKES SAMPLE

State and Region	Budget for Science Supplies	No Budget	No resp-onse	Total
Illinois				
Number	85	29	2	116
Percent	73.3	25.0	1.7	100.0
Indiana				
Number	62	28	2	92
Percent	67.4	30.4	2.2	100.0
Michigan				
Number	89	49	3	141
Percent	63.1	34.8	2.1	100
Ohio				
Number	56	60	4	120
Percent	46.7	50.0	3.3	100.0
Wisconsin				
Number	62	9	4	75
Percent	82.7	12.0	5.3	100.0
Great Lakes				
Number	354	17	15	544
Percent	65.1	32.2	2.8	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 30

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WITH BUDGET FOR SCIENCE SUPPLIES IN THE FAR WEST SAMPLE

State and Region	Budget for Science Supplies	No Budget	No resp-onse	Total
Alaska				
Number	2	1	0	3
Percent	66.7	33.3	0.0	100.0
California				
Number	205	16	10	231
Percent	88.7	6.9	4.3	100.0
Hawaii				
Number	9	1	0	10
Percent	90.0	10.0	0.0	100.0
Nevada				
Number	9	0	0	9
Percent	100.0	0.0	0.0	100.0
Oregon				
Number	28	3	1	32
Percent	87.5	9.4	3.1	100.0
Washington				
Number	45	25	3	73
Percent	61.6	34.3	4.1	100.0
Far West				
Number	298	46	14	358
Percent	83.2	12.8	3.9	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 31

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY PER PUPIL EXPENDITURE FOR SCIENCE EQUIPMENT AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	$1.00 to $2.00	$3.00 to $4.00	$5.00 to $6.00	More than $6.00	No resp- onse	Total
Illinois						
Number	46	9	2	6	53	116
Percent	39.7	7.8	1.7	5.2	45.7	100.0
Indiana						
Number	23	7	1	3	58	92
Percent	25.0	7.6	1.1	3.3	63.0	100.0
Michigan						
Number	26	7	2	4	102	141
Percent	18.4	5.0	1.4	2.8	72.3	100.0
Ohio						
Number	25	2	4	1	88	120
Percent	20.8	1.7	3.3	0.8	73.3	100.0
Wisconsin						
Number	26	8	4	4	33	75
Percent	34.7	10.7	5.3	5.3	44.0	100.0
Great Lakes						
Number	146	33	13	18	334	544
Percent	26.8	6.1	2.4	3.3	61.4	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 32

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY PER PUPIL EXPENDITURE FOR SCIENCE EQUIPMENT AND BY STATE IN THE FAR WEST SAMPLE

State and Region	$1.00 to $2.00	$3.00 to $4.00	$5.00 to $6.00	More than $6.00	No resp-onse	Total
Alaska						
Number	2	0	0	0	1	3
Percent	66.7	0.0	0.0	0.0	33.3	100.0
California						
Number	45	11	1	11	163	231
Percent	19.5	4.8	0.4	4.8	70.6	100.0
Hawaii						
Number	6	2	0	0	2	10
Percent	60.0	20.0	0.0	0.0	20.0	100.0
Nevada						
Number	8	1	0	0	0	9
Percent	89.9	11.1	0.0	0.0	0.0	100.0
Oregon						
Number	11	3	0	0	18	32
Percent	34.4	9.4	0.0	0.0	56.3	100.0
Washington						
Number	19	5	5	5	39	73
Percent	26.0	6.8	6.8	6.8	53.4	100.0
Far West						
Number	91	22	6	16	223	358
Percent	25.4	6.2	1.7	4.5	62.3	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 33

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY PER PUPIL EXPENDITURE FOR SCIENCE SUPPLIES AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	\$1.00 to \$2.00	\$3.00 to \$4.00	\$5.00 to \$6.00	More than \$6.00	No resp-onse	Total
Illinois						
Number	39	18	7	4	48	116
Percent	33.6	15.5	6.0	3.4	41.4	100.0
Indiana						
Number	40	3	0	6	43	92
Percent	43.5	3.3	0.0	6.5	46.7	100.0
Michigan						
Number	53	10	6	2	70	141
Percent	37.6	7.1	4.3	1.4	49.6	100.0
Ohio						
Number	33	4	2	1	80	120
Percent	27.5	3.3	1.7	0.8	66.7	100.0
Wisconsin						
Number	30	10	5	1	29	75
Percent	40.0	13.3	6.7	1.3	38.7	100.0
Great Lakes						
Number	195	45	20	14	270	544
Percent	35.8	8.3	3.7	2.6	49.6	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 34

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY PER PUPIL EXPENDITURE FOR SCIENCE SUPPLIES AND BY STATE IN THE FAR WEST SAMPLE

State and Region	\$1.00 to \$2.00	\$3.00 to \$4.00	\$5.00 to \$6.00	More than \$6.00	No resp- onse	Total
Alaska						
Number	2	0	0	0	1	3
Percent	66.7	0.0	0.0	0.0	33.3	100.0
California						
Number	124	16	10	10	71	231
Percent	53.7	6.9	4.3	4.3	30.7	100.0
Hawaii						
Number	6	1	0	0	3	10
Percent	60.0	10.0	0.0	0.0	30.0	100.0
Nevada						
Number	6	3	0	0	0	9
Percent	66.7	33.3	0.0	0.0	0.0	100.0
Oregon						
Number	16	2	0	1	13	32
Percent	50.0	6.3	0.0	3.1	40.6	100.0
Washington						
Number	24	13	3	1	32	73
Percent	32.9	17.8	4.1	1.4	43.8	100.0
Far West						
Number	178	35	13	12	120	358
Percent	49.7	9.8	3.6	3.4	33.5	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 35

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH ALLOW/ DISALLOW SCIENCE TEACHERS TO PURCHASE SCIENCE EQUIPMENT AND SUPPLIES IN THE GREAT LAKES SAMPLE

State and Region	Yes	No	No response	Total
Illinois				
Number	105	10	1	116
Percent	90.5	8.6	0.9	100.0
Indiana				
Number	86	5	1	92
Percent	93.5	5.4	1.1	100.0
Michigan				
Number	122	17	2	141
Percent	86.5	12.1	1.4	100.0
Ohio				
Number	109	10	1	120
Percent	90.8	8.3	0.8	100.0
Wisconsin				
Number	66	9	0	75
Percent	88.0	12.0	0.0	100.0
Great Lakes				
Number	488	51	5	544
Percent	89.7	9.4	0.9	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 36

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH ALLOW/ DISALLOW SCIENCE TEACHERS TO PURCHASE SCIENCE EQUIPMENT AND SUPPLIES IN THE FAR WEST SAMPLE

State and Region	Yes	No	No response	Total
Alaska				
Number	3	0	0	3
Percent	100.0	0.0	0.0	100.0
California				
Number	220	5	6	231
Percent	95.3	2.2	2.6	100.0
Hawaii				
Number	10	0	0	10
Percent	100.0	0.0	0.0	100.0
Nevada				
Number	9	0	0	9
Percent	100.0	0.0	0.0	100.0
Oregon				
Number	30	2	0	32
Percent	93.8	6.2	0.0	100.0
Washington				
Number	69	4	0	73
Percent	94.5	5.5	0.0	100.0
Far West				
Number	341	11	6	358
Percent	95.3	3.1	1.7	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 37

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH HAVE USED/NOT USED NDEA FUNDS SINCE SEPTEMBER 1968 TO PURCHASE SCIENCE EQUIPMENT IN THE GREAT LAKES SAMPLE

State and Region	NDEA Funds used	NDEA Funds not used	No resp- onse	Total
Illinois				
Number	80	32	4	116
Percent	69.0	27.6	3.4	100.0
Indiana				
Number	59	30	3	92
Percent	64.1	32.6	3.3	100.0
Michigan				
Number	105	29	7	141
Percent	74.5	20.6	5.0	100.0
Ohio				
Number	100	20	0	120
Percent	83.3	16.7	0.0	100
Wisconsin				
Number	61	10	4	75
Percent	81.3	13.3	5.3	100.0
Great Lakes				
Number	405	121	18	544
Percent	74.5	22.2	3.3	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 38

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH HAVE USED/NOT USED NDEA FUNDS SINCE SEPTEMBER 1968 TO PURCHASE SCIENCE EQUIPMENT IN THE FAR WEST SAMPLE

State and Region	NDEA Funds Used	NDEA Funds Not Used	No response	Total
Alaska				
Number	0	3	0	3
Percent	0.0	100.0	0.0	100.0
California				
Number	91	132	8	231
Percent	39.4	57.2	3.4	100.0
Hawaii				
Number	6	3	1	10
Percent	60.0	30.0	10.0	100.0
Nevada				
Number	3	6	0	9
Percent	33.3	66.7	0.0	100.0
Oregon				
Number	10	22	0	32
Percent	31.3	68.7	0.0	100.0
Washington				
Number	38	33	2	73
Percent	52.1	45.2	2.7	100.0
Far West				
Number	148	199	11	358
Percent	41.3	55.6	3.1	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 39

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH HAVE USED/NOT USED ESEA FUNDS SINCE SEPTEMBER 1968 TO PURCHASE SCIENCE EQUIPMENT IN THE GREAT LAKES SAMPLE

State and Region	ESEA Funds Used	ESEA Funds Not Used	No response	Total
Illinois				
Number	27	83	6	116
Percent	23.3	71.5	5.2	100.0
Indiana				
Number	40	43	9	92
Percent	43.5	46.7	8.8	100.0
Michigan				
Number	55	71	15	141
Percent	39.0	50.4	10.6	100.0
Ohio				
Number	62	53	5	120
Percent	51.7	44.2	4.2	100.0
Wisconsin				
Number	28	40	7	75
Percent	37.3	53.3	9.3	100.0
Great Lakes				
Number	212	290	42	544
Percent	39.0	53.3	7.7	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 40

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH HAVE USED/NOT USED ESEA FUNDS SINCE SEPTEMBER 1968 TO PURCHASE SCIENCE EQUIPMENT IN THE FAR WEST SAMPLE

State and Region	ESEA Funds Used	ESEA Funds Not Used	No response	Total
Alaska				
Number	0	2	1	3
Percent	0.0	66.7	33.3	100.0
California				
Number	39	178	14	231
Percent	16.9	77.1	6.1	100.0
Hawaii				
Number	1	7	2	10
Percent	10.0	70.0	20.0	100.0
Nevada				
Number	3	6	0	9
Percent	33.3	66.7	0.0	100.0
Oregon				
Number	5	27	0	32
Percent	15.6	84.4	0.0	100.0
Washington				
Number	22	47	4	73
Percent	30.1	64.4	5.5	100.0
Far West				
Number	70	267	21	358
Percent	19.6	74.6	5.8	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 41

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH HAVE USED/NOT USED NDEA FUNDS SINCE SEPTEMBER 1968 TO REMODEL SCIENCE FACILITIES IN THE GREAT LAKES SAMPLE

State and Region	NDEA Funds Used	NDEA Funds Not Used	No response	Total
Illinois				
Number	27	87	2	116
Percent	23.3	75.0	1.7	100.0
Indiana				
Number	11	77	4	92
Percent	12.0	83.7	4.3	100.0
Michigan				
Number	23	115	3	141
Percent	16.3	81.6	2.1	100.0
Ohio				
Number	15	105	0	120
Percent	12.5	87.5	0.0	100.0
Wisconsin				
Number	8	66	1	75
Percent	10.7	88.0	1.3	100.0
Great Lakes				
Number	84	450	10	544
Percent	15.4	82.7	1.8	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 42

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH HAVE USED/NOT USED NDEA FUNDS SINCE SEPTEMBER 1968 TO REMODEL SCIENCE FACILITIES IN THE FAR WEST SAMPLE

State and Region	NDEA Funds Used	NDEA Funds Not Used	No resp-onse	Total
Alaska				
Number	0	2	1	3
Percent	0.0	66.7	33.3	100.0
California				
Number	24	199	8	231
Percent	10.4	86.2	3.0	100.0
Hawaii				
Number	1	9	0	10
Percent	10.0	90.0	0.0	100.0
Nevada				
Number	1	8	0	9
Percent	11.1	88.9	0.0	100.0
Oregon				
Number	1	31	0	32
Percent	3.1	96.9	0.0	100.0
Washington				
Number	4	67	2	73
Percent	5.5	91.8	2.7	100.0
Far West				
Number	31	316	11	358
Percent	8.7	88.3	3.0	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 43

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH REPORTED STUDENT ENROLLMENTS IN VARIOUS SCIENCE COURSES BY STATE IN THE GREAT LAKES SAMPLE

Science Course	Illinois No.	Illinois %	Indiana No.	Indiana %	Michigan No.	Michigan %	Ohio No.	Ohio %	Wisconsin No.	Wisconsin %	Great Lakes Region No.	Great Lakes Region %
General Sc.	38	32.8	26	28.3	46	32.7	40	33.3	21	27.9	171	30.8
Life Science	9	7.8	5	5.5	16	11.4	9	7.5	9	12.0	48	8.6
Biology	75	64.7	54	58.9	87	61.8	95	78.9	32	42.6	343	61.7
Chemistry	61	52.6	23	25.1	47	33.4	60	50.0	18	23.9	209	37.6
Physics	24	20.7	3	3.3	11	7.8	8	6.6	7	9.3	53	9.5
Earth Sc.	31	26.7	12	13.1	26	18.5	18	14.9	15	20.0	102	18.4
Physical Sc.	38	32.8	19	20.7	38	27.0	24	19.9	14	18.5	133	23.9
Health Sc.	9	7.7	21	22.9	8	5.7	20	16.6	2	2.7	60	10.8
Other	9	7.7	3	3.3	21	14.9	14	11.6	6	7.8	53	9.5
Combined courses	1	0.9	0	0.0	4	2.8	2	1.7	0	0.0	7	1.3

TABLE 44

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH REPORTED STUDENT ENROLLMENTS IN VARIOUS SCIENCE COURSES BY STATE IN THE FAR WEST SAMPLE

Science Course	Alaska No.	Alaska %	California No.	California %	Hawaii No.	Hawaii %	Nevada No.	Nevada %	Oregon No.	Oregon %	Washington No.	Washington %	Far West Region No.	Far West Region %
General Sc.	1	33.3	77	33.1	0	0.0	2	22.2	7	21.9	9	12.3	96	26.9
Life Science	1	33.3	53	22.8	4	40.0	2	22.2	7	21.9	6	8.2	73	20.4
Biology	0	0.0	165	74.0	5	50.0	4	44.4	15	47.0	61	83.6	250	70.0
Chemistry	0	0.0	103	44.3	4	40.0	3	33.3	9	28.2	28	38.4	147	41.2
Physics	0	0.0	10	4.3	0	0.0	0	0.0	2	6.3	1	1.4	13	3.6
Earth Sc.	2	66.7	11	4.7	4	40.0	2	22.2	8	25.0	4	5.5	31	8.7
Physical Sc.	1	33.3	48	20.7	5	50.0	0	0.0	8	25.0	9	12.3	71	19.9
Health Sc.	1	33.3	32	13.8	0	0.0	2	22.2	0	0.0	11	15.1	46	12.9
Other	0	0.0	61	26.2	3	30.0	0	0.0	3	9.4	9	12.3	76	21.3
Combined courses	0	0.0	5	2.2	0	0.0	0	0.0	3	9.4	4	5.5	12	3.4

TABLE 45

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH REPORTED STUDENT ENROLLMENTS IN SCIENCE COURSE IMPROVEMENT PROJECTS BY STATE IN THE GREAT LAKES SAMPLE

Science Course Improvement Project	Illinois		Indiana		Michigan		Ohio		Wisconsin		Great Lakes Region	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
IPS	41	35.3	11	12.0	33	23.4	15	12.5	16	21.3	116	20.9
ISCS	1	0.9	2	2.2	4	2.8	1	0.8	3	4.0	11	2.0
ESCP	23	19.8	6	6.5	12	8.5	13	10.8	7	9.3	61	11.0
SSSP	0	0.0	0	0.0	1	0.7	0	0.0	0	0.0	1	0.2
BSCS Blue	20	17.2	7	7.6	20	14.2	18	14.9	4	5.3	69	12.4
BSCS Green	24	20.6	5	5.5	16	11.4	20	16.6	9	12.0	74	13.3
BSCS Yellow	36	31.0	17	18.5	23	16.3	20	16.6	20	26.6	116	20.9
CHEM Study	48	41.3	8	8.7	23	16.3	21	17.4	18	23.9	118	21.2
CBA	3	2.6	2	2.2	0	0.0	5	4.2	0	0.0	10	1.8
PSSC	42	36.1	6	6.5	24	17.0	31	25.7	10	13.3	113	20.3
HPP	10	8.6	2	2.2	14	9.9	10	8.3	5	6.7	31	5.6
BSCS P & P	4	3.4	3	3.3	6	4.3	1	0.8	5	6.7	19	3.4
Other	7	6.0	4	4.4	4	2.8	2	1.7	3	4.0	20	3.6

TABLE 46

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH REPORTED STUDENT ENROLLMENTS IN SCIENCE COURSE IMPROVEMENT PROJECTS BY STATE IN THE FAR WEST

Science Course Improvement Project	Alaska		California		Hawaii		Nevada		Oregon		Washington		Far West Rgn.	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
IPS	0	0.0	43	18.5	6	60.0	0	0.0	15	47.0	9	12.3	63	17.6
ISCS	0	0.0	1	0.4	0	0.0	0	0.0	1	3.1	1	1.4	3	0.8
ESCP	1	33.3	23	9.9	0	0.0	1	11.1	1	3.1	8	11.0	34	9.5
SSSP	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
BSCS Blue	0	0.0	51	21.9	0	0.0	0	0.0	6	18.8	8	11.0	65	18.2
BSCS Green	0	0.0	59	25.4	1	10.0	1	11.1	10	31.3	31	42.5	102	28.6
BSCS Yellow	0	0.0	37	15.9	7	70.0	4	44.4	9	28.2	22	30.1	79	22.1
CHEM Study	1	33.3	95	40.9	5	50.0	0	0.0	11	34.4	28	38.4	140	39.2
CBA	0	0.0	7	3.0	0	0.0	0	0.0	1	3.1	5	6.9	13	3.6
PSSC	0	0.0	83	35.7	3	30.0	0	0.0	12	37.6	31	42.5	129	36.1
HPP	0	0.0	31	13.3	1	10.0	0	0.0	1	3.1	8	11.0	41	11.5
BSCS P & P	0	0.0	9	3.9	4	40.0	0	0.0	1	3.1	0	0.0	14	3.9
Other	0	0.0	8	3.4	1	10.0	1	11.1	1	3.1	3	4.1	14	3.9

TABLE 47

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH REPORTED STUDENT ENROLLMENTS IN ADVANCED SCIENCE COURSES BY STATE IN THE GREAT LAKES SAMPLE

Advanced Science Course	Illinois		Indiana		Michigan		Ohio		Wisconsin		Great Lakes Region	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Honors Science	10	8.6	1	1.1	4	2.8	5	4.2	5	6.7	25	4.5
Advanced Biology	50	43.0	35	38.2	48	34.1	36	29.9	26	34.6	195	35.1
BSCS Second Course	7	6.0	2	2.2	4	2.8	5	4.2	6	8.0	25	4.5
Advanced Chemistry	33	28.4	17	18.5	19	13.5	26	21.6	16	21.3	111	20.0
Advanced Physics	11	9.5	3	3.3	5	3.6	8	6.6	5	6.7	32	5.8
Advanced PSSC	3	2.6	0	0.0	0	0.0	2	1.7	1	1.3	6	1.1
Other	15	12.9	1	1.1	9	6.4	7	5.8	7	9.3	39	7.0

TABLE 48

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH REPORTED STUDENT ENROLLMENTS IN ADVANCED SCIENCE COURSES BY STATE IN THE FAR WEST SAMPLE

Advanced Science Course	Alaska		California		Hawaii		Nevada		Oregon		Washington		Far West Rgn.	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Honors Science	0	0.0	19	8.2	0	0.0	1	11.1	1	3.1	6	8.2	27	7.6
Advanced Biology	1	33.3	68	29.2	0	0.0	2	22.2	6	18.8	27	37.0	104	29.1
BSCS Second Course	0	0.0	16	6.9	2	20.0	0	0.0	2	6.3	4	5.5	24	6.7
Advanced Chemistry	0	0.0	15	6.5	0	0.0	0	0.0	2	6.3	13	17.8	30	8.4
Advanced Physics	0	0.0	5	2.2	0	0.0	0	0.0	0	0.0	2	2.7	7	2.0
Advanced PSSC	0	0.0	2	0.9	0	0.0	0	0.0	0	0.0	0	0.0	2	0.6
Other	0	0.0	16	6.9	0	0.0	0	0.0	1	3.1	10	13.7	27	7.6

TABLE 49

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH TAUGHT ENVIRONMENTAL/CONSERVATION EDUCATION AS A SEPARATE SUBJECT IN THE GREAT LAKES SAMPLE

State and Region	Environmental Education Taught Separately					
	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Illinois(116)*						
Number	0	1	6	10	10	10
Percent	0.0	0.9	5.2	8.6	8.6	8.6
Indiana(92)*						
Number	0	0	2	2	2	2
Percent	0.0	0.0	2.2	2.2	2.2	2.2
Michigan(141)*						
Number	0	1	8	19	22	23
Percent	0.0	0.7	5.7	13.5	15.6	16.3
Ohio(120)*						
Number	0	0	0	4	5	6
Percent	0.0	0.0	0.0	3.3	4.2	5.0
Wisconsin(75)*						
Number	2	2	2	4	5	6
Percent	2.7	2.7	2.7	5.3	13.3	13.3
Great Lakes(544)*						
Number	2	4	18	39	49	51
Percent	0.4	0.7	3.3	7.2	9.0	9.4

*State and region sample sizes.

TABLE 50

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH TAUGHT ENVIRONMENTAL/CONSERVATION EDUCATION AS A SEPARATE SUBJECT BY GRADE IN THE FAR WEST SAMPLE

State and Region	Environmental Education Taught Separately					
	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Alaska (3)*						
Number	0	0	0	1	2	0
Percent	0.0	0.0	0.0	33.3	66.7	0.0
California (231)*						
Number	0	0	6	13	17	18
Percent	0.0	0.0	2.6	5.6	7.4	7.8
Hawaii (10)*						
Number	0	0	0	0	0	0
Percent	0.0	0.0	0.0	0.0	0.0	0.0
Nevada (9)*						
Number	0	0	1	2	2	2
Percent	0.0	0.0	11.1	22.2	22.2	22.2
Oregon (32)*						
Number	0	0	0	1	1	1
Percent	0.0	0.0	0.0	3.1	3.1	3.1
Washington (73)*						
Number	0	0	1	4	7	8
Percent	0.0	0.0	1.4	5.5	9.6	11.0
Far West (358)*						
Number	0	0	8	21	29	29
Percent	0.0	0.0	2.2	5.9	8.1	8.1

* State and region sample sizes.

TABLE 51

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH TAUGHT ENVIRONMENTAL/CONSERVATION EDUCATION WITH SCIENCE IN THE GREAT LAKES SAMPLE

State and Region	Environmental Education Taught with Science					
	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Illinois(116)*						
Number	7	7	38	40	25	25
Percent	6.0	6.0	32.8	34.5	21.6	21.6
Indiana (92)*						
Number	15	18	25	24	20	17
Percent	16.3	19.6	27.2	26.1	21.7	18.5
Michigan(141)*						
Number	14	16	27	33	24	22
Percent	9.9	11.4	19.2	23.4	17.0	15.6
Ohio (120)*						
Number	5	5	22	37	25	18
Percent	4.2	4.2	18.3	30.8	20.8	15.0
Wisconsin (75)*						
Number	12	14	17	20	11	12
Percent	16.0	18.7	22.7	26.7	14.7	16.0
Great Lakes(544)*						
Number	53	60	129	154	105	94
Percent	9.7	11.0	23.7	28.3	19.3	17.3

*State and region sample sizes.

TABLE 52

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH TAUGHT ENVIRONMENTAL/CONSERVATION EDUCATION WITH SCIENCE BY GRADE IN THE FAR WEST SAMPLE

State and Region	Environmental Education Taught with Science					
	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Alaska (3)*						
Number	0	0	2	0	0	0
Percent	0.0	0.0	66.7	0.0	0.0	0.0
California (231)*						
Number	10	23	59	93	72	63
Percent	4.3	10.0	25.5	40.3	31.2	27.3
Hawaii (10)*						
Number	3	1	5	3	3	3
Percent	30.0	10.0	50.0	30.0	30.0	30.0
Nevada (9)*						
Number	1	1	2	4	3	3
Percent	11.1	11.1	22.2	44.4	33.3	33.3
Oregon (32)*						
Number	6	5	8	8	4	4
Percent	18.8	15.6	25.0	25.0	12.5	12.5
Washington (73)*						
Number	2	1	6	27	13	13
Percent	2.7	1.4	8.2	27	13	13
Far West (358)*						
Number	22	31	82	135	95	270
Percent	6.2	8.7	22.9	37.7	26.5	75.4

* State and region sample sizes.

TABLE 53

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH TAUGHT ENVIRONMENTAL/CONSERVATION EDUCATION WITH SOCIAL STUDIES BY GRADE IN THE GREAT LAKES SAMPLE

State and Region	Environmental Education Taught with Social Studies					
	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Illinois (116)*						
Number	1	2	6	10	6	9
Percent	0.8	1.7	5.2	8.6	5.2	7.8
Indiana (92)*						
Number	4	4	3	7	9	10
Percent	4.4	4.4	3.3	7.6	9.8	10.9
Michigan (141)*						
Number	6	9	11	9	12	12
Percent	4.3	6.4	7.8	6.4	8.5	8.5
Ohio (120)*						
Number	2	1	0	5	8	13
Percent	1.7	0.8	0.0	4.2	6.7	10.8
Wisconsin (75)*						
Number	3	3	7	4	9	12
Percent	4.0	4.0	9.3	5.3	12.0	16.0
Great Lakes (544)*						
Number	16	19	27	35	44	56
Percent	2.9	3.5	5.0	6.4	8.1	10.3

*State and region sample sizes.

TABLE 54

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS WHICH TAUGHT ENVIRONMENTAL/CONSERVATION EDUCATION WITH SOCIAL STUDIES BY GRADE IN THE FAR WEST SAMPLE

State and Region	Environmental Education Taught with Social Studies					
	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Alaska(3)*						
Number	0	0	0	1	1	1
Percent	0.0	0.0	0.0	33.3	33.3	33.3
California (231)*						
Number	4	8	39	36	41	43
Percent	1.7	3.5	16.9	15.6	17.8	18.6
Hawaii (10)*						
Number	2	2	3	2	2	3
Percent	20.0	20.0	30.0	20.0	20.0	30.0
Nevada (9)*						
Number	0	0	0	1	2	1
Percent	0.0	0.0	0.0	11.1	22.2	11.1
Oregon (32)*						
Number	2	1	2	1	2	4
Percent	6.3	3.1	6.3	3.1	6.3	12.5
Washington(73)*						
Number	1	2	6	12	12	13
Percent	1.4	2.7	8.2	16.4	16.4	17.8
Far West (358)*						
Number	9	13	50	53	60	65
Percent	2.5	3.6	14.0	14.8	16.8	18.2

* State and region sample sizes.

TABLE 55

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS IN WHICH ENVIRONMENTAL/CONSERVATION EDUCATION IS TAUGHT WITH TWO OR MORE SUBJECTS, INCLUDING SCIENCE, BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Illinois (116)*						
Number	2	2	8	10	7	8
Percent	1.7	1.7	6.9	8.6	6.0	6.9
Indiana (92)*						
Number	3	2	6	7	5	5
Percent	3.3	2.2	6.5	7.6	5.4	5.4
Michigan (141)*						
Number	1	4	7	8	7	8
Percent	0.7	2.8	5.0	5.7	5.0	5.7
Ohio (120)*						
Number	3	5	4	6	5	4
Percent	2.5	4.2	3.3	5.0	4.2	3.3
Wisconsin (75)*						
Number	3	5	6	5	4	5
Percent	4.0	6.7	8.0	6.7	5.3	6.7
Great Lakes (544)*						
Number	12	18	31	36	28	30
Percent	2.2	3.3	5.7	6.6	5.2	5.5

*State and region sample sizes.

TABLE 56

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS IN WHICH ENVIRONMENTAL/CONSERVATION EDUCATION IS TAUGHT WITH TWO OR MORE SUBJECTS INCLUDING SCIENCE BY GRADE IN THE FAR WEST SAMPLE

State and Region	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Alaska (3)*						
Number	0	0	0	0	0	0
Percent	0.0	0.0	0.0	0.0	0.0	0.0
California (231)*						
Number	3	4	16	24	22	19
Percent	1.3	1.7	6.9	10.4	9.5	8.2
Hawaii (10)*						
Number	0	0	0	1	2	1
Percent	0.0	0.0	0.0	10.0	20.0	10.0
Nevada (9)*						
Number	0	0	0	0	0	0
Percent	0.0	0.0	0.0	0.0	0.0	0.0
Oregon (32)*						
Number	1	2	1	2	2	2
Percent	3.1	6.3	3.1	6.3	6.3	6.3
Washington (73)*						
Number	0	0	0	8	9	9
Percent	0.0	0.0	0.0	11.0	12.3	12.3
Far West (358)*						
Number	4	6	17	35	35	31
Percent	1.1	1.7	4.8	9.8	9.8	8.7

*State and region sample sizes.

TABLE 57

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE SPONSORSHIP OF SCIENCE CLUBS, SCIENCE FAIRS AND STUDENT PARTICIPATION IN INTER-SCHOOL SCIENCE FAIRS, BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Science club Sponsored by school	Science fair Sponsored by school	Student participation in inter-school Science fairs
Illinois (116)*			
Number	85	27	47
Percent	73.3	23.3	40.5
Indiana (92)*			
Number	58	31	51
Percent	63.0	33.7	55.4
Michigan (141)*			
Number	71	18	53
Percent	50.4	12.8	37.6
Ohio (120)*			
Number	81	41	66
Percent	67.5	34.2	55.0
Wisconsin (75)*			
Number	44	14	26
Percent	58.7	18.7	34.7
Great Lakes (544)*			
Number	339	131	243
Percent	62.3	24.1	44.7

*State and region sample sizes.

TABLE 58

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE SPONSORSHIP OF SCIENCE CLUBS, SCIENCE FAIRS AND STUDENT PARTICIPATION IN INTER-SCHOOL SCIENCE FAIRS BY STATE IN THE FAR WEST SAMPLE

State and Region	Science club Sponsored by School	Science fair Sponsored by School	Student participation in inter-school Science fairs
Alaska (3)*			
Number	1	2	2
Percent	33.3	66.7	66.7
California (231)*			
Number	179	45	118
Percent	77.5	19.5	51.1
Hawaii (10)*			
Number	8	5	7
Percent	80.0	50.0	70.0
Nevada (9)*			
Number	8	4	7
Percent	88.9	44.4	77.8
Oregon (32)*			
Number	17	1	7
Percent	53.1	3.1	21.9
Washington (73)*			
Number	49	9	18
Percent	67.1	12.3	24.7
Far West (358)*			
Number	262	66	159
Percent	73.2	18.4	44.4

*State and region sample sizes.

TABLE 59

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE USE OF CITY/COUNTY SPECIALISTS OR CONSULTANTS BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialists Used	Not Used
Illinois (116)*				
Number	15	4	5	90
Percent	12.9	3.5	4.3	77.6
Indiana (92)*				
Number	15	8	2	67
Percent	16.3	8.7	2.2	72.8
Michigan (141)*				
Number	28	8	5	100
Percent	19.9	5.7	3.5	70.9
Ohio (120)*				
Number	24	20	5	71
Percent	20.0	16.7	4.2	59.2
Wisconsin (75)*				
Number	14	3	5	53
Percent	18.7	4.0	6.7	70.7
Great Lakes (544)*				
Number	96	43	22	381
Percent	17.7	7.9	4.0	70.0

Note: Due to rounding, percents may not total 100.0.

*State and region sample sizes.

TABLE 60

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE USE OF CITY/COUNTY SPECIALISTS OR CONSULTANTS BY STATE IN THE FAR WEST SAMPLE

State and Region	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialists Used	Not Used
Alaska (3)*				
Number	1	0	0	2
Percent	33.3	0.0	0.0	66.7
California (231)*				
Number	52	23	13	143
Percent	22.5	10.0	5.6	61.9
Hawaii (10)*				
Number	0	2	1	7
Percent	0.0	20.0	10.0	70.0
Nevada (9)*				
Number	0	2	0	7
Percent	0.0	22.2	0.0	77.8
Oregon (32)*				
Number	3	4	1	24
Percent	9.4	12.5	3.1	75.0
Washington (73)*				
Number	16	9	2	46
Percent	21.9	12.3	2.7	63.0
Far West (358)*				
Number	72	40	17	229
Percent	20.1	11.2	4.8	64.0

Note: Due to rounding, percents may not total 100.0.
*State and region sample sizes.

TABLE 61

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE USE OF THE STATE DEPARTMENT SPECIALISTS OR CONSULTANTS BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialists Used	Not Used
Illinois (116)*				
Number	21	4	5	84
Percent	18.1	3.5	4.3	72.4
Indiana (92)*				
Number	18	9	2	63
Percent	19.6	9.8	2.2	68.5
Michigan (141)*				
Number	8	3	2	128
Percent	5.7	2.1	1.4	90.8
Ohio (120)*				
Number	3	5	1	111
Percent	2.5	4.2	0.8	92.5
Wisconsin (75)*				
Number	8	4	4	59
Percent	10.7	5.3	5.3	78.7
Great Lakes (544)*				
Number	58	25	14	449
Percent	10.7	4.6	2.6	82.8

Note: Due to rounding, percents may not total 100.0.
*State and region sample sizes.

TABLE 62

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE USE OF STATE DEPARTMENT SPECIALISTS OR CONSULTANTS BY STATE IN THE FAR WEST SAMPLE

State and Region	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialists Used	Not Used
Alaska(3)*				
Number	0	0	0	3
Percent	0.0	0.0	0.0	100.0
California(231)*				
Number	3	6	0	222
Percent	1.3	2.6	0.0	96.1
Hawaii(10)*				
Number	1	1	2	6
Percent	10.0	10.0	20.0	60.0
Nevada (9)*				
Number	3	1	1	4
Percent	33.3	11.1	11.1	44.4
Oregon (32)*				
Number	15	1	1	15
Percent	46.9	3.1	3.1	46.9
Washington (73)*				
Number	16	8	3	46
Percent	21.9	11.0	4.1	63.0
Far West (358)*				
Number	38	17	7	296
Percent	10.6	4.8	2.0	82.7

Note: Due to rounding, percents may not total 100.0.
*State and region sample sizes.

TABLE 63

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE USE OF COLLEGE OR UNIVERSITY CONSULTANTS BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialists Used	Not Used
Illinois (116)*				
Number	19	7	5	85
Percent	16.4	6.0	4.3	73.3
Indiana (92)*				
Number	15	6	2	69
Percent	16.3	6.5	2.2	75.0
Michigan (141)*				
Number	24	5	4	108
Percent	17.0	3.6	2.8	76.6
Ohio (120)*				
Number	21	2	2	95
Percent	17.5	1.7	1.7	79.2
Wisconsin (75)*				
Number	15	3	2	55
Percent	20.0	4.0	2.7	73.3
Great Lakes (5[illegible]				
Number	[illegible]	23	15	412
Percent	[illegible].3	4.2	2.8	75.7

Note: Due to [illegible]ding, percents may not total 100.0.
*State and r[illegible] sample sizes.

TABLE 64

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE USE OF COLLEGE OR UNIVERSITY CONSULTANTS BY STATE IN THE FAR WEST SAMPLE

State and Region	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialists Used	Not Used
Alaska (3)*				
Number	1	0	0	2
Percent	33.3	0.0	0.0	66.7
California (231)*				
Number	33	9	2	187
Percent	14.3	3.9	0.9	80.9
Hawaii(10)*				
Number	2	0	1	7
Percent	20.0	0.0	10.0	70.0
Nevada(9)*				
Number	3	1	0	5
Percent	33.3	11.1	0.0	55.6
Oregon (32)*				
Number	8	1	1	22
Percent	25.0	3.1	3.1	68.8
Washington(73)*				
Number	15	1	5	52
Percent	20.6	1.4	6.9	71.2
Far West (358)*				
Number	62	12	9	275
Percent	17.3	3.4	2.5	76.8

Note: Due to rounding, percents may not total 100.0.
*State and region sample sizes.

TABLE 65

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE USE OF SCHOOL SYSTEM RESOURCE TEACHERS, SCHOOL RESOURCE TEACHERS, AND LOCAL CONSULTANTS, BY STATE IN THE GREAT LAKES SAMPLE

State and Region	System Resource Teachers Used	School Resource Teachers Used	Local Consultants Used
Illinois (116)*			
Number	17	18	43
Percent	14.7	15.5	37.1
Indiana (92)*			
Number	10	7	21
Percent	10.9	7.6	22.8
Michigan (141)*			
Number	19	15	46
Percent	13.5	10.6	32.6
Ohio (120)*			
Number	11	11	39
Percent	9.2	9.2	32.5
Wisconsin (75)*			
Number	14	5	21
Percent	18.7	6.7	28.0
Great Lakes (544)*			
Number	71	56	170
Percent	13.1	10.3	30.3

*State and region sample sizes.

TABLE 66

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS REPORTING THE USE OF SCHOOL SYSTEM RESOURCE TEACHERS, SCHOOL RESOURCE TEACHERS, AND LOCAL CONSULTANTS BY STATE IN THE FAR WEST SAMPLE

State and Region	System Resource Teachers Used	School Resource Teachers Used	Local Consultants Used
Alaska (3)*			
Number	1	0	0
Percent	33.3	0.0	0.0
California (231)*			
Number	48	18	80
Percent	20.8	7.8	34.6
Hawaii (10)*			
Number	1	1	5
Percent	10.0	10.0	50.0
Nevada (9)*			
Number	1	0	2
Percent	11.1	0.0	22.2
Oregon (32)*			
Number	2	1	12
Percent	6.3	3.1	37.5
Washington (73)*			
Number	23	7	38
Percent	31.5	9.6	52.1
Far West (358)*			
Number	76	27	140
Percent	21.2	7.5	39.1

*State and region sample sizes.

TABLE 67

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS PARTICIPATING IN INSERVICE SCIENCE EDUCATION ACTIVITIES FOR SCIENCE TEACHERS, BY TYPE OF ACTIVITY AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Curriculum Development and revision meetings	Science Teaching Work-Shops	College Science Courses/ Workshops	Television and/or radio programmes	Others
Illinois (116)*					
Number	100	96	71	32	5
Percent	86.2	82.8	61.2	27.6	4.3
Indiana (92)*					
Number	81	61	37	18	2
Percent	88.0	66.3	40.2	19.6	2.2
Michigan (141)*					
Number	130	91	72	28	3
Percent	92.2	64.5	51.1	19.9	2.1
Ohio (120)*					
Number	102	81	65	25	4
Percent	85.0	67.5	54.4	20.8	3.3
Wisconsin (75)*					
Number	68	54	47	23	1
Percent	90.7	72.0	62.7	30.7	1.3
Great Lakes (544)*					
Number	481	383	292	126	15
Percent	88.4	70.4	53.7	23.2	2.8

*State and region sample sizes.

TABLE 68

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS PARTICIPATING IN INSERVICE SCIENCE EDUCATION ACTIVITIES FOR SCIENCE TEACHERS BY TYPE OF ACTIVITY AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Curriculum Development and revision meetings	Science Teaching Work-shops	College Science Courses/ Workshops	Television and/or radio Programs	Others
Alaska (3)*					
Number	3	1	1	0	0
Percent	100.0	33.3	33.3	0.0	0.0
California (231)*					
Number	208	179	164	85	7
Percent	90.0	77.5	71.0	36.8	3.0
Hawaii (10)*					
Number	10	9	9	6	1
Percent	100.0	90.0	90.0	60.0	10.0
Nevada (9)*					
Number	9	5	6	5	0
Percent	100.0	55.6	66.7	55.6	0.0
Oregon (32)*					
Number	31	26	24	12	2
Percent	96.9	81.3	75.0	37.5	6.3
Washington (73)*					
Number	64	55	50	27	3
Percent	87.7	75.3	68.5	37.0	4.1
Far West (358)*					
Number	325	275	254	135	13
Percent	90.8	76.8	71.0	37.7	3.6

*State and region sample sizes.

TABLE 69

NUMBER AND PERCENT OF SCIENCE TEACHERS BY AGE GROUP AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Below 30 Years	30 - 39 Years	40 - 49 Years	50 - 59 Years	Over 60 Years	No response	Total
Illinois							
Number	35	50	22	9	3	3	122
Percent	28.7	41.0	18.0	7.4	2.5	2.5	100.0
Indiana							
Number	19	29	18	10	5	0	81
Percent	23.4	35.7	22.4	12.3	6.2	0.0	100.0
Michigan							
Number	39	55	29	12	6	2	143
Percent	27.3	38.5	20.3	8.4	4.2	1.4	100.0
Ohio							
Number	39	33	34	11	4	3	124
Percent	31.6	26.7	27.5	8.9	3.2	2.4	100.0
Wisconsin							
Number	15	32	16	12	3	2	80
Percent	18.8	40.0	18.0	15.0	3.8	2.5	100.0
Great Lakes							
Number	147	199	119	54	21	11	550
Percent	26.5	35.8	21.4	9.7	3.8	2.0	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 70

NUMBER AND PERCENT OF SCIENCE TEACHERS BY AGE GROUP AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Below 30 Years	30-39 Years	40-49 Years	50-59 Years	60 and over Years	No response	Total
Alaska							
Number	0	2	1	0	0	0	3
Percent	0.0	66.7	33.3	0.0	0.0	0.0	100.0
California							
Number	39	82	82	33	7	3	246
Percent	16.0	33.6	33.6	13.5	2.9	1.2	100.0
Hawaii							
Number	4	5	1	0	0	0	10
Percent	40.0	50.0	10.0	0.0	0.0	0.0	100.0
Nevada							
Number	3	3	2	0	0	0	8
Percent	37.5	37.5	25.0	0.0	0.0	0.0	100.0
Oregon							
Number	2	15	12	5	0	0	34
Percent	5.9	44.1	35.3	14.7	0.0	0.0	100.0
Washington							
Number	9	30	17	10	3	1	70
Percent	12.9	42.9	24.3	14.3	4.3	1.4	100.0
Far West							
Number	57	137	115	46	12	4	371
Percent	15.4	37.0	32.2	12.4	3.2	1.1	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 71

NUMBER AND PERCENT OF SCIENCE TEACHERS BY HIGHEST DEGREE HELD AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Highest Degree Held No Degree	B.S. or B.A.	M.S. or M.A.	Special-ist	Ed.D.or Ph.D.	No resp-onse
Illinois						
Number	0	41	78	1	2	0
Percent	0.0	33.6	63.9	0.8	1.6	0.0
Indiana						
Number	0	17	62	1	0	1
Percent	0.0	21.0	76.5	1.2	0.0	1.2
Michigan						
Number	0	45	95	1	2	0
Percent	0.0	31.5	66.4	0.7	1.4	0.0
Ohio						
Number	1	51	68	0	2	2
Percent	0.8	41.1	54.8	0.0	1.6	1.6
Wisconsin						
Number	1	31	47	0	1	0
Percent	1.3	38.8	58.8	0.0	1.3	0.0
Great Lakes						
Number	2	185	350	3	7	3
Percent	0.4	33.6	63.4	0.6	1.3	0.6

Note: Due to rounding, percents may not total 100.0.

TABLE 72

NUMBER AND PERCENT OF SCIENCE TEACHERS BY HIGHEST DEGREE HELD AND BY STATE IN THE FAR WEST SAMPLE

State and Region	No Degree	Highest B.S. or B.A.	Degree Held M.S. or M.A.	Special-ist	Ed. D. or Ph.D	No resp-onse
Alaska						
Number	0	2	1	0	0	0
Percent	0.0	66.7	33.3	0.0	0.0	0.0
California						
Number	0	90	152	3	1	0
Percent	0.0	36.6	61.8	1.2	0.4	0.0
Hawaii						
Number	0	7	3	0	0	0
Percent	0.0	70.0	30.0	0.0	0.0	0.0
Nevada						
Number	0	2	6	0	0	0
Percent	0.0	25.0	75.0	0.0	0.0	0.0
Oregon						
Number	0	7	26	0	1	0
Percent	0.0	20.6	76.5	0.0	2.9	0.0
Washington						
Number	0	31	37	1	1	0
Percent	0.0	44.3	52.9	1.4	1.4	0.0
Far West						
Number	0	139	225	4	3	371
Percent	0.0	37.5	60.7	1.1	0.8	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 73

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF UNDERGRADUATE SEMESTER HOURS IN BIOLOGICAL SCIENCE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Number of Semester Hours 10 and under	11-20	21-30	31-40	Over 40	No response	Total
Illinois							
Number	25	12	18	30	23	14	122
Percent	20.5	9.8	14.8	24.6	18.8	11.5	100.0
Indiana							
Number	10	7	21	16	19	8	81
Percent	12.3	8.6	25.8	19.7	23.4	9.9	100.0
Michigan							
Number	24	34	31	27	18	20	143
Percent	16.8	23.8	21.7	18.9	12.6	14.0	100.0
Ohio							
Number	22	22	20	29	11	20	124
Percent	17.8	17.8	16.2	23.5	8.9	16.2	100.0
Wisconsin							
Number	9	14	18	19	14	6	80
Percent	11.3	17.5	22.5	23.8	17.6	7.5	100.0
Great Lakes							
Number	90	79	107	121	85	68	550
Percent	16.2	14.2	19.3	21.8	15.3	12.4	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 74

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF UNDERGRADUATE SEMESTER HOURS IN BIOLOGICAL SCIENCE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Number of Semester Hours: 10 and under	11-20	21-30	31-40	Over 40	No response	Total
Alaska							
Number	0	0	0	0	3	0	3
Percent0	0.0	0.0	0.0	0.0	100.0	0.0	100.0
California							
Number	27	40	35	44	66	34	246
Percent	11.0	16.0	14.2	18.0	26.9	13.8	100.0
Hawaii							
Number	3	3	2	0	2	0	10
Pefcent	30.0	30.0	20.0	0.0	20.0	0.0	100.0
Nevada							
Number	0	1	0	2	5	0	8
Percent	0.0	12.5	0.0	25.0	62.5	0.0	100.0
Oregon							
Number	1	5	7	7	9	5	34
Percent	2.9	14.7	20.6	20.6	26.5	14.7	100.0
Washington							
Number	15	10	13	14	7	9	70
Percent	21.5	14.3	18.6	20.0	10.0	12.9	100.0
Far West							
Number	46	59	57	67	94	48	371
Percent	12.4	15.9	15.4	18.1	25.4	12.9	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 75

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF UNDERGRADUATE SEMESTER HOURS IN PHYSICAL SCIENCE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Number of Semester Hours 10 and under	11-20	21-30	31-40	Over 40	No response	Total
Illinois							
Number	27	29	17	28	18	8	122
Percent	22.1	23.8	13.9	18.9	14.8	6.6	100.0
Indiana							
Number	18	13	20	11	10	9	81
Percent	22.1	16.0	24.6	13.5	12.3	11.1	100.0
Michigan							
Number	26	29	32	14	17	25	143
Percent	18.2	20.3	22.4	9.8	11.9	17.5	100.0
Ohio							
Number	20	22	23	19	26	14	124
Percent	16.2	17.8	18.6	15.4	21.1	11.3	100.0
Wisconsin							
Number	10	27	12	12	9	10	80
Percent	12.5	33.8	15.0	15.0	11.3	12.5	100.0
Great Lakes							
Number	101	120	104	79	80	66	550
Percent	19.2	21.6	18.7	14.2	14.4	12.0	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 76

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF UNDER-GRADUATE SEMESTER HOURS IN PHYSICAL SCIENCE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Number of Semester Hours						
	10 and under	11-20	21-31	31-40	Over 40	No response	Total
Alaska							
Number	0	1	0	2	0	0	3
Percent	0.0	33.3	0.0	66.7	0.0	0.0	100.0
California							
Number	37	76	50	29	36	18	246
Percent	15.1	30.9	20.3	11.8	14.7	7.3	100.0
Hawaii							
Number	1	3	3	3	0	0	10
Percent	10.0	30.0	30.0	30.0	0.0	0.0	100.0
Nevada							
Number	1	2	1	2	1	1	8
Percent	12.5	25.0	12.5	25.0	12.5	12.5	100.0
Oregon							
Number	8	11	6	3	3	3	34
Percent	23.5	32.3	17.6	8.8	8.8	8.8	100.0
Washington							
Number	18	14	11	9	13	5	70
Percent	25.7	20.0	15.7	12.9	18.6	7.1	100.0
Far West							
Number	65	107	71	48	53	27	371
Percent	17.6	30.0	19.2	12.9	14.3	7.3	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 77

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OR UNDER-GRADUATE SEMESTER HOURS IN EARTH SCIENCE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Number of Semester Hours 10 and under	Over 10	No response	Total
Illinois				
Number	32	12	78	122
Percent	26.2	9.8	63.9	100.0
Indiana				
Number	24	4	53	81
Percent	29.5	5.0	65.4	100.0
Michigan				
Number	37	18	88	143
Percent	25.9	12.6	61.5	100.0
Ohio				
Number	32	8	84	124
Percent	25.9	6.4	67.7	100.0
Wisconsin				
Number	35	14	31	80
Percent	43.8	17.5	38.8	100.0
Great Lakes				
Number	160	56	334	550
Percent	30.4	10.1	60.7	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 78

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF UNDERGRADUATE SEMESTER HOURS IN EARTH SCIENCE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Number of Semester Hours 10 and under	Over 10	No response	Total
Alaska				
Number	1	0	2	3
Percent	33.3	0.0	66.7	100.0
California				
Number	98	26	122	246
Percent	39.9	10.6	49.6	100.0
Hawaii				
Number	5	2	3	10
Percent	50.0	20.0	30.0	100.0
Nevada				
Number	2	0	6	8
Percent	25.5	0.0	75.0	100.0
Oregon				
Number	14	4	16	34
Percent	41.2	11.8	47.1	100.0
Washington				
Number	33	8	29	70
Percent	47.2	11.5	41.4	100.0
Far West				
Number	153	40	178	371
Percent	41.3	10.8	48.0	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 79

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF GRADUATE SEMESTER HOURS IN BIOLOGICAL SCIENCE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	10 and under	11-20	21-30	31-40	Over 40	No response	Total
	Number of Semester Hours						
Illinois							
Number	23	11	15	8	9	56	122
Percent	18.9	9.0	12.3	6.6	7.4	45.9	100.0
Indiana							
Number	19	13	10	7	4	28	81.0
Percent	23.4	16.0	12.3	816	4.9	34.6	100.0
Michigan							
Number	30	18	19	6	4	66	143
Percent	21.0	12.6	13.3	4.2	2.8	46.2	100.0
Ohio							
Number	19	11	5	7	9	73	124
Percent	15.4	8.9	4.1	5.7	7.3	58.9	100.0
Wisconsin							
Number	14	9	8	4	7	38	80
Percent	17.5	11.3	10.0	5.0	8.8	47.5	100.0
Great Lakes							
Number	105	62	57	32	33	261	550
Percent	18.9	11.2	10.3	5.8	5.9	47.5	100.0

note: Due to rounding, percents may not total 100.0.

TABLE 80

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF GRADUATE SEMESTER HOURS IN BIOLOGICAL SCIENCE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Number of Semester Hours: 10 and under	11-20	21-30	31-40	Over 40	No response	Total
Alaska							
Number	1	0	1	1	0	0	3
Percent	33.3	0.0	33.3	33.3	0.0	0.0	100.0
California							
Number	62	45	26	24	22	67	246
Percent	25.2	18.3	10.6	9.8	9.0	27.2	100.0
Hawaii							
Number	1	0	0	1	0	8	10
Percent	10.0	0.0	0.0	10.0	0.0	80.0	100.0
Nevada							
Number	1	0	1	2	2	2	8
Percent	12.5	0.0	12.5	25.0	25.0	25.0	100.0
Oregon							
Number	10	6	4	0	4	10	34
Percent	29.4	17.6	11.8	0.0	11.8	29.4	100.0
Washington							
Number	18	8	12	5	4	23	70
Percent	25.7	11.4	17.2	7.2	5.7	32.9	100.0
Far West							
Number	93	59	44	34	31	110	371
Percent	25.1	15.9	11.9	9.2	8.4	29.7	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 81

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF GRADUATE SEMESTER HOURS IN PHYSICAL SCIENCE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Number of Semester Hours 10 and under	11-20	21-30	31-40	Over 40	No response	Total
Illinois							
Number	26	10	11	7	8	60	122
Percent	21.3	8,2	8.9	5.7	6.6	49.2	100.0
Indiana							
Number	17	5	5	5	5	6	44
Percent	20.9	6.2	6.2	6.2	7.4	54.3	100.0
Michigan							
Number	40	21	5	7	6	64	143
Percent	28.0	14.7	3.5	4.9	4.2	44.8	100.0
Ohio							
Number	16	14	13	8	5	68	124
Percent	13.0	11.3	10.5	6.5	4.1	54.8	100.0
Wisconsin							
Number	16	17	6	2	4	35	80
Percent	20.0	21.3	7.5	2.5	5.0	43.8	100.0
Great Lakes							
Number	115	67	40	29	28	271	550
Percent	20.7	12.1	7.2	5.2	5.0	49.3	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 82

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF GRADUATE SEMESTER HOURS IN PHYSICAL SCIENCE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Number of Semester Hours 10 and under	11-20	21-30	31-40	Over 40	No response	Total
Alaska							
Number	1	0	1	0	0	0	3
Percent	33.3	0.0	33.3	0.0	0.0	33.3	100.0
California							
Number	55	46	24	12	8	101	246
Percent	22.4	18.7	9.8	4.9	3.3	41.1	100.0
Hawaii							
Number	3	0	1	0	0	6	10
Percent	30.0	0.0	10.0	0.0	0.0	60.0	100.0
Nevada							
Number	1	1	0	0	0	6	8
Percent	12.5	12.5	0.0	0.0	0.0	75.0	100.0
Oregon							
Number	8	8	6	4	1	7	34
Percent	23.5	23.5	17.6	11.8	2.9	20.6	100.0
Washington							
Number	20	11	11	8	1	19	70
Percent	28.6	15.7	15.7	11.4	1.4	27.1	100.0
Far West							
Number	88	66	43	24	10	140	371
Percent	23.8	17.8	11.6	6.5	2.7	37.7	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 83

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF GRADUATE SEMESTER HOURS IN EARTH SCIENCE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Number of Semester Hours 10 and under	Over 10	No response	Total
Illinois				
Number	19	8	95	122
Percent	15.6	6.6	77.9	100.0
Indiana				
Number	13	4	64	81
Percent	16.6	5.0	79.0	100.0
Michigan				
Number	33	8	102	143
Percent	23.1	5.6	71.3	100.0
Ohio				
Number	16	5	103	124
Percent	13.0	4.1	83.1	100.0
Wisconsin				
Number	13	9	58	80
Percent	16.3	11.3	72.5	100.0
Great Lakes				
Number	94	34	422	550
Percent	16.9	6.1	76.7	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 84

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF GRADUATE SEMESTER HOURS IN EARTH SCIENCE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Number of Semester Hours: 10 and under	Number of Semester Hours: Over 10	No response	Total
Alaska				
Number	1	0	2	3
Percent	33.3	0.0	66.7	100.0
California				
Number	58	19	169	246
Percent	23.6	7.8	68.7	100.0
Hawaii				
Number	1	0	9	10
Percent	10.0	0.0	90.0	100.0
Nevada				
Number	1	0	7	8
Percent	12.5	0.0	87.5	100.0
Oregon				
Number	13	2	19	34
Percent	38.2	5.9	55.9	100.0
Washington				
Number	21	5	44	70
Percent	30.0	7.2	62.8	100.0
Far West				
Number	95	26	250	371
Percent	25.7	7.0	67.4	100.0

Note: Due to rounding, percents may not total 100.0.

Table 85

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF GRADUATE SEMESTER HOURS IN SCIENCE EDUCATION AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Number of Semester Hours 10 and under	11-20	Over 20	No response	Total
Illinois					
Number	40	7	5	70	122
Percent	32.8	5.7	4.1	57.4	100.0
Indiana					
Number	26	5	2	47	81
Percent	32.0	6.2	2.5	58.0	100.0
Michigan					
Number	60	6	5	72	143
Percent	42.0	4.2	3.5	50.4	100.0
Ohio					
Number	30	12	4	78	124
Percent	24.3	7.7	3.2	62.9	100.0
Wisconsin					
Number	29	5	6	40	80
Percent	36.3	6.3	7.5	50.0	100.0
Great Lakes					
Number	185	36	22	307	550
Percent	33.3	6.5	4.0	55.8	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 86

NUMBER AND PERCENT OF SCIENCE TEACHERS BY NUMBER OF GRADUATE SEMESTER HOURS IN SCIENCE EDUCATION AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Number of Semester Hours 10 and under	11-20	Over 20	No response	Total
Alaska					
Number	1	1	0	1	3
Percent	33.3	33.3	0.0	33.3	100.0
California					
Number	98	41	17	90	246
Percent	39.9	17.6	7.0	36.6	100.0
Hawaii					
Number	2	0	1	7	10
Percent	20.0	0.0	10.0	70.0	100.0
Nevada					
Number	3	0	0	5	8
Percent	37.5	0.0	0.0	62.5	100.0
Oregon					
Number	18	4	1	11	34
Percent	52.9	11.8	2.9	32.4	100.0
Washington					
Number	40	4	2	24	70
Percent	57.2	5.7	2.9	34.3	100.0
Far West					
Number	162	50	21	138	371
Percent	43.7	13.5	5.7	37.2	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 87

NUMBER AND PERCENT OF SCIENCE TEACHERS BY KIND OF INSTITUTE ATTENDED AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Academic Year Institute	Inservice Institute	Summer Institute	Research Institute	Other Sponsored Institute
Illinois					
Number	7	29	62	8	17
Percent	5.7	23.8	51.8	6.6	13.9
Indiana					
Number	5	20	40	0	6
Percent	6.2	24.6	49.2	0.0	7.4
Michigan					
Number	14	35	75	7 4	10
Percent	9.8	24.5	52.5	4.9	7.0
Ohio					
Number	6	22	59	4	7
Percent	4.8	17.7	47.6	3.2	5.7
Wisconsin					
Number	12	22	45	5	11
Percent	15.0	27.5	56.3	6.3	13.8
Great Lakes					
Number	44	128	281	24	51
Percent	8.0	23.3	51.1	4.4	9.3

Note: Due to rounding, percents may not total 100.0.

TABLE 88

NUMBER AND PERCENT OF SCIENCE TEACHERS BY KIND OF INSTITUTE ATTENDED AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Academic Year Institute	Inservice Institute	Summer Institute	Research Institute	Other Sponsored Institute
Alaska					
Number	0	1	1	0	1
Percent	0.0	33.3	33.3	0.0	33.3
California					
Number	33	77	154	17	30
Percent	13.4	31.3	62.6	6.9	12.2
Hawaii					
Number	2	3	4	0	0
Percent	20.0	30.0	40.0	0.0	0.0
Nevada					
Number	0	1	2	0	0
Percent	0.0	12.5	25.0	0.0	0.0
Oregon					
Number	5	20	27	3	4
Percent	14.7	58.8	79.4	8.8	11.8
Washington					
Number	12	17	44	6	5
Percent	17.2	24.3	62.9	8.6	7.1
Far West					
Number	52	119	232	26	40
Percent	14.0	32.1	62.5	7.0	10.8

Note: Due to rounding, percents may not total 100.0.

TABLE 89

NUMBER AND PERCENT OF SCIENCE TEACHERS BY YEARS OF SECONDARY SCHOOL TEACHING EXPERIENCE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Under 6 Years	6-10 Years	11-20 years	21-30 Years	Over 30 Years	No resp-onse	Total
Illinois							
Number	38	33	37	9	3	2	122
Percent	31.2	27.1	30.3	7.4	2.5	1.6	100.0
Indiana							
Number	16	21	22	13	8	1	81
Percent	19.7	25.8	27.1	16	9.8	1.2	100.0
Michigan							
Number	36	43	39	13	6	6	143
Percent	25.2	30.1	27.3	9.1	4.2	4.2	100.0
Ohio							
Number	30	32	42	10	9	1	124
Percent	24.3	25.9	34.0	8.1	7.3	0.8	100.0
Wisconsin							
Number	15	20	26	12	6	1	80
Percent	18.8	25.0	32.5	15.0	7.5	1.3	100.0
Great Lakes							
Number	135	149	166	58	30	13	550
Percent	24.3	26.8	29.9	10.4	5.4	2.2	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 90

NUMBER AND PERCENT OF SCIENCE TEACHERS BY YEARS OF SECONDARY SCHOOL TEACHING EXPERIENCE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Under 6 Years	6-10 Years	11-20 Years	21-30 Years	Over 30 Years	No response	Total
Alaska							
Number	1	1	1	0	0	0	3
Percent	33.3	33.3	33.3	0.0	0.0	0.0	100.0
California							
Number	46	54	105	31	3	7	246
Percent	18.9	22.1	43.1	12.7	1.2	2.9	100.0
Hawaii							
Number	3	5	2	0	0	0	10
Percent	30.0	50.0	20.0	0.0	0.0	0.0	100.0
Nevada							
Number	2	2	4	0	0	0	8
Percent	25.0	25.0	50.0	0	0	0	100.0
Oregon							
Number	4	9	15	6	0	0	34
Percent	11.8	26.5	44.1	17.6	0.0	0.0	100.0
Washington							
Number	10	16	31	6	6	1	70
Percent	14.3	22.9	44.3	8.6	8.6	1.4	100.0
Far West							
Number	66	87	158	43	9	8	371
Percent	178	23.5	42.7	11.6	2.4	2.2	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 91

NUMBER AND PERCENT OF SCIENCE TEACHERS BY YEARS OF SECONDARY SCHOOL SCIENCE TEACHING EXPERIENCE AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Under 6 Years	6-10 Years	11-20 Years	21-30 Years	Over 30 Years	No resp-onse	Total
Illinois							
Number	41	31	37	9	3	1	122
Percent	33.6	25.4	30.3	7.4	2.5	0.8	100.0
Indiana							
Number	18	20	23	11	7	2	81
Percent	22.1	24.6	28.3	13.5	8.6	2.5	100.0
Michigan							
Number	40	41	38	12	6	6	143
Percent	28.0	28.7	26.6	8.4	4.2	4.2	100.0
Ohio							
Number	31	31	42	11	7	2	124
Percent5	25.1	25.1	34.0	8.9	5.7	1.6	100.0
Wisconsin							
Number	17	20	27	9	6	1	80
Percent	21.3	25.0	33.8	11.3	7.5	1.3	100.0
Great Lakes							
Number	147	143	167	53	27	13	550
Percent	26.5	25.7	30.1	9.5	4.9	2.3	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 92

NUMBER AND PERCENT OF SCIENCE TEACHERS BY YEARS OF SECONDARY SCHOOL SCIENCE TEACHING EXPERIENCE AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Under 6 Years	6-10 Years	11-20 Years	21-30 Years	Over 30 Years	No response	Total
Alaska							
Number	1	1	1	0	0	0	3
Percent	33.3	33.3	33.3	0.0	0.0	0.0	100.0
California							
Number	48	55	110	25	2	6	246
Percent	19.7	22.6	47.3	10.8	0.8	2.4	100.0
Hawaii							
Number	3	4	2	0	0	1	10
Percent	30.0	40.0	20.0	0.0	0.0	10.0	100.0
Nevada							
Number	2	2	4	0	0	0	8
Percent	25.0	25.0	50.0	0.0	0.0	0.0	100.0
Oregon							
Number	4	10	15	4	0	1	34
Percent	11.8	29.4	44.1	11.8	0.0	2.9	100.0
Washington							
Number	11	16	31	7	5	0	70
Percent	15.7	22.9	44.3	10.0	7.2	0.0	100.0
Far West							
Number	69	88	163	36	7	8	371
Percent	18.6	23.8	44.0	9.7	1.9	2.2	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 93

NUMBER AND PERCENT OF SCIENCE TEACHERS REPORTING THE KIND OF ROOM WHICH THEY USED FOR TEACHING SCIENCE BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Laboratory or special science room	Classroom with portable science kits	Classroom with no science facilities or kits	Other	No response	Total
Illinois						
Number	114	2	1	5	0	122
Percent	93.4	1.6	0.8	4.1	0.0	100.0
Indiana						
Number	69	4	4	2	2	81
Percent	85.2	4.9	4.9	2.5	2.5	100.0
Michigan						
Number	122	7	1	8	5	143
Percent	85.3	4.9	0.7	5.6	3.5	100.0
Ohio						
Number	109	4	3	5	3	124
Percent	87.9	3.2	2.4	4.0	2.4	100.0
Wisconsin						
Number	76	3	0	1	0	80
Percent	95.0	3.8	1.3	1.3	0.0	100.0
Great Lakes						
Number	490	20	9	21	10	550
Percent	89.1	3.6	1.6	3.8	1.8	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 94

NUMBER AND PERCENT OF SCIENCE TEACHERS REPORTING THE KIND OF ROOM WHICH THEY USED FOR TEACHING SCIENCE BY STATE IN THE FAR WEST SAMPLE

State and Region	Laboratory or special science room	Classroom with portable science kits	Classroom with no science facilities or kits	Other	No resp- onse	Total
Alaska						
Number	2	0	0	0	1	3
Percent	66.7	0.0	0.0	0.0	33.3	100.0
California						
Number	216	10	4	10	6	246
Percent	87.8	4.1	1.6	4.1	2.5	100.0
Hawaii						
Number	8	1	0	1	0	10
Percent	80.0	10.0	0.0	10.0	0.0	100.0
Nevada						
Number	6	0	1	1	0	8
Percent	75.5	0.0	12.5	12.5	0.0	100.0
Oregon						
Number	29	2	1	2	0	34
Percent	85.3	5.9	2.9	5.9	0.0	100.0
Washington						
Number	65	2	1	1	1	70
Percent	92.9	2.9	1.4	1.4	1.4	100.0
Far West						
Number	326	15	7	15	8	371
Percent	89.9	4.0	1.9	4.0	2.2	100.0

Note: Due to rounding, percents may not total 100.0.

TABLE 95

NUMBER AND PERCENT OF SCIENCE TEACHERS REPORTING THE AVAILABILITY OF SPECIAL SCIENCE FACILITIES IN THEIR SCHOOLS BY STATE IN THE GREAT LAKES SAMPLE

Special Science Facility	Illinois		Indiana		Michigan		Ohio		Wisconsin		Great Lakes Region	
	No.	%	No.	%	No.	%	No.	%	No.	%	NO.	%
Auto-tutorial laboratory	8	6.6	13	16.6	16	11.2	9	7.3	2	2.5	48	8.6
Closed circuit T.V.	32	26.2	21	25.8	30	21.0	30	24.3	2.	26.3	134	24.4
Computer terminals	30	25.6	6	7.4	17	11.9	17	13.8	5	6.3	75	13.5
Greenhouse	38	31.2	24	29.5	71	49.7	42	34.0	27	33.8	202	36.4
Ham radio station	11	9.0	8	9.8	14	9.8	8	6.5	2	2.5	43	7.7
Land laboratory	15	12.3	15	18.5	26	18.2	23	8.6	19	23.8	98	17.6

Note: Due to rounding, percents may not total 100.0.

TABLE 96

NUMBER AND PERCENT OF SCIENCE TEACHERS REPORTING THE AVAILABILITY OF SPECIAL SCIENCE FACILITIES IN THEIR SCHOOLS BY STATE IN THE FAR WEST SAMPLE

Special Science Facility	Alaska		California		Hawaii		Nevada		Oregon		Washington		Far West Region	
	No.	%	No.	%	%	%	No.	%	No.	%	No.	%	No.	%
Auto-tutorial laboratory	0	0.0	12	4.9	0	0.0	3	37.5	2	5.9	2	2.9	19	5.1
Closed circuit T.V.	0	0.0	76	31.2	2	20.0	4	50.0	8	23.5	25	35.8	115	31.1
Computer terminals	0	0.0	18	7.4	0	0.0	1	12.5	6	17.6	7	10.0	32	8.6
Greenhouse	0	0.0	50	20.5	2	20.0	2	25.0	10	29.4	32	45.8	96	25.9
Ham radio station	0	0.0	22	9.0	1	10.0	0	0.0	4	11.8	3	4.3	30	8.1
Land laboratory	0	0.0	31	12.7	3	30.0	0	0.0	2	5.9	13	18.5	49	13.2

Note: Due to rounding, percents may not total 100.0.

TABLE 97

NUMBER AND PERCENT OF SCIENCE TEACHERS REPORTING THE AVAILABILITY OF SPECIAL SCIENCE FACILITIES IN THEIR SCHOOLS BY STATE IN THE GREAT LAKES SAMPLE

Special Science Facility	Illinois		Indiana		Michigan		Ohio		Wisconsin		Great Lakes Region	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Nature trail(s)	26	21.3	18	22.1	37	25.9	32	25.9	29	36.3	142	25.6
Observatory	5	4.1	5	6.2	7	4.9	15	12.2	1	1.3	33	5.9
Planetarium	9	7.4	12	14.8	17	11.9	20	16.2	16	20.0	74	13.3
Science darkroom	51	41.8	34	41.8	76	53.2	40	32.4	41	51.3	242	43.6
Ventilated animal house	10	8.2	13	16.0	29	20.3	20	16.2	10	12.5	82	14.8
Weather station	30	24.6	11	13.5	19	13.3	10	8.1	16	20.0	86	15.5

Note: Due to rounding, percents may not total 100.0.

TABLE 98

NUMBER AND PERCENT OF SCIENCE TEACHERS REPORTING THE AVAILABILITY OF SPECIAL SCIENCE FACILITIES IN THEIR SCHOOLS BY STATE IN THE FAR WEST SAMPLE

Special Science Facility	Alaska		California		Hawaii		Nevada		Oregon		Washington		Far West	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Nature trail(s)	0	0.0	28	11.5	1	10.0	3	37.5	7	20.6	15	21.5	54	14.6
Observatory	0	0.0	14	5.7	2	20.0	1	12.5	2	5.9	2	2.9	21	5.7
Planetarium	1	33.3	15	6.1	2	20.0	2	25.0	2	5.9	1	1.4	23	6.2
Science darkroom	1	33.3	84	34.4	0	0.0	5	62.5	13	38.2	27	38.6	130	35.1
Ventilated animal house	0	0.0	25	10.3	0	0.0	0	0.0	8	23.5	11	15.7	44	11.9
Weather station	0	0.0	36	14.8	1	10.0	4	50.0	6	17.6	7	10.0	54	14.6

Note: Due to rounding, percents may not total 100.0.

TABLE 99

NUMBER AND PERCENT OF SCIENCE TEACHERS ASSIGNING VARIOUS DEGREES OF USAGE TO SELECTED LEARNING ACTIVITIES BY GEOGRAPHICAL REGION

Learning activity and Degree of Usage	Great Lakes Region		Far West Region	
	Number	Percent	Number	Percent
Lecture				
Most often used	58	10.6	11	30
Second most often used	36	6.6	16	4.3
Third most often used	44	7.5	2.2	5.9
Lecture-discussion				
Most often used	308	56.0	194	52.3
Second most often used	103	18.7	79	21.3
Third most often used	51	9.3	37	10.0
Small group discussion				
Most often used	16	2.9	9	2.4
Second most often used	28	5.1	14	3.8
Third most often used	42	7.6	22	5.9

TABLE 100

NUMBER AND PERCENT OF SCIENCE TEACHERS ASSIGNING VARIOUS DEGREES OF USAGE TO SELECTED LEARNING ACTIVITIES BY GEOGRAPHICAL REGION.

Learning activity and Degree of Usage	Great Lakes Region		Far West Region	
	Number	Percent	Number	Percent
Science demonstrations				
Most often used	16	2.9	7	1.9
Second most often used	59	10.7	28	7.6
Third most often used	101	18.4	63	17.0
Instructional films				
Most often used	7	1.3	4	1.1
Second most often used	25	4.6	12	3.2
Third most often used	94	17.1	78	21.0
Independent study				
Most often used	13	2.4	12	3.2
Second most often used	14	2.6	12	3.2
Third most often used	27	4.9	24	6.5

TABLE 101

NUMBER AND PERCENT OF SCIENCE TEACHERS ASSIGNING VARIOUS DEGREES OF USAGE TO SELECTED LEARNING ACTIVITIES BY GEOGRAPHICAL REGION

Learning activity and Degree of Usage	Great Lakes Region		Far West Region	
	Number	Percent	Number	Percent
Individual laboratory activity				
Most often used	75	13.6	47	12.7
Second most often used	103	18.7	75	20.2
Third most often used	52	9.5	26	7.0
Group laboratory activity				
Most often used	77	14.0	88	23.7
Second most often used	174	31.6	107	28.8
Third most often used	79	14.4	49	13.2
In-class written assignments				
Most often used	6	1.1	9	2.4
Second most often used	33	6.0	32	8.6
Third most often used	57	10.4	40	10.8

TABLE 102

NUMBER AND PERCENT OF SCIENCE TEACHERS ASSIGNING VARIOUS DEGREES OF USAGE TO SELECTED LEARNING ACTIVITIES BY GEOGRAPHICAL REGION

Learning activity and Degree of Usage	Great Lakes Region		Far West Region	
	Number	Percent	Number	Percent
Excursions or field studies				
Most often used	1	0.2	0	0.0
Second most often used	6	1.1	2	0.5
Third most often used	10	1.8	7	1.9
Programmed instruction				
Most often used	7	1.8	7	1.9
Second most often used	4	0.7	5	1.4
Third most often used	55	10.0	3	0.8
Auto-tutorial instruction				
Most often used	1	0.2	0	0.0
Second most often used	3	0.6	1	0.3
Third most often used	4	0.7	1	0.3

TABLE 103

NUMBER AND PERCENT OF SCIENCE TEACHERS ASSIGNING VARIOUS DEGREES OF USAGE TO SELECTED GRADING METHODS BY GEOGRAPHICAL REGION

Grading Method and Degree of Usage	Great Lakes Region		Far West Region	
	Number	Percent	Number	Percent
Test scores				
Most often used	391	71.1	219	59.0
Second most often used	71	12.9	80	21.6
Third most often used5	44	8.0	32	8.6
Written assignments				
Most often used	54	9.8	47	12.7
Second most often used	189	34.4	96	25.9
Third most often used	125	22.7	137	36.9
Student participation in class discussion				
Most often used	22	4.0	7	1.9
Second most often used	59	10.7	28	7.6
Third most often used	140	25.5	64	17.3

TABLE 104

NUMBER AND PERCENT OF SCIENCE TEACHERS ASSIGNING VARIOUS DEGREES OF USAGE TO SELECTED GRADING METHODS BY GEOGRAPHICAL REGION

Grading method and Degree of Usage	Great Lakes Region		Far West Region	
	Number	Percent	Number	Percent
Student performance in laboratory activity				
Most often used	74	13.5	81	21.8
Second most often used	215	39.1	146	39.4
Third most often used	131	23.8	75	20.2
Student performance in science projects				
Most often used	3	0.6	2	0.5
Second most often used	18	3.3	12	3.2
Third most often used5	26	4.7	14	3.8
Student interest in science				
Most often used	5	0.9	0	0.0
Second most often used	10	1.8	4	1.1
Third most otten used	22	4.0	7	1.9

TABLE 105

NUMBER AND PERCENT OF SCIENCE TEACHERS REPORTING THE USAGE OF VARIOUS KINDS OF TEXTBOOKS AND CURRICULUM MATERIALS BY GEOGRAPHIC REGION

Kind of Textbook and Curriculum Materials	Great Lakes Region		Far West Region	
	Number	Percent	Number	Percent
Single textbook	44	8.0	17	4.6
Single textbook including laboratory manual	67	12.2	47	12.7
Multiple textbooks	14	2.6	5	1.4
Multiple textbooks including laboratory manual	20	3.6	18	4.9
Single textbook and separate laboratory manual	78	14.2	41	11.1
Multiple textbooks and separate laboratory manual	7	1.3	5	1.4

TABLE 106

NUMBER AND PERCENT OF SCIENCE TEACHERS REPORTING THE USAGE OF VARIOUS KINDS OF TEXTBOOKS AND CURRICULUM MATERIALS BY GEOGRAPHIC REGION

Kind of Textbook and Curriculum Materials	Great Lakes Region		Far West Region	
	Number	Percent	Number	Percent
Single textbook and locally prepared materials	56	10.2	19	5.1
Single textbook including laboratory manual and locally prepared materials	32	5.8	23	6.2
Multiple textbooks including laboratory manual and locally prepared materials	20	3.6	21	5.6
Single textbook and separate laboratory manual and locally prepared materials	64	11.6	32	8.6
Multiple textbooks and separate laboratory manual and locally prepared materials	19	3.5	18	4.9

TABLE 107

PERCENT OF SCIENCE TEACHERS ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO SELECTED FACTORS FOR OBTAINING AND MAINTAINING HIGH QUALITY SCIENCE PROGRAMS IN THE GREAT LAKES SAMPLE

Factors	Degrees of Importance				
	Very Important 5	4	3	2	Not Important 1
Innovative science programs	53.5	28.4	12.7	4.2	0.7
Administrative support	60.0	28.4	7.8	2.0	1.3
Science facilities	70.4	24.0	3.8	0.9	0.2
Teacher's salary	23.5	33.1	24.9	8.9	7.8
Inservice education	28.6	34.4	23.5	6.9	3.8
Cooperative staff	56.7	28.9	9.5	1.3	1.6
Small classes	49.5	37.3	10.2	1.6	0.9
Number of different subject preparations	50.0	32.9	10.4	2.7	1.3
Lighter teaching loads	32.7	38.7	19.3	4.7	1.6

TABLE 108

PERCENT OF SCIENCE TEACHERS ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO SELECTED FACTORS FOR OBTAINING AND MAINTAINING HIGH QUALITY SCIENCE PROGRAMS IN THE FAR WEST SAMPLE

Factors	Degrees of Importance: Very Important 5	4	3	2	Not Important 1
Innovative science programs	58.8	26.7	9.2	2.2	1.4
Administrative support	64.9	23.2	8.4	1.9	1.1
Science facilities	66.0	24.8	7.8	0.8	0.3
Teacher's salary	22.6	33.2	28.0	9.4	6.2
Inservice education	26.7	34.2	24.0	7.3	6.2
Cooperative staff	60.4	27.8	9.2	1.4	0.5
Small classes	55.8	31.5	9.7	1.6	1.6
Number of different subject preparations	56.1	31.0	9.2	1.6	1.6
Lighter teaching loads	41.2	32.4	17.8	3.5	1.9

TABLE 109

NUMBER AND PERCENT OF SCIENCE TEACHERS BY DEGREE OF SATISFACTION WITH TEACHING SCIENCE AS A CAREER AND BY STATE IN THE GREAT LAKES SAMPLE

State and Region	Degree of Satisfaction						
	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied	No Response	Total
Illinois							
Number	71	46	2	3	0	0	122
Percent	58.2	37.7	1.6	2.5	0.0	0.0	100.0
Indiana							
Number	50	24	6	1	0	0	81
Percent	61.7	29.6	7.4	1.2	0.0	0.0	100.0
Michigan							
Number	83	52	6	0	1	1	143
Percent	58.0	36.4	4.2	0.0	0.7	0.7	100.0
Ohio							
Number	77	41	2	4	0	0	124
Percent	62.1	33.1	1.6	3.2	0.0	0.0	100.0
Wisconsin							
Number	51	24	3	1	0	1	80
Percent	63.8	30.0	3.8	1.3	0.0	0.0	100.0
Great Lakes							
Number	332	187	19	9	1	2	550
Percent	60.4	34.0	3.5	1.6	0.2	0.4	100.0

TABLE 110

NUMBER AND PERCENT OF SCIENCE TEACHERS BY DEGREE OF SATISFACTION WITH TEACHING SCIENCE AS A CAREER AND BY STATE IN THE FAR WEST SAMPLE

State and Region	Very Satisfied	Satisfied	Neutral	Dissatisffied	Very Dissatisfied	No Response	Total
	Degree of Satisfaction						
[illegible]							
[illegible]	0	3	0	0	0	0	3
Percent	0.0	100.0	0.0	0.0	0.0	0.0	100.0
California							
Number	152	78	6	7	0	3	246
Percent	61.8	31.7	2.4	2.9	0.0	1.2	100.0
Hawaii							
Number	2	6	2	0	0	0	10
Percent	20.0	60.0	20.0	0.0	0.0	0.0	100.0
Nevada'							
Number	3	5	0	0	0	0	8
Percent	37.5	62.5	0.0	0.0	0.0	0.0	100.0
Oregon							
Number	16	15	1	1	0	1	34
Percent	47.1	44.1	2.9	2.9	0.0	2.9	100.0
Washington							
Number	45	22	3	0	0	0	70
Percent	64.3	31.4	4.3	0.0	0.0	0.0	100.0
Far West							
Number	218	129	12	8	0	4	371
Percent	58.8	34.8	3.2	2.2	0.0	1.1	100.0

TABLE 111

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING MODULAR OR OTHER KIND OF SCHEDULE

School Enrollment Groups	Kind of Schedule Modular or Other	Non-modular and non response	Total
499 and under			
Number	8	119	127
Percent	6.3	93.7	100.0
500-999			
Number	12	166	178
Percent	6.7	93.3	100.0
1,000-1,999			
Number	33	362	395
Percent	8.4	91.6	100.0
2,000 and over			
Number	19	183	202
Percent	9.4	90.6	100.0
All sizes			
Number	72	830	902
Percent	8.0	92.0	100.0

$\chi^2 = 1.49$; df = 3 ; not significant.

TABLE 112

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT AND BY NUMBER OF REGULARLY SCHEDULED CLASS PERIODS/MODULES PER DAY

School Enrollment Group	Number of Periods/Modules Per Day 5 or less	6	7	8 or more	Total
499 and under					
Number	13	28	44	42	127
Percent	10.2	22.0	34.6	33.1	100.0
500-999					
Number	10	57	76	35	178
Percent	5.6	32.0	42.7	19.7	100.0
1,000-1,999					
Number	28	186	103	78	395
Percent	7.1	47.1	26.1	19.7	100.0
2,000 and over					
Number	16	70	39	77	202
Percent	7.9	34.7	19.3	38.1	100.0
All sizes					
Number	67	341	262	232	902
Percent	7.4	37.8	29.0	25.7	100.0

$\chi^2 = 65.06$; df = 9 ; $p < 0.001$.

TABLE 113

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING HOMOGENEOUS GROUPING OF SCIENCE CLASSES

School Enrollment Groups	Homogeneous Grouping	No Homogeneous Grouping	Total
499 and under			
Number	46	81	127
Percent	36.2	63.8	100.0
500-999			
Number	73	105	178
Percent	41.0	59.0	100.0
1,000-1,999			
Number	197	198	395
Percent	49.9	50.1	100.0
2,000 and over			
Number	126	76	202
Percent	62.4	37.6	100.0
All sizes			
Number	442	460	902
Percent	49.0	51.0	100.0

$\chi^2 = 27.43$; df = 3 ; $p < 0.001$.

TABLE 114

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT AND BY NUMBER OF FULL-TIME SCIENCE TEACHERS IN THE GREAT LAKES AND FAR WEST SAMPLES

School Enrollment Groups	None or no response	Number of Full-time Science Teachers 1	2	3	4	5	6	7	8	9-10	Over 11	Total
499 and under												
Number	18	34	42	7	5	6	3	5	2	1	4	127
Percent	14.2	26.8	33.1	5.5	3.9	4.7	2.4	3.9	1.6	0.8	3.1	100.0
500-999												
Number	11	19	43	30	35	23	13	1	2	1	0	178
Percent	6.2	10.7	24.2	16.9	19.7	12.9	7.3	0.6	1.1	0.6	0.0	100.0
1,000-1,999												
Number	19	4	25	35	80	65	61	43	33	23	7	395
Percent	4.8	1.0	6.3	8.9	20.3	16.5	15.4	10.9	8.4	5.8	1.8	100.0
2,000 and over												
Number	12	0	2	3	4	10	23	23	27	33	65	202
Percent	5.9	0.0	1.0	1.5	2.0	5.0	11.4	11.4	13.4	16.3	32.2	100.0
All sizes												
Number	60	57	112	75	124	104	100	72	64	58	76	902
Percent	6.7	6.3	12.4	8.3	13.7	11.5	11.1	8.0	7.1	6.4	8.4	100.0

$\chi^2 = 613.08$; df = 30 ; $p < 0.001$.

TABLE 115

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT AND BY PER PUPIL EXPENDITURE FOR SCIENCE EQUIPMENT IN THE GREAT LAKES AND FAR WEST SAMPLES

School Enrollment Groups	No response	\$1.00 to \$2.00	\$3.00 to \$4.00	\$5.00 to \$6.00	More than \$6.00	Total
499 and under						
Number	88	19	10	3	6	126
Percent	69.8	15.1	7.9	2.4	4.8	100.0
500-999						
Number	114	44	10	5	5	178
Percent	64.0	24.7	5.6	2.8	2.8	100.0
1,000-1,999						
Number	240	109	23	6	16	394
Percent	60.9	27.7	5.8	1.5	4.1	100.0
2,000 and over						
Number	115	65	12	5	5	202
Percent	56.9	32.2	5.9	2.5	2.5	100.0
All sizes						
Number	557	237	55	19	32	900
Percent	61.9	26.3	6.1	2.1	3.6	100.0

$\chi^2 = 15.19$; df = 12 ; not significant.

TABLE 116

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT AND BY PER PUPIL EXPENDITURE FOR SCIENCE SUPPLIES IN THE GREAT LAKES AND FAR WEST SAMPLES

School Enrollment Groups	No response	$1.00 to $2.00	$3.00 to $4.00	$5.00 to $6.00	More than $6.00	Total
499 and under						
Number	76	37	9	3	2	127
Percent	59.8	29.1	7.1	2.4	1.6	100.0
500-999						
Number	98	57	16	4	3	178
Percent	55.1	32.0	9.0	2.2	1.7	100.0
1,000-1,999						
Number	146	176	39	19	15	395
Percent	37.0	44.6	9.9	4.8	3.8	100.0
2,000 and over						
Number	70	103	16	7	6	202
Percent	34.7	51.0	7.9	3.5	3.0	100.0
All sizes						
Number	390	373	80	33	26	902
Percent	43.2	41.4	8.9	3.7	2.9	100.0

$\chi^2 = 41.65$; df = 12 ; $p < 0.001$.

TABLE 117

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT WHICH ALLOW SCIENCE TEACHERS TO PURCHASE SCIENCE EQUIPMENT AND SUPPLIES

School Enrollment Groups	No response	No	Yes	Total
499 and under				
Number	1	8	118	127
Percent	0.8	6.3	92.9	100.0
500 - 999				
Number	1	14	163	178
Percent	0.6	7.9	91.6	100.0
1,000 - 1,999				
Number	5	21	369	395
Percent	1.3	5.3	93.4	100.0
2,000 and over				
Number	4	19	179	202
Percent	2.0	9.4	88.6	100.0
All sizes				
Number	11	62	829	902
Percent	1.2	6.9	91.9	100.0

$\chi^2 = 5.74$; df = 6; not significant.

TABLE 118

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING USAGE OF NDEA FUNDS SINCE SEPTEMBER 1968 TO PURCHASE SCIENCE EQUIPMENT

School Enrollment Groups	No response	NDEA Funds not used	NDEA Funds Used	Total
499 and under				
Number	7	42	78	127
Percent	5.5	33.1	61.4	100.0
500 - 999				
Number	1	58	119	178
Percent	0.6	32.6	66.9	100
1,000 - 1,999				
Number	12	134	249	395
Percent	3.0	33.9	63.0	100.0
2,000 and over				
Number	9	86	107	202
Percent	4.5	42.6	53.0	100.0
All sizes				
Number	29	320	553	902
Percent	3.2	35.5	61.3	100.0

$\chi^2 = 14.13$; df = 6; $p < 0.05$.

TABLE 119

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING USAGE OF ESEA FUNDS SINCE SEPTEMBER 1968 TO PURCHASE SCIENCE EQUIPMENT

School Enrollment Groups	No resp-onse	ESEA Funds not Used	ESEA Funds Used	Total
499 and under				
Number	12	75	40	127
Percent	9.4	59.1	31.5	100.0
500 - 999				
Number	12	107	59	178
Percent	6.7	60.1	33.1	100.0
1,000 - 1,999				
Number	22	246	127	395
Percent	5.6	62.3	32.2	100.0
2,000 and over				
Number	17	129	56	202
Percent	8.4	63.9	27.7	100.0
All sizes				
Number	63	557	282	902
Percent	7.0	61.8	31.3	100.0

$\chi^2 = 4.35$; df= 6; not significant.

TABLE 120

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING USAGE OF NDEA FUNDS SINCE SEPTEMBER 1968 TO REMODEL SCIENCE FACILITIES

School Enrollment Groups	No resp- onse	NDEA Funds not used	NDEA Funds Used	Total
499 and under				
Number	4	98	25	127
Percent	3.1	77.2	19.2	100.0
500 - 999				
Number	1	161	16	178
Percent	0.6	90.4	9.0	100.0
1,000 - 1,999				
Number	9	345	41	395
Percent	2.3	87.3	10.4	100.0
2,000 and over				
Number	7	162	33	202
Percent	3.5	80.2	16.3	100.0
All sizes				
Number	21	766	115	902
Percent	2.3	84.9	12.7	100.0

$\chi^2 = 16.77$; df = 6; $p < 0.02$.

TABLE 121

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING THE TEACHING OF ENVIRONMENT/CONSERVATION EDUCATION

School Enrollment Groups	No resp-onse	Not Taught	Taught	Total
499 and under				
Number	12	48	67	127
Percent	9.4	37.8	52.8	100.0
500 - 999				
Number	14	76	88	178
Percent	7.9	42.7	49.4	100.0
1,000 1,999				
Number	20	127	248	395
Percent	5.1	32.2	62.8	100.0
2,000 and over				
Number	10	47	145	202
Percent	5.0	23.3	71.8	100.0
All sizes				
Number	56	298	548	902
Percent	6.2	33.0	60.8	100.0

$\chi^2 = 25.51$; $df = 6$; $p < 0.001$.

TABLE 122

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING THE AVAILABILITY OF FACILITIES FOR TEACHING ENVIRONMENTAL/ CONSERVATION EDUCATION

School Enrollment Groups	Facilities Not Available	Facilities Available	Total
499 and under			
Number	98	29	127
Percent	77.2	22.8	100.0
500 - 999			
Number	130	48	178
Percent	73.0	27.0	100.0
1,000 - 1,999			
Number	289	103	392
Percent	73.7	26.3	100.0
2,00 and over			
Number	128	73	201
Percent	63.7	36.3	100.0
All sizes			
Number	645	253	898
Percent	71.8	28.2	100.0

$\chi^2 = 9.20$; $df = 3$; $p < 0.05$.

TABLE 123

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING THE SPONSORSHIP OF SCIENCE CLUBS

School Enrollment Groups	No response	No Science Clubs	Science Clubs Sponsored	Total
499 and under				
Number	5	69	54	127
Percent	3.1	54.3	42.5	100.0
500 - 999				
Number	5	71	102	178
Percent	2.8	39.9	57.3	100.0
1,000 - 1,999				
Number	9	108	278	395
Percent	2.3	27.3	70.4	100.0
2,000 and over				
Number	4	31	167	202
Percent	2.0	15.3	82.7	100.0
All sizes				
Number	22	279	601	902
Percent	2.4	30.9	66.6	100.0

$\chi^2 = 67.22$; df = 6; $p < 0.001$.

TABLE 124

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING THE SPONSORSHIP OF SCIENCE FAIRS

School Enrollment Groups	No response	No Science Fairs	Science Fairs Sponsored	Total
499 and under				
Number	3	97	27	127
Percent	2.4	76.4	21.3	100.0
500 - 999				
Number	5	127	46	178
Percent	2.8	71.3	25.8	100.0
1,000 - 1,999				
Number	19	294	82	395
Percent	4.8	74.4	20.8	100.0
2,000 and over				
Number	3	157	42	202
Percent	1.5	77.7	20.8	100.0
All sizes				
Number	30	675	197	902
Percent	3.3	74.8	21.8	100.0

$\chi^2 = 7.37$; df = 6; not significant.

TABLE 125

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT AND BY LENGTH OF CLASS PERIODS

School Enrollment Groups	Number of Minutes: Less than 40	40 - 44	45 - 49	50 - 54	55 - 59	60 or more	Total
499 and under							
Number	16	7	19	30	50	5	127
Percent	12.6	5.5	15.0	23.6	39.4	3.9	100.0
500-999							
Number	13	15	21	50	68	11	178
Percent	7.3	8.4	11.8	28.1	38.2	6.2	100.0
1,000-1,999							
Number	25	38	29	112	173	18	395
Percent	6.3	9.6	7.3	28.4	43.8	4.6	100.0
2,000 and over							
Number	11	31	19	69	61	11	202
Percent	5.4	15.3	9.4	34.2	30.2	5.4	100.0
All sizes							
Number	65	91	88	261	352	45	902
Percent	7.2	10.1	9.8	28.9	39.0	5.0	100.0

$\chi^2 = 32.46$; $df = 15$; $p < 0.01$.

TABLE 126

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING HOMOGENEOUS GROUPING OF SCIENCE CLASSES AT GRADE SEVEN

School Enrollment Groups	No Homogeneous Grouping	Homogeneous Grouping	Total
499 and under			
Number	112	15	127
Percent	88.2	11.8	100.0
500 - 999			
Number	161	17	178
Percent	90.4	9.6	100.0
1,000 - 1,999			
Number	364	31	395
Percent	92.2	7.8	100.0
2,000 and over			
Number	194	8	202
Percent	96.0	4.0	100.0
All sizes			
Number	831	71	902
Percent	92.1	7.9	100.0

$\chi^2 = 7.67$; df = 3; $p < 0.10$.

TABLE 127

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING HOMOGENEOUS GROUPING OF SCIENCE CLASSES AT GRADE EIGHT

School Enrollment Groups	No Homogeneous Grouping	Homogeneous Grouping	Total
499 and under			
Number	113	14	127
Percent	89.0	11.0	100.0
500-999			
Number	159	19	178
Percent	89.3	10.7	100.0
1,000-1,999			
Number	359	36	395
Percent	90.9	9.1	100.0
2,000 and over			
Number	196	6	202
Percent	97.0	3.0	100.0
All sizes			
Number	827	75	902
Percent	91.7	8.3	100.0

$\chi^2 = 10.42$; df = 3 ; $p < 0.02$.

TABLE 128

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING HOMOGENEOUS GROUPING OF SCIENCE CLASSES AT GRADE TEN

School Enrollment Group	No Homogeneous Grouping	Homogeneous Grouping	Total
499 and under			
Number	96	31	127
Percent	75.6	24.4	100.0
500-999			
Number	141	37	178
Percent	79.2	20.8	100.0
1,000-1,999			
Number	276	119	395
Percent	69.9	30.1	100.0
2,000 and over			
Number	95	107	202
Percent	47.0	53.0	100.0
All sizes			
Number	608	294	902
Percent	67.4	32.6	100.0

$\chi^2 = 54.43$; df = 3 ; $p < 0.001$.

TABLE 129

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING HOMOGENEOUS GROUPING OF SCIENCE CLASSES AT GRADE ELEVEN

School Enrollment Groups	No Homogeneous Grouping	Homogeneous Grouping	Total
499 and under			
Number	106	21	127
Percent	83.5	16.5	100.0
500 - 999			
Number	162	16	178
Percent	91.0	9.0	100.0
1,000 - 1,999			
Number	323	72	395
Percent	81.8	18.2	100.0
2,000 and over			
Number	134	68	202
Percent	66.3	33.7	100.0
All sizes			
Number	725	177	902
Percent	80.4	19.6	100.0

$\chi^2 = 39.26$; df = 3 ; $p < 0.001$.

TABLE 130

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING HOMOGENEOUS GROUPING OF SCIENCE CLASSES AT GRADE TWELVE

School Enrollment Groups	No Homogeneous Grouping	Homogeneous Grouping	Total
499 and under			
Number	107	20	127
Percent	84.3	15.7	100.0
500-999			
Number	164	14	178
Percent	92.1	7.9	100.0
1,000-1,999			
Number	329	66	395
Percent	83.3	16.7	100.0
2,000 and over			
Number	137	65	202
Percent	67.8	32.2	100.0
All sizes			
Number	737	165	902
Percent	81.7	18.3	100.0

$\chi^2 = 40.22$; df = 3 ; $p < 0.001$.

TABLE 131

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO MARKS/GRADES AS A CRITERION FOR THE HOMOGENEOUS GROUPING OF SCIENCE CLASSES

School Enrollment Groups	No response	Degrees of Importance			Total
		Some Importance	Important	Very Important	
499 and under					
Number	90	10	19	8	127
Percent	70.9	7.9	15.0	6.3	100.0
500 - 999					
Number	120	13	21	24	178
Percent	67.4	7.3	11.8	13.5	100.0
1,000 - 1,999					
Number	253	30	67	45	395
Percent	64.1	7.6	17.0	11.4	100.0
2,000 and over					
Number	109	15	52	26	202
Percent	54.0	7.4	25.7	12.9	100.0
All sizes					
Number	572	68	159	103	902
Percent	63.4	7.5	17.6	11.4	100.0

$\chi^2 = 20.01$; df = 9; $p < 0.02$.

TABLE 132

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO INTELLIGENCE TESTS AS A CRITERION FOR THE HOMOGENEOUS GROUPING OF SCIENCE CLASSES

School Enrollment Groups	No response	Degrees of Importance: Some Importance	Important	Very Important	Total
499 and under					
Number	108	10	6	3	127
Percent 5	85.0	7.9	4.7	2.4	100.0
500 - 999					
Number	157	11	8	2	178
Percent	88.2	6.2	4.5	1.1	100.0
1,000 - 1,999					
Number	319	29	29	18	395
Percent	80.8	7.3	7.3	4.6	100.0
2,000 and over					
Number	144	22	21	15	202
Percent	71.3	10.9	10.4	7.4	100.0
All sizes					
Number	728	72	64	38	902
Percent	80.7	8.0	7.1	4.2	100.0

$\chi^2 = 22.79$; df = 9; $p < 0.01$.

TABLE 133

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO APTITUDE TESTS AS A CRITERION FOR HOMOGENEOUS GROUPING OF SCIENCE CLASSES

School Enrollment Groups	No response	Degrees of Importance Some Importance	Important	Very Important	Total
499 and under					
Number	111	4	5	7	127
Percent	81.4	3.1	3.9	5.5	100.0
500 - 999					
Number	149	10	11	8	178
Percent	83.7	5.6	6.2	4.5	100.0
1,000 - 1,999					
Number	316	22	36	21	395
Percent	80.0	5.6	9.1	5.3	100.0
2,000 and over					
Number	154	12	12	24	202
Percent	76.2	5.9	5.9	11.9	100.0
All sizes					
Number	730	48	64	60	902
Percent	80.9	5.3	7.1	6.7	100.0

$\chi^2 = 18.26$; df = 9; $p < 0.05$.

TABLE 134

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO TEACHER RECOMMENDATION AS A CRITERION FOR THE HOMOGENEOUS GROUPING OF SCIENCE CLASSES

School Enrollment Groups	No response	Degrees of Importance: Some Importance	Important	Very Important	Total
499 and under					
Number	88	9	18	12	127
Percent	69.3	7.1	14.2	9.4	100.0
500 - 999					
Number	117	17	21	23	178
Percent	65.7	9.6	11.8	12.9	100.0
1,000 - 1,999					
Number	222	38	66	69	395
Percent	56.2	9.6	16.7	17.5	100.0
2,000 and over					
Number	96	30	30	45	201
Percent	47.8	14.9	14.9	22.4	100.0
All sizes					
Number	523	94	135	149	901
Percent	58.0	10.4	15.0	16.5	100.0

$\chi^2 = 25.78$; $df = 9$; $p < 0.01$.

TABLE 135

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING THE USE OF CITY/COUNTY SPECIALISTS OR CONSULTANTS

School Enrollment Groups	No response	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialists Used	Total
499 and under					
Number	104	9	12	2	127
Percent	81.9	7.1	9.4	1.6	100.0
500 - 999					
Number	135	22	17	4	178
Percent	75.8	12.4	9.6	2.2	100.0
1,000 - 1,999					
Number	260	84	36	15	395
Percent	65.8	21.3	9.1	3.8	100.0
2,000 and over					
Number	113	53	18	18	202
Percent	55.9	26.2	8.9	8.9	100.0
All sizes					
Number	612	168	83	39	902
Percent	67.8	18.6	9.2	4.3	100.0

$\chi^2 = 44.55$;   df = 9; $p < 0.001$.

TABLE 136

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING THE USE OF STATE DEPARTMENT SPECIALISTS OR CONSULTANTS

School Enrollment Groups	No response	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialists Used	Total
499 and under					
Number	94	17	10	6	127
Percent	74.0	13.4	7.9	4.7	100
500 - 999					
Number	145	24	7	2	178
Percent	81.5	13.5	3.9	1.1	100.0
1,000 - 1,999					
Number	334	32	19	10	395
Percent	84.6	8.1	4.8	2.5	100.0
2,000 and over					
Number	170	23	6	3	202
Percent	84.2	11.4	3.0	1.5	100.0
All sizes					
Number	743	96	42	21	902
Percent	82.4	10.6	4.7	2.3	100.0

$\chi^2 = 15.35$; df = 9; $p < 0.10$.

TABLE 137

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING THE USE OF SCHOOL SYSTEM RESOURCE TEACHERS

School Enrollment Groups	No response	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialists Used	Total
499 and under					
Number	116	6	3	2	127
Percent	91.3	4.7	2.4	1.6	100.0
500 - 999					
Number	161	9	7	1	178
Percent	90.4	5.1	3.9	0.6	100.0
1,000 - 1,999					
Number	324	47	15	9	395
Percent	82.0	11.9	3.8	2.3	100.0
2,000 and over					
Number	154	33	11	4	202
Percent	76.2	16.3	5.4	2.0	100.0
All sizes					
Number	755	95	36	16	902
Percent	83.7	10.5	4.0	1.8	100.0

$\chi^2 = 23.70$; df = 9; $p < 0.01$.

TABLE 138

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT REPORTING THE USE OF SCHOOL RESOURCE TEACHERS

School Enrollment Groups	No response	Science Specialist Used	General Curriculum Specialist Used	Both Types of Specialist Used	Total
499 and under					
Number	118	6	2	1	127
Percent	92.9	4.7	1.6	0.8	100.0
500 - 999					
Number	172	3	3	0	178
Percent	96.6	1.7	1.7	0.0	100.0
1,000 - 1,999					
Number	357	22	13	3	395
Percent	90.4	5.6	3.3	0.8	100.0
2,000 and over					
Number	172	17	11	2	202
Percent	85.1	8.4	5.4	1.0	100.0
All sizes					
Number	819	48	29	6	902
Percent	90.8	5.3	3.2	0.7	100.0

$\chi^2 = 16.71$; $df = 9$; $p < 0.10$.

TABLE 139

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT WHICH REPORTED THE TEACHING OF THE EARTH SCIENCE CURRICULUM PROJECT (ESCP)

School Enrollment Group	ESCP Not Taught	ESCP Taught	Total
499 and under			
Number	120	6	126
Percent	95.2	4.8	100.0
500 - 999			
Number	163	16	179
Percent	91.1	8.9	100.0
1,000 - 1,999			
Number	351	44	395
Percent	88.9	11.1	100.0
2,000 and over			
Number	172	30	202
Percent	85.1	14.9	100.0
All sizes			
Number	806	96	902
Percent	89.4	10.6	100.0

$\chi^2 = 8.99$; $df = 3$; $p < 0.05$.

TABLE 140

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT WHICH REPORTED THE TEACHING OF THE BIOLOGICAL SCIENCES CURRICULUM STUDY (BSCS) BLUE VERSION

School Enrollment Groups	BSCS Blue Not Taught	BSCS Blue Taught	Total
499 and under			
Number	110	15	125
Percent	88.0	12.0	100.0
500 - 999			
Number	162	17	179
Percent	90.5	9.5	100.0
1,000 - 1,999			
Number	343	52	395
Percent	86.8	13.2	100.0
2,000 and over			
Number	153	49	202
Percent	75.7	24.3	100.0
All sizes			
Number	768	133	901
Percent	85.2	14.8	100.0

$\chi^2 = 19.98$, df $= 3$; $p < 0.001$.

TABLE 141

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT WHICH REPORTED THE TEACHING OF THE BIOLOGICAL SCIENCES CURRICULUM STUDY (BSCS) GREEN VERSION

School Enrollment Groups	BSCS Green Not Taught	BSCS Green Taught	Total
499 and under			
Number	106	20	126
Percent	84.1	15.9	100.0
500 - 999			
Number	149	30	179
Percent	83.2	16.8	100.0
1,000 - 1,999			
Number	326	69	395
Percent	82.5	17.5	100.0
2,000 and over			
Number	145	55	200
Percent	72.5	27.5	100.0
All sizes			
Number	726	174	900
Percent	80.7	19.3	100.0

$\chi^2 = 11.16$; $df = 3$; $p < 0.02$.

TABLE 142

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT WHICH REPORTED THE TEACHING OF BIOLOGICAL SCIENCES CURRICULUM STUDY (BSCS) YELLOW VERSION

School Enrollment Groups	BSCS Yellow Not Taught	BSCS Yellow Taught	Total
499 and under			
Number	113	13	126
Percent	89.7	10.3	100.0
500 - 999			
Number	152	27	179
Percent	84.9	15.1	100.0
1,000 - 1,999			
Number	297	97	394
Percent	75.4	24.6	100.0
2,000 and over			
Number	145	56	201
Percent	72.1	27.9	100
All sizes			
Number	707	193	900
Percent	78.6	21.4	100.0

$\chi^2 = 20.83$; $df = 3$; $p < 0.001$.

TABLE 143

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT WHICH REPORTED THE TEACHING OF THE CHEMICAL EDUCATION MATERIAL STUDY (CHEM STUDY)

School Enrollment Groups	CHEM Study Not Taught	Chem Study Taught	Total
499 and under			
Number	103	23	126
Percent	81.7	18.3	100.0
500 999			
Number	151	28	179
Percent	84.4	15.6	100.0
1,000 - 1,999			
Number	288	107	395
Percent	72.9	27.1	100.0
2,000 and over			
Number	102	100	202
Percent	50.5	49.5	100.0
All sizes			
Number	644	258	902
Percent	71.4	28.6	100.0

$\chi^2 = 64.99$; df = 3; $p < 0.001$.

TABLE 144

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT WHICH REPORTED THE TEACHING OF PHYSICAL SCIENCE STUDY COMMITTEE (PSSC) PHYSICS

School Enrollment Groups	PSSC Physics Not Taught	PSSC Physics Taught	Total
499 and under			
Number	103	23	126
Percent	81.7	18.3	100.0
500 - 999			
Number	152	27	179
Percent	84.9	15.1	100.0
1,000 - 1,999			
Number	280	115	395
Percent	70.9	29.1	100.0
2,000 and over			
Number	118	84	202
Percent	58.4	41.6	100.0
All sizes			
Number	653	249	902
Percent	72.4	27.6	100.0

$\chi^2 = 39.76$; $df = 3$; $p < 0.001$.

TABLE 145

NUMBER AND PERCENT OF PUBLIC SECONDARY SCHOOLS BY SCHOOL ENROLLMENT WHICH REPORTED THE TEACHING OF HARVARD PROJECT PHYSICS (HPP)

School Enrollment Groups	HPP Not Taught	HPP Taught	Total
499 and under			
Number	121	5	126
Percent	96.0	4.0	100.0
500 - 999			
Number	172	7	179
Percent	96.1	3.9	100.0
1,000 - 1,999			
Number	353	42	395
Percent	89.4	10.6	100.0
2,000 and over			
Number	171	31	202
Percent	84.7	15.3	100.0
All sizes			
Number	817	85	902
Percent	90.6	9.4	100.0

$\chi^2 = 19.75$; $df = 3$; $p < 0.001$.

TABLE 146

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY TYPE OF SCHOOL

Type of School	School Enrollment Groups 499 and under No.	%	500-999 No.	%	1,000-1,999 No.	%	2,000 and over No.	%	All sizes No.	%
K-12	16	16.2	0	0.0	2	0.7	2	1.4	20	2.9
1-12	2	2.0	2	1.4	0	0.0	0	0.0	4	0.6
7-12	13	13.1	11	7.5	9	3.1	3	2.1	36	5.3
8-12	3	3.0	1	0.7	7	2.4	0	0.0	11	1.6
9-12	40	40.4	54	36.7	120	40.8	93	66.4	307	45.1
10-12	16	16.2	35	23.8	101	34.4	38	27.1	190	27.9
7-8	3	3.0	4	2.7	2	0.7	0	0.0	9	1.3
7-9	2	2.0	35	23.8	48	16.3	4	2.9	89	13.1
Other	3	3.0	5	3.4	5	1.7	0	0.0	13	1.9
No response	1	1.0	0	0.0	0	0.0	0	0.0	1	0.1
Total	99	100.0	147	100.0	294	100.0	140	100.0	680	100.0

$\chi^2 = 182.46$; df = 27 ; $p < 0.001$.

TABLE 147

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY AGE GROUP

School Enrollment Groups	Below 30 Years	30-39 Years	40-49 Years	50-59 Years	Over 60 Years	Total
499 and under						
Number	33	40	15	8	3	99
Percent	33.3	40.4	15.2	8.1	3.0	100.0
500-999						
Number	37	53	35	13	9	147
Percent	25.2	36.1	23.8	8.8	6.1	100.0
1,000-1,999						
Number	70	109	68	34	13	294
Percent	23.8	37.1	23.1	11.1	4.4	100.0
2,000 and over						
Number	35	45	41	15	4	140
Percent	25.0	32.1	29.3	10.7	2.9	100.0
All sizes						
Number	175	247	159	70	29	680
Percent	25.7	36.3	23.4	10.3	4.3	100.0

$\chi^2 = 12.31$; df = 12 ; not significant.

TABLE 148

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY HIGHEST DEGREE HELD

School Enrollment Groups	B.S./B.A. or less	M.S. or M.A.	Ed.D/Ph.D. or Specialist	Total
499 and under				
Number	48	50	1	99
Percent	48.5	50.5	1.0	100.0
500-999				
Number	57	88	2	147
Percent	38.8	59.9	1.4	100.0
1,000-1,999				
Number	101	189	4	294
Percent	34.4	64.3	1.4	100.0
2,000 and over				
Number	36	100	4	140
Percent	25.7	71.4	2.9	100.0
All sizes				
Number	242	427	11	680
Percent	35.6	62.8	1.6	100.0

$\chi^2 = 15.09$; df = 6 ; $p < 0.02$.

TABLE 149

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY NUMBER OF UNDERGRADUATE SEMESTER HOURS IN PHYSICAL SCIENCE

School Enrollment Groups	No response	Number of Semester Hours: 10 and under	11-20	21-30	31-40	Over 40	Total
499 and under							
Number	16	20	18	17	21	7	99
Percent	16.2	20.2	18.2	17.2	21.2	7.1	100.0
500-999							
Number	21	25	41	22	18	20	147
Percent	14.3	17.0	27.9	15.0	12.2	13.6	100.0
1,000-1,999							
Number	21	60	79	53	32	49	294
Percent	7.1	20.4	26.9	18.0	10.9	16.7	100.0
2,000 and over							
Number	12	14	34	35	24	21	140
Percent	8.6	10.0	24.3	25.0	17.1	15.0	100.0
All sizes							
Number	70	119	172	127	95	97	680
Percent	10.3	17.5	25.3	18.7	14.0	14.3	100.0

$\chi^2 = 34.09$; df = 15 ; $p < 0.005$.

TABLE 150

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY NUMBER OF GRADUATE SEMESTER HOURS IN BIOLOGICAL SCIENCE

School Enrollment Groups	No response	10 and under	Number of Semester Hours 11-20	21-30	31-40	Over 40	Total
499 and under							
Number	51	20	9	6	10	3	99
Percent	51.5	20.2	9.1	6.1	10.1	3.0	100.0
500-999							
Number	66	31	22	13	7	8	147
Percent	44.9	21.1	15.0	8.8	4.8	5.4	100.0
1,000-1,999							
Number	121	59	39	32	28	15	294
Percent	41.2	20.1	13.3	10.9	9.5	5.1	100.0
2,000 and over							
Number	49	25	18	23	6	19	140
Percent	35.0	17.9	12.9	16.4	4.3	13.6	100.0
All sizes							
Number	287	135	88	74	51	45	680
Percent	42.2	19.9	12.9	10.9	7.5	6.6	100.0

$\chi^2 = 32.13$; df = 15 ; $p < 0.01$.

TABLE 151

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY NUMBER OF YEARS IN CURRENT SCHOOL SYSTEM OR DISTRICT

School Enrollment Groups	No response	1 Year	2-5 Years	6-10 Years	11-20 Years	21-30 Years	Over 30 Years	Total
499 and under								
Number	1	18	31	26	18	3	2	99
Percent	1.0	18.2	31.3	26.3	18.2	3.0	2.0	100.0
500-999								
Number	4	7	42	38	40	13	3	147
Percent	2.7	4.8	28.6	25.9	27.2	8.8	2.0	100.0
1,000-1,999								
Number	4	13	80	87	81	24	5	294
Percent	1.4	4.4	27.2	29.6	27.6	8.2	1.7	100.0
2,000 and over								
Number	3	5	38	39	41	8	6	140
Percent	2.1	3.6	27.1	27.9	29.3	5.7	4.3	100.0
All sizes								
Number	12	43	191	190	180	48	16	680
Percent	1.8	6.3	28.1	27.9	26.5	7.1	2.4	100.0

$\chi^2 = 38.34$; $df = 18$; $p < 0.005$.

TABLE 152

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY ATTENDANCE AT N.S.F. SUMMER INSTITUTES

School Enrollment Groups	Attendance at N.S.F. Summer Institutes		
	No	Yes	Total
499 and under			
Number	60	39	99
Percent	60.6	39.4	100.0
500-999			
Number	69	78	147
Percent	46.9	53.1	100.0
1,000-1,999			
Number	134	160	294
Percent	45.6	54.4	100.0
2,000 and over			
Number	54	86	140
Percent	38.6	61.4	100.0
All sizes			
Number	317	363	680
Percent	46.6	53.4	100.0

$\chi^2 = 11.56$; $df = 3$; $p < 0.01$.

TABLE 153

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT REPORTING THE USAGE OF VARIOUS KINDS OF TEXTBOOKS AND CURRICULUM MATERIALS

Kind of Textbook and Curriculum Materials	School Enrollment Groups									
	499 and under		500-999		1,000-1,999		2,000 and over		All sizes	
	No.	%	No.	%	No.	%	No.	%	No.	%
Single textbook	11	11.1	9	6.1	18	6.1	7	5.0	45	6.6
Single textbook including laboratory manual	11	11.1	30	20.4	31	10.5	16	11.4	88	12.9
Multiple textbooks	1	1.0	4	2.7	7	2.4	5	3.6	17	2.5
Multiple textbooks including laboratory manual	4	4.0	5	3.4	13	4.4	4	2.9	26	3.8
Single textbook and separate laboratory manual	18	18.2	18	12.2	37	12.6	18	12.9	91	13.4
Multiple textbooks and separate laboratory manual	1	1.0	2	1.4	4	1.4	1	0.7	8	1.2

TABLE 154

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT REPORTING THE USAGE OF VARIOUS KINDS OF TEXTBOOKS AND CURRICULUM MATERIALS

Kind of Textbook and Curriculum Materials	School Enrollment Groups: 499 and under No.	%	500-999 No.	%	1,000-1,999 No.	%	2,000 and over No.	%	All sizes No.	%
Single textbook and locally prepared materials	6	6.1	19	12.9	23	7.8	10	7.1	58	8.5
Single textbook including laboratory manual and locally prepared materials	7	7.1	5	3.4	12	4.1	14	10.0	38	5.6
Multiple textbooks including laboratory manual and locally prepared materials	4	4.0	10	6.8	10	3.4	6	4.3	30	4.4
Single textbook and separate laboratory manual and locally prepared materials	10	10.1	11	7.5	37	12.6	11	7.9	69	10.1
Multiple textbooks and separate laboratory manual and locally prepared materials	5	5.1	2	1.4	13	4.4	7	5.0	27	4.0

TABLE 155

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY DEGREE OF USAGE OF GROUP LABORATORY ACTIVITY

School Enrollment Groups	Degrees of Usage No response	Activity used	Third most often used	Second most often used	Most often used	Total
499 and under						
Number	14	27	13	35	10	99
Percen	14.1	27.3	13.1	35.4	10.1	100.0
500-999						
Number	26	40	23	28	30	147
Percent	17.7	27.2	15.6	19.0	20.4	100.0
1,000-1,999						
Number	52	49	38	101	54	294
Percent	17.7	16.7	12.9	34.4	18.4	100.0
2,000 and over						
Number	23	22	24	45	26	140
Percent	16.4	15.7	17.1	32.1	18.6	100.0
All sizes						
Number	115	138	98	209	120	680
Percent	16.9	20.3	14.4	30.7	17.6	100.0

$\chi^2 = 23.81$; $df = 12$; $p < 0.05$.

TABLE 156

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY DEGREE OF USAGE OF STUDENT PARTICIPATION IN CLASS DISCUSSION AS A GRADING METHOD

School Enrollment Groups	No response	Used	Degrees of Usage Third most often used	Second most often used	Most often used	Total
499 and under						
Number	50	11	23	13	2	99
Percent	50.5	11.1	23.2	13.1	2.0	100.0
500-999						
Number	61	24	42	15	5	147
Percent	41.5	16.3	28.6	10.2	3.4	100.0
1,000-1,999						
Number	169	41	53	24	7	294
Percent	57.5	13.9	18.0	8.2	2.4	100.0
2,000 and over						
Number	74	12	33	12	9	140
Percent	52.9	8.6	23.6	8.6	6.4	100.0
All sizes						
Number	354	88	151	64	23	680
Percent	52.1	12.9	22.2	9.4	3.4	100.0

$\chi^2 = 21.29$; df = 12 ; $p < 0.05$.

TABLE 157

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT REPORTING THE AVAILABILITY OF CLOSED CIRCUIT TELEVISION (CCTV) FOR USE IN TEACHING SCIENCE

School Enrollment Groups	No response	CCTV not available	CCTV available	Total
499 and under				
Number	17	64	18	99
Percent	17.2	64.6	18.2	100.0
500-999				
Number	28	90	29	147
Percent	19.0	61.2	19.7	100.0
1,000-1,999				
Number	51	152	91	294
Percent	17.3	51.7	31.0	100.0
2,000 and over				
Number	15	76	49	140
Percent	10.7	54.3	35.0	100.0
All sizes				
Number	111	382	187	680
Percent	16.3	56.2	27.5	100.0

$\chi^2 = 17.16$; df = 6 ; $p < 0.01$.

TABLE 158

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT REPORTING THE AVAILABILITY OF COMPUTER TERMINALS FOR USE IN TEACHING SCIENCE

School Enrollment Groups	No response	Computer terminals not available	Computer terminals available	Total
499 and under				
Number	16	76	7	99
Percent	16.2	76.8	7.1	100.0
500-999				
Number	37	100	10	147
Percent	25.2	68.0	6.8	100.0
1,000-1,999				
Number	66	192	36	294
Percent	22.4	65.3	12.2	100.0
2,000 and over				
Number	22	85	33	140
Percent	15.7	60.7	23.6	100.0
All sizes				
Number	141	453	86	680
Percent	20.7	66.6	12.6	100.0

$\chi^2 = 26.55$; df = 6 ; $p < 0.001$.

TABLE 159

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT REPORTING THE AVAILABILITY OF GREENHOUSES FOR USE IN TEACHING SCIENCE

School Enrollment Groups	No response	Greenhouse not available	Greenhouse available	Total
499 and under				
Number	14	65	20	99
Percent	14.1	65.7	20.2	100.0
500-999				
Number	27	80	40	147
Percent	18.4	54.4	27.2	100.0
1,000-1,999				
Number	45	137	112	294
Percent	15.3	46.6	38.1	100.0
2,000 and over				
Number	10	58	72	140
Percent	7.1	41.4	51.4	100.0
All sizes				
Number	96	340	244	680
Percent	14.1	50.0	35.9	100.0

$\chi^2 = 34.86$; df = 6 ; $p < 0.001$.

TABLE 160

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT REPORTING THE AVAILABILITY OF HAM RADIO STATIONS FOR USE IN TEACHING SCIENCE

School Enrollment Groups	No response	Ham Radio Station not available	Ham Radio Station available	Total
499 and under				
Number	17	76	6	99
Percent	17.2	76.8	6.1	100.0
500-999				
Number	37	105	5	147
Percent	25.2	71.4	3.4	100.0
1,000-1,999				
Number	69	199	26	294
Percent	23.5	67.7	8.8	100.0
2,000 and over				
Number	22	99	19	140
Percent	15.7	70.7	13.6	100.0
All sizes				
Number	145	479	56	680
Percent	21.3	70.4	8.2	100.0

$\chi^2 = 15.13$; df = 6 ; $p < 0.02$.

TABLE 161

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT ASSIGNING VARIOUS DEGREES OF IMPORTANCE TO CO-OPERATIVE STAFF AS A FACTOR FOR OBTAINING AND MAINTAINING HIGH QUALITY SCIENCE PROGRAMS

School Enrollment Groups	No response	Degrees of Importance: Not Important 1	2	3	4	Very Important 5	Total
499 and under							
Number	4	1	1	17	37	39	99
Percent	4.0	1.0	1.0	17.2	37.4	39.4	100.0
500-999							
Number	1	4	2	12	48	80	147
Percent	0.7	2.7	1.4	8.2	32.7	54.4	100.0
1,000-1,999							
Number	3	3	3	27	78	180	294
Percent	1.0	1.0	1.0	9.2	26.5	61.2	100.0
2,000 and over							
Number	2	1	4	7	35	91	140
Percent	1.4	0.7	2.9	5.0	25.0	65.0	100.0
All sizes							
Number	10	9	10	63	198	390	680
Percent	1.5	1.3	1.5	9.3	29.1	57.4	100.0

$\chi^2 = 32.75$; df = 15 ; $p < 0.01$.

TABLE 162

NUMBER AND PERCENT OF SCIENCE TEACHERS BY SCHOOL ENROLLMENT AND BY DEGREE OF SATISFACTION WITH TEACHING SCIENCE AS A CAREER

School Enrollment Groups	Degrees of Satisfaction: No response	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Total
499 and under							
Number	0	0	3	5	43	48	99
Percent	0.0	0.0	3.0	5.1	43.4	48.5	100.0
500-999							
Number	1	0	0	5	58	83	147
Percent	0.7	0.0	0.0	3.4	39.5	56.5	100.0
1,000-1,999							
Number	2	1	3	10	87	191	294
Percent	0.7	0.3	1.0	3.4	29.6	65.0	100.0
2,000 and over							
Number	0	0	3	6	32	99	140
Percent	0.0	0.0	2.1	4.3	22.9	70.7	100.0
All sizes							
Number	3	1	9	26	220	421	680
Percent	0.4	0.1	1.3	3.8	32.4	61.9	100.0

$\chi^2 = 25.08$; df = 15 ; $p < 0.05$.

CHAPTER V

SUMMARY, IMPLICATIONS AND RECOMMENDATIONS

In this chapter, the main results reported in Chapter IV are summarized and their implications discussed. Then suggestions are made for further research.

SUMMARY

Great varieties of science teaching practices, conditions, and procedures were found among the secondary schools of varying types and in different states and regions of the country. Science teacher characteristics and qualifications were also very diverse.

School Organization and Size

Public secondary schools in the two regions surveyed included a variety of grade groupings. In both the regions, four-year high schools were most prevalent, followed by three-year high schools and three-year junior high schools.

These three common groupings accounted for over 94 percent of the public secondary schools in the Far West region and 84 per cent of the public secondary schools in the Great Lakes region.

Schools with enrollment of 1,000-1,999 pupils constituted the single largest group in both regions. The second largest group of schools in the Great Lakes region had enrollments of 500-999; in the Far West region, the very large schools, those with enrollments of 2,000 and over, constituted the second largest group of schools.

Organization of the School Day

The school day was organized into regular class periods by 92 percent of the schools in the Great Lakes region, and by 88 percent of the schools in the Far West region. Schools using modular scheduling comprised just over five percent of the schools in both regions. There was no significant association between school size and the kind of schedule used.

The great majority of schools in both regions organized the school day into 6 or 7 class periods/modules. But the small schools (499 and under) were less likely to adopt the "conventional" 6 or 7 period day. They were likely to have 5 or less periods/modules per day on the one hand, and 8 or more periods/modules per day on the other. The very large schools (2,000 and over) were also likely to have 8 or more periods/modules per day.

The majority of schools had class periods within the range 40-59 minutes, with the 55-59 minute range being most common in the Great Lakes region, and the 50-54 minute range most common in the Far West region. School size was found to be related to the length of class periods. The small schools were more likely to have the shortest class periods (less than 40 minutes); the very large schools more often had the 50-54 minute range of class periods.

Hamogeneous Grouping of Science Classes

Homogeneous grouping of science classes was practised by 52 percent of schools in the Great Lakes region, and by 44 percent of schools in the Far West region. In the Great Lakes region, homogeneous grouping was done often at grade nine. In the Far West region, homogeneous grouping of science classes was most commonly practised at grade ten.

The presence or absence of homogeneous grouping at grades seven, eight, ten, eleven and twelve was found to be related to school size. At grades seven and eight, the smallest the school, the more likely was homogeneous grouping of science classes practised. At grades ten, eleven and twelve, the very large schools were more likely to practise homogeneous grouping of science classes than the other sized schools.

The criteria most used as the basis of homogeneous of science classes were: (1) teacher recommendation, (2) marks or grades, (3) aptitude tests and (4) student interest. The use of teacher recommendation, and marks or grades as criteria for homogeneous grouping was related to school size. The larger the size of the school, the more important was teacher recommendation rated as a criterion for homogeneous grouping.

The medium, large and very large schools were also more likely to rate marks or grades as a very important criterion for homogeneous grouping than the small schools.

Funds for Science

The majority of schools had annual budgets for science equipment and supplies. While there was no significant association between school size and per pupil expenditure for science equipment, over 43 percent of the very large schools reported budgets for science equipment, compared with 30 percent of the small schools. School size was found to be associated with the presence of an annual budget for science suplies. The larger the school, the more likely was there a budget for science supplies.

More than 74 percent of the Great Lakes schools, and 41 percent of the Far West schools reported the use of NDEA funds since September 1968 to purchase science equipment. The very large schools were less likely to have used NDEA funds for this purpose than the large, medium-sized, and small schools.

Thirty-nine percent of the Great Lakes schools, and 19.6 percent of the Far West schools had used ESFA funds since September 1968 to purchase science equipment. No significant association was found between school size and the use of ESEA funds for purchasing science equipment.

Over 15 percent of the Great Lakes schools, and 8.7 percent of the Far West schools had used NDEA funds since September 1968 to re-model science facilities. The small schools were more likely to have used NDEA funds for this purpose than the medium-sized, large, or very large schools.

Environmental/Conservation Education

Environmental/conservation education was taught in over 55 percent of the Great Lakes schools, and in over 68 percent of the Far West schools. It was most commonly taught with science, with social studies, or as a separate subject in grades eleven and twelve. The very large schools were more likely to offer environmental/conservation education than the smaller schools. Again, the very large schools were more likely to have special facilities such as school farms, forests, and land laboratories for teaching environmental/conservation education than the smaller schools.

Science Clubs and Fairs

Two-thirds of schools in both regions had science clubs. About 24 percent of the Great Lakes schools, and

18 percent of the Far West schools sponsored science fairs. In both regions, over 44 percent of the schools reported that their students had participated in inter-school science fairs during the 1969-70 school year.

A significant association was found between school size and the sponsorship of science clubs. The larger the size of the school, the more likely was there a science club in the school.

Usage of Specialists and Consultants

A variety of science and general curriculum specialists and consultants from city/county departments, state departments, and colleges and universities were used by schools. The very large and large schools were more likely to use city/county science and general curriculum specialists, school system resource teachers, and school resource teachers, than the small and medium-sized schools. On the other hand, the small and medium-sized schools were more likely to use state department specialists and consultants than the large or very large schools.

Science Course Offerings

The science course offered by most schools was

Biology, followed by Chemistry and General Science. Other popular science courses were Physical Science, Earth Science and Life Science.

Of the science course improvement projects, the BSCS Yellow version was most popular in the Great Lakes schools, while the BSCS Green version was most popular in the Far West schools. CHEM Study, PSSC Physics, Introductory Physical Science, Earth Science Curriculum Project, and the other BSCS versions were also commonly offered.

Advanced Biology was the most often offered advanced science course in both regions, followed by Advanced Chemistry, Honors Science, and the BSCS Second Course.

The size of the school was related to the offering of some of the science course improvement projects. The very large and large schools were more likely than the small and medium-sized schools to offer the Earth Science Curriculum Project, BSCS Blue, Green and Yellow versions, CHEM Study, PSSC Physics, and Harvard Project Physics.

<u>Inservice Science Education</u>

A variety of inservice science education activities was available for science teachers. The most common type of inservice activities were curriculum development and revision meetings, science teaching workshops, college science courses, and television and/or radio programs.

Characteristics and Qualifications of Science Teachers

Over 87 percent of all science teachers in the sample were male. On the whole, science teachers were relatively young. Over 62 percent of the Great Lakes teachers were under forty years of age. In the Far West, 52.4 percent of the science teachers were under forty years. There was no significant association between school size and the distribution of science teachers according to age group.

Over 63 percent of the science teachers in the Great Lakes region, and 60.7 percent of the science teachers in the Far West region held masters' degrees. About one third of the teachers held the bachelors' degrees as their highest degree. There was a significant association between school size and the highest degrees held by science teachers. The larger the size of the school, the more likely were the science teachers to have masters' degrees. More than 71 percent of science teachers in the very large schools held masters' degrees compared with 50.5 percent of the small schools.

Teacher Preparation in Science and Science Education

Science teachers were generally better prepared in biological science than in physical science. Over 56 percent of the Great Lakes teachers, and 58.9 percent of the Far West teachers had more than 20 undergraduate semester hours in biological science. Approximately 47 percent of science teachers in both regions had more than 20 undergraduate semester hours in physical science. Relatively few science teachers had more than 10 semester hours of earth science. One third of the Great Lakes teachers had 10 or less graduate semester hours in science education. In the Far West, 43.7 percent of the science teachers had 10 or less graduate semester hours in science education.

Attendance at Institutes

The majority of science teachers had attended summer institutes. Over 23 percent of the Great Lakes teachers, and

32.1 percent of the Far West teachers had attended inservice institutes. Only 8 percent of the Great Lakes teachers, and 14 percent of the Far West teachers had attended academic year institutes. There was a significant association between school size and attendance at summer institutes. The teachers in the very large schools were more likely to have attended summer institutes than those in the large, medium, or small schools.

Teaching Experience

About half of the Great Lakes teachers had 10 or less years of secondary school teaching experience, approximately 30 percent had between 11 and 20 years of teaching experience. In the Far West sample, 41.3 percent had 10 or less years of secondary school teaching experience, while 42.7 percent had between 11 and 20 years of such experience.

There was no significant association between the length of secondary school science teaching experience and school size. But there was a significant association between the number of years science teachers were in their current school system and school size.

Over 18 percent of the science teachers in the small schools were in their first year in the school system, compared with only 3.6 percent of the science teachers in the very large schools.

Laboratories and Special Science Facilities

Over 89 percent of science teachers used laboratories or special science rooms to teach science. There was no significant association between school size and the kind of rooms used for teaching science.

The three most commonly available special science facilities were:(1) the science darkroom, (2) greenhouse, and (3) closed circuit television. The very large and large schools were more likely to have closed circuit television, computer terminals, greenhouses, and ham radio stations than the medium-sized, and small schools.

Teaching Practices

The three most commonly used learning activities were: (1) lecture-discussion, (2) individual laboratory activity, and (3) group laboratory activity. There were no significant associations between school size and the use of lecture-discussion, and individual laboratory activity. But teachers in medium-sized schools were more likely to rate group laboratory activity as the most often used leasing activity than in the other-sized schools.

The three most commonly used grading methods were: (1) test scores, (2) student performance in laboratory activity, and (3) written assignments. The degree of usage of student participation in class discussion as a grading method was found to be associated with school size . Teachers in the very large schools were more likely to use student participation in class discussion as a grading method than teachers in small, medium-sized, and large schools.

The most common practices with respect to the use of textbooks and curriculum materials were: (1) single textbook and separate laboratory manual, (2) single textbook including laboratory manual, and (3) single textbook, separate laboratory manual, and locally prepared materials.

Proportionately more science teachers in small schools were using a single textbook than science teachers in the medium-sized, large, and very large schools.

Importance of Factors for High Quality Science Programs

In the opinion of science teachers, the three most important factors for obtaining and maintaining high quality science programs were: (1) science facilities, (2) administrative support, and (3) cooperative staff. A significant association between school size and cooperative staff as a factor was found. Sixty five percent of science teachers rated cooperative staff as a very important factor, compared with 39.4 percent of the science teachers in small schools.

Satisfaction with Teaching Science

The great majority (94.3 percent) of science teachers reported that they were very satisfied or satisfied with teaching science. There was a significant association between school size and degree of satisfaction. Science teachers in very large schools were more likely to be very satisfied with teaching science than teachers in small, medium-sized, and large schools.

IMPLICATIONS

The implications of the findings of this study are, of course, dependent on the representativeness of the sample of secondary schools, science teachers, and science classes. The investigator had, as far as possible, used random selection procedures to include schools, science teachers, and science classes in the samples.

Some major findings and their implications are:

1. Approximately 90 percent of the schools organized the school day into regular class periods. Schools using modular or other kind of scheduling comprised about eight percent of the schools. This finding suggests that modular or flexible schedules were not widely used.
2. Over 61 percent of the schools reported use of NDEA funds to purchase science equipment; 31.3 percent of the schools reported using ESEA funds for the same purpose. But only

12.7 percent of the schools had used NDEA funds to re-model science facilities. In view of the finding that science teachers considered adequate science facilities to be the most important factor for obtaining and maintainig high quality science programs, it seems imperative that schools should avail themselves of NDEA funds to up-date their science facilities.

3. The majority of schools offered conventional science courses. The science course offered by most schools was Biology, followed by Chemistry, General Science, Physical Science, and Physics. Koelsche (1961) had reported that Biology was the most popular science course offering, followed by General Science, Chemistry, and Physics.

4. Some of the science course improvement projects were having considerable usage in the schools.

The BSCS Blue version was offered by 14.8 percent of the schools, the BSCS Green version by 19.3 percent, and the BSCS Yellow version by 21.4 percent. There was a definite trend in favor of the BSCS Yellow version. This result contrasts with Maberly and Margolin's (1965) finding that there was no clear-cut indication of a preference pattern for Yellow, Green, or Blue among the BSCS versions offered. CHEM Study was offered by 28.6 percent of the schools compared to 2.5 percent of schools which offered CBA chemistry. There was thus a definite trend in favor of CHEM Study. PSSC Physics was offered by 27.6 percent of the schools, and Harvard Project Physics by 9.4 percent. The ESCP course was offered by 10.6 percent of the schools. These results also indicate that science students were being exposed to a diverse curricula, in addition to the conventional science courses.

5. Environmental/conservation education appeared to be an important subject during the current phase of ecological and environmental awareness and concern. Over 60 percent of the schools reported teaching the subject, but only 28.2 percent of the schools reported that special facilities for the teaching of environmental/conservation education were available. This implies that a substantial number of schools were teaching the subject without the benefit of the special facilities.

6. While science clubs were still popular in the schools, fewer schools were sponsoring science fairs than in 1963 (Rogers 1963). This suggests that the importance of science fairs as an educational activity has been down-graded.

7. Science teachers appeared to have used the opportunities to attend N.S.F. institutes. In addition, more than 60 percent of science teachers now had masters' degrees compared

with 33.3 percent a decade ago (Brown and Obourn 1959). This finding implies the success of the N.S.F. institute programs in helping to upgrade the preparation of science teachers.

8. The results indicated, however, that science teachers as a group were not vey well prepared in science education or in earth science. This suggests a need to upgrade science teacher preparation in these fields.

9. The fact that the great majority of science teachers were satisfied with teaching science augurs well for science education in the secondary schools. This assumes that teacher satisfaction is a necessary(but perhaps not sufficient) condition for effective science teaching.

RECOMMENDATIONS

This study was an exploratory study and therefore, did not examine any specific problem in depth. Furthermore, the investigator was limited by time to undertake further analyses with the data available.

Exemplars of possible further research are:

1. A study should be made of the relationship, if any, between school size and other variables of interest such as average class size, science facilities, textbook adoption policies, and selected teacher characteristics.
2. Further investigation should be made into the characteristics, qualifications, and academic preparation of biology, chemistry, physics, and general science teachers in each state and region.
3. Student enrollments in the various science courses should be analysed, and enrollments in science course improvement projects and in conventional science courses should be compared.
4. The use of special science facilities and audio-visual aids by science teachers should be studied.
5. The usage of specific textbooks in science courses should be studied in depth.

APPENDIX A

LETTER TO THE PRINCIPAL

THE OHIO STATE UNIVERSITY
COLLEGE OF EDUCATION
1945 NORTH HIGH STREET
COLUMBUS, OHIO 43210

Faculty of Science and
Mathematics Education

(614) 293-4121

Dear Principal,

In the past decade great emphasis has been placed on the improvement of science teaching and learning in elementary and secondary schools. Both government and private foundations have supported large scale course content improvement projects in the sciences. Colleges and universities, with support from government agencies, have offered many institute programs for science teachers. Matched monies have been made available for schools to improve science teaching facilities and to upgrade science equipment. Individual schools and school systems have undertaken curriculum development and revision projects.

As the decade of the 1960's came to a close, many citizens, elected representatives in government and educators have asked for an accounting of the profession for changes and improvements which may have resulted from these massive programs. Basic questions being asked include: (1) What science is now being taught in our schools? (2) Who are the science teachers? (3) Who are the students taking science courses? (4) What are the conditions for science teaching in the schools?

No nationwide studies have been made in the past ten years in the area of science teaching in elementary and secondary schools. We are asking you and one of your science teachers to take part in such a study at this time. Our study includes all 50 states and the District of Columbia. Schools were selected through random sampling techniques and in proportion to the number of students in each state. Approximately 6,400 secondary schools and 10,000 elementary schools in the United States are included in the sample; however, your school may be the only school in the district or county included in the study. Therefore, your response is important to reflect national trends.

The questionnaires have been prepared in such a way as to obtain maximum information with a minimum of time required of principals and teachers. We have had the questionnaires evaluated by small samples of principals and teachers, and have revised them in terms of the feedback. We hope that you will find them clear, adequate and not too time consuming.

Results of this study will be given wide distribution and will be available through the ERIC Clearinghouse for Science and Mathematics Education at the Ohio State University. This study is an independent effort on the part of the Center for Science and Mathematics Education. We feel that the study is urgent at this time and that its findings may have an important effect on the future development of science education in our schools. We do urge you to take part in this study.

Cordially yours,

Fred R. Schlessinger

Fred R. Schlessinger,
Professor, Faculty of Science
and Mathematics Education

Robert W. Howe

Robert W. Howe,
Chairman, Faculty of
Science and Mathematics
Education

APPENDIX B

DIRECTIONS TO THE PRINCIPAL

Directions:

Your name and the name of your school are needed on the Principal's Questionnaire to ensure authenticity of the survey sample. Please be assured that no evaluation will be made of individual schools, nor will school, principals and science teachers be identified in the final report.

The method for selecting one science teacher in your school to respond to the Science Teacher Questionnaire is described on the sheet entitled " Science Teacher Selection Criteria ". The science teacher selected by you should seal the completed Science Teacher Questionnaire in the enclosed white envelope. This can be inserted in the kraft clasp envelope to be used for your questionnaire or returned separately. In either case, we hope to have all completed questionnaires returned at your earliest convenience.

Please feel welcome to make any comments by letter or on the back of any questionnaire page.

Long Fay Chin

Long Fay Chin,
Graduate Research Associate

James H. Baker

James H. Baker,
Graduate Research Associate

Ellen C. Buckeridge

Ellen C. Buckeridge,
Graduate Research Associate

APPENDIX C

SCIENCE TEACHER SELECTION CRITERIA

SCIENCE TEACHER SELECTION CRITERIA

In order to ensure that the secondary school science teachers in this survey constitute a random sample, we request your cooperation in selecting one science teacher in your school to respond to the Science Teacher Questionnaire.

The method of selecting this science teacher is as follows:

1. List the last names of all full-time teachers who teach at least one science course or subject in any grade level or a combination of grade levels from 7 through 12 in your school in alphabetical order.
2. Please give the enclosed Science Teacher Questionnaire to one of your science teachers on the alphabetical list whom you select according to the following criteria:

Selection Numbers for Your School

09
05
03
01

(a) If the total number of science teachers in your school is greater than or equal to 9, give the Science Teacher Questionnaire to the 9th teacher on your alphabetical list.
(b) If the total number of science teachers is less than 9 but greater than or equal to 5, give the Science Teacher Questionnaire to the 5th teacher on your list.
(c) If the total number of science teachers is less than 5 but greater than or equal to 3, give the Science Teacher Questionnaire to the 3rd teacher on your list.
(d) If you have less than 3 science teachers, give the Science Teacher Questionnaire to the 1st teacher on your list.

Kindly request the return of all Science Teacher Questionnaires to your office. In order that the analysis can proceed, it is important that you return completed questionnaires at your earliest convenience.

Your cooperation is greatly appreciated.

APPENDIX D

PRINCIPAL'S QUESTIONNAIRE

THE OHIO STATE UNIVERSITY
CENTER FOR SCIENCE AND MATHEMATICS EDUCATION
244 Arps Hall, 1945 North High Street
Columbus, Ohio 43210

SURVEY OF SCIENCE TEACHING IN PUBLIC SECONDARY SCHOOLS
1970-71

PRINCIPAL'S QUESTIONNAIRE

/ / / / / / / / / / /

Name of Principal: ______________________________

Name of School: ______________________________

Address of School: ______________________________
Number   Street

____
City   County

____
State   Zip Code

General Instructions:

This questionnaire is to be answered for an individual public secondary school, not for the school system at large. Please check over the questionnaire to get an idea of the scope of the questions asked before beginning to fill out the form. Check (✓) or fill every item that applies.

Definition:

For purposes of this survey a public secondary school is defined as " an educational institution, operated on public funds, under the principal or head teacher, including any combination of grade levels from 7 through 12, except any lower grades under an elementary school organization." This definition excludes <u>all</u> private, parochial or diocesan secondary schools, correctional schools, technical or vocational schools, and special schools for the blind, the partially blind, the deaf, dumb, emotionally-disturbed and physically or mentally-handicapped children.

I. SCREENING QUESTION

Is your school a <u>public secondary school</u> according to the above definition ?

______ Yes (If checked, continue with item 1 of Section II.)

______ No (If checked, indicate below what type of school yours is and disregard the rest of the questionnaire and mail it back to us.)

Type of School ______________________________

II. SCHOOL ORGANIZATION AND SCHEDULING

1. Check the grade levels that are in the school(s) for which you are responsible.

K-12 ______	8-12 ______	7-8 ______
1-12 ______	9-12 ______	7-9 ______
7-12 ______	10-12 ______	Other (specify) ______

2. Give the enrollment for each grade level in the school(s) for which you are responsible as of Fall, 1970. Give also the total school enrollment. If you do not have students in a particular grade level, please leave the corresponding space blank.

Grade Level	Enrollment	Grade Level	Enrollment
7	______	10	______
8	______	11	______
9	______	12	______

Total school enrollment ______

3a) Check the kind of scheduling that is used in your school.

Period ______ Modular ______ Other(specify) ______

b) Specify the number of regular class periods or modules per day .

______ periods/modules.

c) What is the length of a regular class period or module in minutes ? (Do not include the time for passing between classes.)

______ minutes.

d) How many periods or modules per week are devoted to teaching science in each grade level ?

Grade Level	Periods/Modules per week	Grade Level	Periods/Modules per week
7	______	10	______
8	______	11	______
9	______	12	______

Combination of grades(specify)

______ ______

4. What is the length of your regular school year ? (Number of days classes are in session.)

Number of days ______

III. GROUPING OF SCIENCE CLASSES

1a) Are science classes grouped homogeneously in your school ?

Yes ______ If yes, answer item 1b and 2 below.

No ______ If no, go on to item 1 of Section IV.

b) At what grade level(s) is homogeneous grouping for science classes generally done ?

Grade 7 ______ Grade 8 ______ Grade 9 ______

Grade 10 ______ Grade 11 ______ Grade 12 ______

All grades (7 through 12) ______

2. Please rank three of the following criteria in order of importance as the basis for the homogeneous grouping of science classes in your school. Use "1" for the criterion of greatest importance, "2" for the next most important, and "3" for the third most important criterion.

Criterion	Rank	Criterion	Rank
Marks or grades	______	Teacher(s) recommendation	______
Intelligence test(s)	______	Parent(s) recommendation	______
Aptitude test(s)	______	Counsellor's recommendation	______
Others (specify)		Student interest	______
________________	______		
________________	______		

IV. TEACHING STAFF

For items 1 and 2 below, the following definitions apply:

Full-time teachers: those teachers who occupy teaching positions which require them to be on the job on school days, throughout the school year, at least the number of hours the schools in the system are in session.

Part-time teachers: those teachers who occupy teaching positions which require less than full-day service.

(Substitute teachers, defined as persons employed to teach on a day-to-day basis, temporarily replacing regularly employed teachers, are not considered as part-time teachers in this study.)

1. Specify the total number of regularly employed teachers (all subjects) in your school.

Sex	Number of Full-time Teachers	Number of Part-time Teachers
Male	__________	__________
Female	__________	__________

2. Specify the total number of regularly employed teachers who teach at least one science subject or course.

Sex	Number of Full-time Teachers who Teach Science	Number of Part-time Teachers who Teach Science
Male	________	________
Female	________	________

3. Please complete the table below to show how many of your science teachers have the following percent of their assignment teaching science.

> Example
> • If you have 2 teachers who teach science 50 percent of the time, please write "2" in the space across from "41-60".

Percent of Teaching Assignment devoted to Teaching Science	Number of Teachers
0 - 20	____
21 - 40	____
41 - 60	____
61 - 80	____
81 - 100	____

V. SCIENCE BUDGET

For items 1-6 below, the following definitions apply:

Equipment is defined as non-consumable, non-perishable items such as microscopes, chemical balances, models, telescopes, aquariums, etc.

Supplies are defined as perishable or easily breakable materials that must continually be replenished such as chemicals, dry cells, glassware, electric bulbs, copper wire, etc.

1. Does your school have an annual budget for the purchase of new science equipment ? Yes ______ No ______

   If yes, amount of money spent or committed per student for 1970-71 (Please use the total school enrollment for computing this.)

   $ __________

2. Does your school have an annual budget for the purchase of consumable supplies such as chemicals, batteries, etc ? Yes ______ No ______

   If yes, amount of money spent or committed per student for 1970-71 (Please use the total school enrollment for computing this.)

   $ __________

3. Are your science teachers permitted to purchase equipment and supplies periodically throughout the school year ? Yes ______ No ______

4. Have you used money from the National Defense Education Act (NDEA) since September 1968 to purchase new science equipment ?

Yes ______ No ______

5. Have you used money from the Elementary and Secondary Education Act (ESEA) since September 1968 to purchase new science equipment ?

Yes ______ No ______

6. Have you remodeled science facilities in your school with money from the National Defense Education Act (NDEA) since September 1968 ?

Yes ______ No ______

VI. COURSE OFFERINGS

1. Please specify the number of students by grade level(s) who are taking the following science courses in your school during the 1970-71 school year. If a particular course is not taught in your school, please leave the corresponding spaces blank.

Science Course	Number of Students by Grade Levels					
	7	8	9	10	11	12
General Science						
Life Science						
Biology						
Chemistry						
Physics						
Earth Science						
Geology						
Physical Science						
Health Science						
Others (specify)						
______						
______						
______						
Combination of Courses (specify)						
______						
______						
______						

2. Please specify the number of students by grade levels who are taking Science Course Improvement Projects taught in your school during the 1970-71 school year. If a particular course is not taught in your school, please leave the corresponding spaces blank.

Science Course Improvement Project	Number of Students by Grade Levels					
	7	8	9	10	11	12
Introductory Physical Science (IPS)						
Intermediate Science Curriculum Study (ISCS)						
Earth Science Curriculum Project (ESCP)						
Secondary School Science Project (SSSP)						
Biological Sciences Curriculum Study (BSCS)						
a) Blue Version						
b) Green Version						
c) Yellow Version						
Chemical Education Material Study (CHEMS)						
Chemical Bond Approach (CBA)						
Physical Science Study Committee (PSSC) Physics						
Harvard Project Physics (HPP)						
Others (specify)						
________________						
________________						

3. Please specify the number of students by grade levels in each of the Advanced Science Courses taught in your school during the 1970-71 school year. If a particular course is not taught in your school, please leave the corresponding spaces blank.

Advanced Science Course	Number of Students by Grade Levels					
	7	8	9	10	11	12
Honors Science Program						
Advanced Biology						
BSCS Second Course						
Advanced Chemistry						
Advanced Physics						
Advanced Topics (PSSC)						
Science Research Seminar						
Others (specify)						
________________						
________________						

4a) Is Environmental/ Conservation Education taught in your school ?

Yes ______ If yes, answer items 4b and 4c.

No ______ If no, go to item 1 of Section VII.

b) Is Environmental/ Conservation Education taught as a separate subject or in relation to other subjects ?
(Check in the appropriate space for each grade level.)

	Grade Level 7	8	9	10	11	12
Taught separately						
Taught with science						
Taught with social studies						
Integrated with two or more subjects including science						
Integrated with two or more subjects not including science						
Other (specify) ______						

c) Specify the facilities (such as an outdoor education laboratory, school farm, school forest ...) that are available for teaching Environmental/ Conservation Education in your school.

______

______

______

VII. MISCELLANEOUS

1. Does your school sponsor a science club ? Yes ______ No ______

2. Does your school sponsor a science fair ? Yes ______ No ______

3. Did your students take part in science fairs with students from other schools during the 1969-70 school year ? Yes ______ No ______

4. Which type of supervisors or consultants are used by science teachers in your school during the 1970-71 school year. If not used, check in the first column of the table below.

Affiliation of Supervisors or Consultants	Not Used	Science Specialist	General Curriculum Specialist
a) City/county supervisor or consultant			
b) State Department supervisor or consultant			
c) Consultant from college or university			

4. (Continued)

Affiliation of Supervisors or Consultants	Not Used	Science Specialist	General Curriculum Specialist
d) Resource teacher employed by school system for several schools			
e) Resource teacher employed by your school			
f) Local, professionally-trained people (eg., doctors, scientists, engineers...)			
g) Other (specify) ________			

5. What are the opportunities science teachers in your school have for in-service science education ? Check as many spaces as apply for each type of in-service activity for science teachers.

In-service Activities for Science Teachers	Local School Level	School System Level	State Level	College Sponsored	Any Other Sponsorship (specify)
a) Curriculum development and revision meetings					
b) Workshops devoted to science teaching methods					
c) College science content courses or workshops					
d) Television and/or radio programs for science teachers					
e) Others (specify) ________					
________					
________					

END OF THE PRINCIPAL'S QUESTIONNAIRE

THANK YOU FOR YOUR COOPERATION

APPENDIX E

LETTER TO SCIENCE TEACHER

THE OHIO STATE UNIVERSITY
COLLEGE OF EDUCATION
1945 NORTH HIGH STREET
COLUMBUS, OHIO 43210

Faculty of Science and Mathematics Education

(614) 293-4121

Dear Science Teacher,

In the past decade great emphasis has been placed on the improvement of science teaching and learning in elementary and secondary schools. Both government and private foundations have supported large scale course content improvement projects in the sciences. Colleges and universities, with support from government agencies, have offered many institute programs for science teachers. Matched monies have been made available for schools to improve science teaching facilities and to upgrade science equipment. Individual schools and school systems have undertaken curriculum development and revision projects.

As the decade of the 1960's came to a close, many citizens, elected representatives in government and educators have asked for an accounting of the profession for changes and improvements which may have resulted from these massive programs. Basic questions being asked include: (1) What science is now being taught in our schools? (2) Who are the science teachers? (3) Who are the students taking science courses? (4) What are the conditions for science teaching in the schools?

No nationwide studies have been made in the past ten years in the area of science teaching in elementary and secondary schools. We are asking you and your principal to take part in such a study at this time. Our study includes all 50 states and the District of Columbia. Schools were selected through random sampling techniques and in proportion to the number of students in each state. Approximately 6,400 secondary schools and 10,000 elementary schools in the United States are included in the sample; however, your school may be the only school in the district or county included in the study. Therefore, your response is important to reflect national trends.

The questionnaires have been prepared in such a way as to obtain maximum information with a minimum of time required of teachers and principals. We have had the questionnaires evaluated by small samples of teachers and principals, and have revised them in terms of the feedback. We hope that you will find them clear, adequate and not too time consuming.

Results of this study will be given wide distribution and will be available through the ERIC Clearinghouse for Science and Mathematics Education at the Ohio State University. This study is an independent effort on the part of the Center for Science and Mathematics Education. We feel that the study is urgent at this time and that its findings may have an important effect on the future development of science education in our schools. We do urge you to take part in this study.

Cordially yours,

Fred R. Schlesinger

Fred R. Schlessinger,
Professor, Faculty of Science and Mathematics Education

Robert W. Howe

Robert W. Howe,
Chairman, Faculty of Science and Mathematics Education

APPENDIX F

SCIENCE CLASS SELECTION CRITERIA

V. SCIENCE TEACHING

Special Instruction

Items 1,2,3,4 and 5 below have been designed to provide information specific to one science class. If you teach only one class of science, respond to these same items with respect to that class. You may skip directly to item 1 below. If you teach more than one science class, please read the following before you begin item 1.

In order to ensure that the secondary school science classes in this survey constitute a random sample, we request your cooperation in selecting one of your science classes, about which we hope to obtain specific information regarding the science teaching practices.

The method of selecting this science class from all your science classes is outlined below. In selecting a science class for the information needed in Section V, Items 1-5, of the questionnaire, treat each group of students or unit as a separate class.

A. Order your science classes in numerical order, starting with "1" for the first science class that you teach each day, "2" for your second science class, and so on, ending with your last science class for the day.

B. Please select one of the science classes according to the following selection criteria:

Science Class Selection Numbers

05
03
02
01

a) If the total number of science classes that you teach is greater than or equal to 5, select the 5th science class.

b) If the total number of science classes that you teach is less than 5 but greater than or equal to 3, select the 3rd science class.

c) If the total number of science classes that you teach is 2, select the 2nd science class.

APPENDIX G

SCIENCE TEACHER QUESTIONNAIRE

THE OHIO STATE UNIVERSITY
CENTER FOR SCIENCE AND MATHEMATICS EDUCATION
244 Arps Hall, 1945 North High Street
Columbus, Ohio 43210

SURVEY OF SCIENCE TEACHING IN PUBLIC SECONDARY SCHOOLS
1970-71

SCIENCE TEACHER QUESTIONNAIRE

/__/__/ /__/__/__/ /__/__/__/

Name of School: ______________________________

Address of School: ______________________________
Number Street

____
City County

____
State Zip Code

General Instructions:

This questionnaire is to be answered by the individual secondary school science teacher. Please check over the questionnaire to get an idea of the scope of questions asked before beginning to fill out the form. Check (√) or fill every item that applies.

Definition:

For purposes of this survey, a secondary school science teacher is defined as "a teacher who teaches at least one science course or subject in any grade level or combination of grade levels from 7 through 12, in any school designated as a public secondary school."

I. SCHOOL ORGANIZATION

Check the grade levels that are included in your school.

K-12 _____	8-12 _____	7-8 _____
1-12 _____	9-12 _____	7-9 _____
7-12 _____	10-12 _____	Other (specify) _____

II. TEACHER CHARACTERISTICS

Check (√) or fill in the blank.

1. Age in years _____

2. Sex: male _____ female _____

3. Please check the degree(s) you now hold, and specify the major and minor subject matter fields of the degree(s).

Degree(s) Held	Subject Matter Fields Major	Minor(s)	
B.S. or B.A._____	__________	______	______
M.S. or M.A._____	__________	______	______
Ed.D._____	__________	______	______
Ph.D._____	__________	______	______
Specialist _____	__________	______	______
Non-degree _____	__________	______	______
Other (specify)__	__________	______	______

4. Are you now working on a formal degree program? Yes _____ No ____

If yes, what degree ? _____

Major subject matter field ____________________

Minor subject matter field(s)________________ ______________

5. Please specify the number of credits you have in the following areas in *either* quarter hours *or* semester hours.

Undergraduate Work	Quarter Hours	Semester Hours
Biological Sciences	______	______
Physical Sciences	______	______
Earth Science	______	______
Mathematics	______	______
Science Teaching Methods	______	______
Student Teaching in Science	______	______
Graduate Work		
Biological Sciences	______	______
Physical Sciences	______	______
Earth Science	______	______
Mathematics	______	______
Science Teaching Methods or Science Education	______	______

6. If you have attended any sponsored In-service Institutes during the period 1960-70, please circle the year(s) in which you attended the institute(s). For example, if you attended a National Science Foundation (N.S.F.) Academic Year Institute in 1965-66, circle "65". If you have attended an In-service Institute during 1969-70, circle "69".

Kind of Institute											
N.S.F. Academic Year	60	61	62	63	64	65	66	67	68	69	70
N.S.F. In-service	60	61	62	63	64	65	66	67	68	69	70
N.S.F. Summer	60	61	62	63	64	65	66	67	68	69	70
N.S.F. Research	60	61	62	63	64	65	66	67	68	69	70
Other Sponsored Institutes (specify)											
______________	60	61	62	63	64	65	66	67	68	69	70
______________	60	61	62	63	64	65	66	67	68	69	70

7. If you teach or have taught one or more of the Science Course Improvement Projects (eg., IPS,ISCS,ESCP,SSSP, IME, BSCS, CHEM Study, CBA, PSSC, HPP, Portland Project ...), since September 1968, please supply the following information about each project.

Science Course Improvement Project	Attendance at Workshop or Institute Yes	No	Length of Workshop or Institute

The following definitions apply for item 8 below:

Full-time teachers: those teachers who occupy teaching positions which require them to be on the job on school days, throughout the school year for at least the number of hours the schools in the system are in session.

Part-time teachers: those teachers who occupy teaching positions which require less than full-day service.

Substitute teachers: those persons employed to teach on a day-to-day basis, temporarily replacing regularly employed teachers. They are not considered as part-time teachers in this study.

8. On what basis are you now employed by the school system ?

Full-time ______ As a substitute ______

Part-time ______ Other (specify) ____________

9a) Number of years of teaching experience in an elementary school ______

b) Number of years of teaching experience in a secondary school (Include the present school year.) ______

c) Total number of years of teaching experience (Include the present school year.) ______

d) Number of years you have taught science in a secondary school (Include the present school year.) ______

e) Number of years at present school system or district (Include the present school year.) ______

III. TEACHING LOAD

Please list below all subjects or courses you are teaching, and fill in the related information.

> **Example**
>
> A teacher who teaches two sections of 10th grade BSCS Biology - Blue Version with 20 students in one section and 28 students in the other section would fill in the information as follows:
>
> BSCS Blue Version ______ 10 ______ 2 ______ 24

Subject/Course	Grade Level(s)	No. of Sections or Classes	Average Class Size

IV. SPECIAL SCIENCE FACILITIES AND AUDIO-VISUAL AIDS

1. Check the special science facility or facilities that is/are available for your use in teaching science in your school. How much use do you make of each facility that is available ?

Special Science Facility	Availability: Yes	Availability: No	Usage: Often (at least once a week)	Usage: Occasionally (about once a month)	Usage: Rarely (less than once a month)
Auto-tutorial laboratory					
Closed circuit television					
Computer terminal(s)					
Greenhouse					
Ham radio station					
Land laboratory					
Nature trail(s)					
Observatory					
Planetarium					
Science darkroom					
Ventilated animal house					
Weather station					
Other (specify) ______					

2. Check the audio-visual aids that are available to you in teaching science. How much use do you make of each kind of aid that is available ?

Audio-visual Aid	Availability: Yes	Availability: No	Usage: Often (at least once a week)	Usage: Occasionally (about once a month)	Usage: Rarely (less than once a month)
Motion picture projector					
Filmloop projector					
Slide projector					
Overhead projector					
Opaque projector					
Micro-projector					
Phonograph					
Tape-recorder					
Television					
Commercial models (eg. eye ear, molecular models...)					
Commercial charts					

V. SCIENCE TEACHING

Special Instruction

Items 1,2,3,4 and 5 below have been designed to provide information specific to one science class. If you teach only one class of science, respond to these same items with respect to that class. You may skip directly to item 1 below. If you teach more than one science class, please read the following before you begin item 1.

In order to ensure that the secondary school science classes in this survey constitute a random sample, we request your cooperation in selecting one of your science classes, about which we hope to obtain specific information regarding the science teaching practices.

The method of selecting this science class from all your science classes is outlined below. In selecting a science class for the information needed in Section V, Items 1-5, of the questionnaire, treat each group of students or unit as a separate class.

A. Order your science classes in numerical order, starting with "1" for the first science class that you teach each day, "2" for your second science class, and so on, ending with your last science class for the day.

B. Please select one of the science classes according to the following selection criteria:

Science Class Selection Numbers

05
03
02
01

a) If the total number of science classes that you teach is greater than or equal to 5, select the 5th science class.

b) If the total number of science classes that you teach is less than 5 but greater than or equal to 3, select the 3rd science class.

c) If the total number of science classes that you teach is 2, select the 2nd science class.

V. SCIENCE TEACHING (Continued)

1. Title of science course ______________________________

Grade level(s) ________ Class size _________

2. Please check the kind of room that you use to conduct the science class specified above.

Laboratory or special science room ______

Classroom with portable science kits ______

Classroom with no science facilities or kits ______

Other (specify) ______

____

3a) Please specify the kind of curriculum materials and/or textbooks that you use for the science class specified above. Check as many as applies.

Single textbook ______

Separate laboratory manual ______

Single textbook including laboratory manual ______

Multiple textbooks ______

Multiple textbooks including laboratory manual ______

Locally-prepared materials ______

Other (specify) ______

____

b) Please supply the following information about the textbook(s) and/or curriculum materials used for the science class specified above. If space is insufficient, please continue on the back of this sheet or attach a separate list.

Title	Publisher	Publication Date

4. With respect to the science class specified above, rank the three learning activities that you use most often. Use "1" for the most often used activity, "2" for the next most often, and "3" for the third most often used activity. Mark all other activities which you use with a check (✓).

Lecture	______	Individual laboratory activity	______
Lecture-discussion	______	Group laboratory activity	______
Small group discussion	______	In-class written assignments	______
Science demonstrations	______	Excursions or field studies	______
Instructional films	______	Programed instruction	______
Independent study	______	Auto-tutorial instruction	______
Others (specify)	______	Televised instruction	______

____

____

5. With respect to the science class specified above, rank the three grading methods that you use the most often. Use "1" for the most often used grading method, "2" for the next most often, and "3" for the third most often used grading method. If you do not use a particular grading method, please leave the corresponding space blank.

Grading Method	Rank
Test scores	______
Written assignments	______
Student participation in class discussion	______
Student performance in laboratory activity	______
Student performance in science projects	______
Student interest in science	______
Other (specify) ________________________	______

VI. MISCELLANEOUS

1. Evaluate the importance of the following factors to you in obtaining and maintaining a high quality science program in your school.

Factors	Very Important 1	2	3	4	Not Important 5
Innovative science programs	______	______	______	______	______
Administrative support	______	______	______	______	______
Science facilities	______	______	______	______	______
Teacher's salary	______	______	______	______	______

1. (Continued)

Factors	Very Important 1	2	3	4	Not Important 5
In-service education	______	______	______	______	______
Cooperative staff	______	______	______	______	______
Small classes	______	______	______	______	______
Number of different subject preparations	______	______	______	______	______
Lighter teaching loads	______	______	______	______	______
Others (specify)					
______________	______	______	______	______	______
______________	______	______	______	______	______

2. How satisfied are you with teaching science as a career ?
Mark one of the spaces below with a check (✓).

______	______	______	______	______
Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied

END OF THE SCIENCE TEACHER QUESTIONNAIRE

THANK YOU FOR YOUR COOPERATION

APPENDIX H

FORM 1

Appendix H

FORM I

State ____________ County ____________

Total county enrollment, n_c ____________

State unit population, secondary _____ n/UPS _______

District Name	Grade Span	N	N/UPS

APPENDIX I

FORM 2B

FORM 3B

State ____________ County ____________ District ____________________

No. of Secondary Schools in District __________

No. of Secondary Schools to be Sampled (N/UPS) ______

Random Numbers __

Code	School Name	Address	Principal	Enroll.	Trs.

APPENDIX J

FOLLOW-UP POSTCARD

Dear Principal:

Recently, two questionnaires were mailed to you from The Ohio State University National Science Teaching Study. Information was requested from one of your science teachers and yourself.

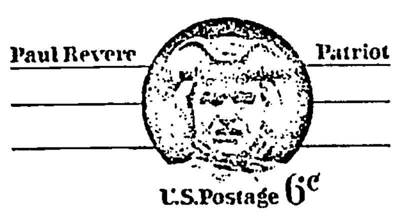
Overall response has been very good. However, we have not received Principal or Teacher Questionnaires from your school. Your data is important since we wish to obtain representative information from your geographic area.

Please check the appropriate box on the reply card. Either detach and mail, or fold, staple and mail.

Sincerely yours,

Long Fay Chin

Long Fay Chin
Graduate Research Associate



National Science Teaching Study
The Ohio State University
Center for Science and Mathematics Education
244 Arps Hall, 1945 North High Street
Columbus, Ohio 43210

National Science Teaching Study
The Ohio State University
Center for Science and Mathematics Education
244 Arps Hall, 1945 North High Street
Columbus, Ohio 43210

Please check the appropriate box:

/_/ Questionnaires have been returned to you.

/_/ Questionnaires will be completed and mailed about ______________________.

/_/ Questionnaires have been received, but we are unable to participate in this National Study.

/_/ Questionnaires have not been received. Please send another set.

Comments: ______________________________

____

/_/ /_/_/ /_/_/_/ /_/_/_/

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