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Science
and
Mathematics
in Public
High Schools
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PART 1

General Facilities and Equipment

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Foreword

THE CONGRESS of the United States, in passing the National Defense Education Act of 1958, reflected an ever increasing desire on the part of the Nation to improve the teaching of science and mathematics in its schools.

The lack of adequate facilities and equipment had long been considered a major handicap to effective science and mathematics instruction. Practically no data were available, however, to indicate the specific kinds of equipment that were lacking or to judge the adequacy or inadequacy of facilities in public high schools of different types and sizes. Information was not available, either, to indicate whether these schools provided better equipment and facilities for some subject areas than for others.

This study was undertaken to supply data which could be helpful in locating the shortages and showing their nature. It is hoped that the present bulletin will point the way to effective use of funds now available for science and mathematics facilities and equipment through the National Defense Education Act, and will highlight those problems in achieving improved teaching of the two subjects which may require a study more intensive than that permitted by the scope of this bulletin.

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Introduction

THE FEW STUDIES that have been carried out at the National level bearing on the status of science and mathematics in the public high schools of the United States are now out of date. Only four such studies have been produced.[1]

The scarcity of current information in these fields concerning teachers, course content, methods of instruction, facilities and equipment, professional problems, etc., prompted the U.S. Office of Education to undertake a study.

The questionnaires for the study, criticized at each stage of development by competent specialists, were revised several times. Three different questionnaires were mailed out to the public high schools: one to science teachers, one to mathematics teachers, and one to principals (see appendix). A large number of these questionnaires, despite the fact that they requested considerable detail, were filled in and returned to the Office in record time.

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[1] Science:

Philip G. Johnson. *The Teaching of Science in Public High Schools* (Bulletin 1950, No. 9). Washington: U.S. Government Printing Office, 1950. 48 p.

W. Edgar Martin. *The Teaching of General Biology in the Public High Schools of the United States* (Bulletin 1952, No. 9). Washington. U.S. Government Printing Office, 1952. 46 p.

Mathematics:

Kenneth E. Brown. *Curriculum Materials in High-School Mathematics* (Bulletin 1954, No. 9). Washington: U.S. Government Printing Office, 1954. 40 p.

—— *Mathematics in Public High Schools* (Bulletin 1953, No. 5). Washington: U.S. Government Printing Office, 1953. 47 p.

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Facilities and Equipment for Science

Items of Study

This study obtained data on the use of the following facilities and equipment for teaching science in the public high schools:

1. ***Types of rooms.***—Information was sought on the use of separate laboratories and classrooms, as compared with combination classrooms and laboratories; of multipurpose rooms having facilities for more than one science; and of rooms equipped with but a few special facilities for science or with facilities for one science but not for other sciences.
2. ***Facilities and equipment.***—More than 30 items concerning special facilities and equipment were listed on the questionnaire. These items included a demonstration table, fume hood, storage cabinet, animal room, nature trail, and preparation room, as well as water and gas and many other items about which little information had previously been brought together concerning their general availability.
3. ***Adequacy of equipment.***—Space limitations in the questionnaire prevented a detailed inquiry about equipment available for individual sciences. However, some information was requested as to the adequacy and condition of teacher-demonstration and individual laboratory equipment for special sciences; the need for more and modern equipment, both for teacher demonstration and student laboratory work; and the adequacy of such general equipment and materials as glassware, rubber stoppers, ring-stands, clamps, chemicals, etc.
4. ***Teaching kits.***—Since kits for science teaching are used so extensively in many European schools and since they have been appearing increasingly on the market in the United States during recent years, information was sought on the extent to which science teachers were using kits in each science.
5. ***Improvised equipment.***—Data were collected on the extent to which improvised equipment was used in teaching science courses.
6. ***Borrowed equipment.***—Many schools make considerable use of community resources to supplement regular teaching. Information was sought on places where science teachers borrowed equipment.
7. ***Purchase of equipment.***—Information was sought on the method of purchasing science equipment and the person in the school system who had the responsibility for placing equipment orders,
8. ***School funds for buying equipment.***—Questions were asked concerning the extent to which science teachers were provided with budgets for equipment and consumable materials, whether or not they were permitted

to purchase equipment without restrictions, whether or not laboratory fees were charged, and whether money so collected could be spent without restrictions.

9. *Out-of-school sources for buying equipment.*—The teachers were asked to indicate whether or not funds for equipment were available from parent-teacher groups, service clubs, a science fair or exhibit of pupils' scientific projects, an interested parent, a scientific society, or other sources.

The original categories of data on facilities and equipment for science teaching in public high schools were by size [1] and type.[2] Analysis of the data by these categories revealed no significant differences between them. It was therefore decided to interpret and prepare this report, except in a few cases, only by school size.

Characteristics of the Sample

The sample consisted of 1,207 high schools. They were selected by pulling every twentieth card from the 1951–52 cardex file of secondary schools in the Educational Statistics Branch of the U.S. Office of Education. Returns were received from 994 of these schools, and 928, or 76.9 percent, were usable.

Following a consideration of the geographical distribution of the 928 high schools submitting usable data, their classification by size and type, and the classification of the 2,210 science teachers in these schools in the same categories, the complete findings will be presented.

The number, size, and type of high schools participating in this investigation are shown in table 1.

Table 1.—Number of Public High Schools in the Study, by Size and Type: 1953

Size of high school (number of pupils)	Type of high school					Total
	Incomplete	Junior	Junior-Senior	4-year	Senior	
1	2	3	4	5	6	7
1–99	6	4	71	36	0	117
100–199	4	7	122	44	0	177
200–499	2	22	288	73	5	388
500 or more	6	65	123	93	30	326
Total	18	98	822	246	44	928

[1] "Size of school" means number of pupils: 1–99, 100–199, 200–499, 500 or more.
[2] "Type of school" means junior, junior-senior, 4-year, or senior high school.

Table 1 reveals that more than one-half (56.3 percent) of the high schools were organized on a 6-year basis—grades 7 through 12—while approximately one-fourth (26.5 percent) were regular 4-year high schools—grades 9 through 12. About one-tenth (10.6 percent) were junior high schools—grades 7 through 9; and roughly one-twentieth (4.7 percent) were senior high schools—grades 10 through 12. Only 1.9 percent were "incomplete"; that is, they did not offer a curriculum leading to a diploma.

Approximately two-thirds (64.9 percent) of the high schools had fewer than 500 pupils, while about one-third (31.7 percent) had fewer than 200. In 35.1 percent of the high schools pupils numbered 500 and more.

The 928 high schools participating in the study were distributed among 9 geographical regions as follows:

Geographical region	Number of schools
New England (Conn., Maine, Mass., N.H., R.I., Vt.)	41
Middle Atlantic (N.J., N.Y., Pa.)	109
East North Central (Ill., Ind., Mich., Ohio, Wis.)	177
West North Central (Iowa, Kans., Minn., Mo., Nebr., N. Dak., S. Dak.)	150
South Atlantic (Del., D.C., Fla., Ga., Md., N.C., S.C., Va., W. Va.)	122
East South Central (Ala., Ky., Miss., Tenn.)	79
West South Central (Ark., La., Okla., Tex.)	133
Mountain (Ariz., Colo., Idaho, Mont., Nev., N. Mex., Utah, Wyo.)	55
Pacific (Calif., Oreg., Wash.)	62

A comparison of the number of high schools in each geographical region with the total number of high schools in the sample, shows that their ratios correspond favorably with those of the total schools in each region of the country as a whole. On the other hand, the percent of schools in the sample having enrollments of 500 and more was about 10 percent greater than the percent for the country as a whole.

It would seem, therefore, that the sample was reasonably representative of the high schools in this country.

The distribution of science teachers among high schools of various sizes and types is given in table 2

Table 2.—Number of Public High School Science Teachers in the Study, by Size and Type of School: 1958

Size of high school (number of pupils)	Type of high school					
	Incomplete	Junior	Junior-senior	4-year	Senior	Total
1	2	3	4	5	6	7
1-99	7	4	94	61	0	166
100-199	8	6	164	71	0	249
200-499	4	27	373	161	16	581
500 or more	16	141	407	457	193	1,214
Total	35	178	1,038	750	209	2,210

Approximately one-half (47 percent) of the 2,210 science teachers were in 6-year high schools—grades 7 through 12; roughly one-third (33.9 percent) in regular 4-year high schools, and almost one-tenth (9.4 percent) in senior high schools.

From the standpoint of school size (number of pupils), the science teachers were distributed as follows: More than one-half (54.9 percent) in high schools enrolling 500 or more pupils, about one-fourth (26.3 percent) in the 200–499 category, about one-tenth (11.3 percent) in the 100–199 category, and 7.5 percent in the 1–99 category.

Details of Findings

Information supplied by the 2,210 science teachers covered the following: Types of rooms used for science teaching; facilities and equipment; adequacy of equipment; use of teaching kits, improvised equipment, and borrowed equipment; purchase of equipment; school funds for equipment and nonschool funds for equipment.

Types of Rooms

Table 3 shows types of rooms used by general science teachers in public high schools.

The general science teachers were using rooms equipped for non-science courses and also multipurpose rooms more frequently than any other type. They used separate recitation and laboratory rooms the least.

Teachers in schools with enrollments below 500 were using multipurpose rooms to a greater extent than were those in schools with enrollments of 500 or more. Schools of this latter category were using, with greater frequency, combination classrooms and laboratory facilities equipped for a single science.

Table 3.—Number and Percent of Public High School General Science Teachers Using Various Types of Rooms, by Size of School: 1958

Type of room	Number and percent in schools having—								Total	
	1-99 pupils		100-199 pupils		200-499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Combination classroom and laboratory with facilities for a single science	15	12.5	10	6.2	33	9.2	130	25.1	188	16.3
Combination classroom and laboratory with facilities for two sciences (e.g., general science and biology)	26	21.6	30	18.7	62	17.4	103	19.9	221	19.2
Combination classroom and laboratory with facilities for all science (multipurpose room)	43	35.8	63	39.4	118	33.1	82	15.9	306	26.5
Separate recitation room and laboratory	8	6.7	13	8.1	48	13.4	35	6.8	104	9.0
Room primarily equipped for nonscience courses	28	23.3	44	27.5	96	26.9	167	32.3	335	29.0
Total	120	99.9	160	99.9	357	100.0	517	100.0	1,154	100.0

Table 4 shows the types of rooms used by biology teachers. These teachers were using combination classrooms equipped for two sciences and multipurpose rooms equipped for all sciences more frequently than other types of presentation and laboratory facilities. One out of every nine of the biology teachers was using a separate room for recitation and laboratory work.

Schools enrolling fewer than 500 pupils used multipurpose rooms for biology to a greater extent than those enrolling 500 or more. A larger percent of biology teachers in schools with enrollments of 500 or more were using combination classrooms and laboratories equipped for either a single science or for two sciences than were their counterparts in schools with lower enrollments.

Schools enrolling fewer than 500 students used multipurpose rooms for biology to a greater extent than those enrolling 500 or more. A larger percent of teachers in schools having enrollments of 500 or more were using combination classrooms and laboratories for either a single science or two sciences than were their counterparts in smaller schools.

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Table 4.—Number and Percent of Public High School Biology Teachers Using Various Types of Rooms, by Size of School: 1958

Type of room	Number and percent in schools having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Combination classroom and laboratory with facilities for a single science	8	7.5	7	4.5	25	8.8	167	31.3	207	19.2
Combination classroom and laboratory with facilities for two sciences (e.g., general science and biology)	26	24.5	33	21.4	68	23.8	160	30.0	287	26.6
Combination classroom and laboratory with facilities for all science (multipurpose room)	37	34.9	67	43.5	106	37.2	47	8.8	257	23.8
Separate recitation room and laboratory	8	7.5	12	7.8	31	10.9	69	12.9	120	11.1
Room primarily equipped for nonscience courses	27	25.5	35	22.7	55	19.3	90	16.9	207	19.2
Total	106	99.9	154	99.9	285	100.0	533	99.9	1,078	99.9

Table 5 shows the types of rooms used by chemistry teachers in the high schools of the sample.

Table 5.—Number and Percent of Public High School Chemistry Teachers Using Various Types of Rooms, by Size of School: 1958

Type of room	Number and percent in schools having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Combination classroom and laboratory with facilities for a single science	7	12.5	7	6.4	17	6.6	103	30.0	134	17.5
Combination classroom and laboratory with facilities for two sciences (e.g., general science and biology)	4	7.1	13	11.8	42	16.4	61	17.8	120	15.7
Combination classroom and laboratory with facilities for all science (multipurpose room)	34	60.7	60	54.5	133	52.0	55	16.0	282	36.9
Separate recitation room and laboratory	2	3.6	14	12.7	51	19.9	116	33.8	183	23.9
Room primarily equipped for nonscience courses	9	16.1	16	14.5	13	5.1	8	2.3	46	6.0
Total	56	100.0	110	99.9	256	100.0	343	99.9	765	100.0

These chemistry teachers were using multipurpose rooms equipped for all sciences and separate rooms for recitation and laboratory work more frequently than any other type of room. Only one out of every 17 used rooms primarily equipped for nonscience courses. Fewer chemistry teachers used this type of presentation facility than did teachers of other science subjects.

Considering the relationship between school enrollments and the use of facilities, the present study found that schools having enrollments below 500 were using multipurpose rooms to a greater extent than those having enrollments of 500 or more. The latter category of schools was teaching chemistry primarily in separate recitation and laboratory rooms and in single science facilities consisting of a combined classroom and laboratory.

Data pertaining to the types of rooms used by physics teachers are given in table 6.

Table 6.—Number and Percent of Public High School Physics Teachers Using Various Types of Rooms, by Size of School: 1958

Type of room	Number and percent in schools having								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Combination classroom and laboratory with facilities for a single science	6	11.1	4	4.3	13	6.4	76	27.4	99	15.8
Combination classroom and laboratory with facilities for two sciences (e.g., general science and biology)	6	11.1	12	12.9	33	16.2	70	25.3	121	19.3
Combination classroom and laboratory with facilities for all science (multipurpose room)	31	57.4	42	45.2	110	53.9	49	17.7	232	36.9
Separate recitation room and laboratory	4	7.4	14	15.1	36	17.6	62	22.4	116	18.5
Room primarily equipped for nonscience courses	7	13.0	21	22.5	12	5.9	20	7.2	60	9.5
Total	54	100.0	93	100.0	204	100.0	277	100.0	628	100.0

The data disclose that physics teachers were using multipurpose rooms, equipped for all sciences, more frequently than other types; and rooms primarily equipped for nonscience courses, the least.

In addition, teachers in schools enrolling fewer than 500 pupils were using multipurpose rooms for physics to a greater extent than those in schools enrolling 500 or more. A greater percent of teachers in large schools were using combination classrooms and laboratories for either a single science or two sciences than were teachers in small schools.

Facilities and Equipment

The availability of various science facilities is shown in table 7.

Table 7.—Number and Percent of Public High School Science Teachers Answering "Yes" as to Availability of Certain Facilities and Equipment, by Size of School: 1958

Facility or equipment	Number and percent in schools having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Animal room	3	1 8	1	0 4	7	1 2	64	5 1	75	3 4
Dark room for photography	13	7 8	58	23 3	182	33 0	457	37 6	720	32 6
Demonstration tables	120	72 3	165	66 3	434	74 7	998	82 2	1,717	77 7
Demonstration table on wheels	2	1 2	10	4 0	48	8 3	195	16 1	255	11 5
Electrical outlets	156	94 0	226	90 8	543	93 5	1,155	95 1	2,080	94 1
Equipment storage cases	122	73 5	173	69 5	430	74 0	947	78 0	1,672	75 6
Exhibit cases	36	21 7	65	26 1	195	33 6	591	48 7	887	40 1
Fume hoods	14	8 4	42	16 9	139	23 9	265	21 8	460	20 8
Garden plot	5	3 0	6	2 4	12	2 1	55	4 5	78	3 5
Gas outlets	105	63 5	185	74 3	472	81 2	1,059	87 2	1,821	82 4
Greenhouse (separate)	3	1 8	1	4	5	9	104	8 6	113	5 1
Library of text books in the room	65	39 2	103	41 4	245	42 2	621	51 2	1,034	46 8
Nature trail	3	1 8	7	2 8	18	3 1	47	3 9	75	3 4
Plant growing room	5	3 0	6	2 4	11	1 9	119	9 8	141	6 4
Project areas for individuals	13	7 8	16	6 4	37	6 4	112	9 2	178	8 1
Project room (separate)	11	6 6	8	3 2	46	7 9	111	9 1	176	8 0
Preparation room	12	7 2	27	10 8	102	17 5	379	31 2	520	23 5
Radio room or shack	5	3 1	1	4	6	1 0	65	5 4	77	3 5
Reforestation area	2	1 2	11	4 4	27	4 6	31	2 6	71	3 2
Rooms are fitted for television reception	5	3 0	16	6 4	26	4 5	68	5 6	115	5 2
Rooms can be darkened for slide and movie projection	90	54 2	156	62 7	351	60 4	855	70 4	1,452	65 7
Rooms have bulletin boards	139	83 7	210	84 3	521	89 7	1,135	93 5	2,005	90 7
Rooms have chalkboards	164	98 8	242	97 2	568	97 8	1,198	98 7	2,172	98 3
Rooms have classroom libraries and reading tables	28	16 9	22	8 3	49	8 4	129	10 6	228	10 3
Rooms have wall and window tables	29	17 5	49	19 7	106	18 2	370	30 5	554	25 1
School camp	1	6	0	0	8	1 4	7	6	16	7
School farm	1	6	15	6 0	29	5 0	29	2 4	74	3 3
Science museum	3	1 8	13	5 2	28	4 8	82	6 8	126	5 7
Water available	142	85 5	217	87 1	516	88 8	1,109	91 3	1,984	89 8
Weather station	2	1 2	3	1 2	8	1 4	31	2 6	44	2 0

The most prevalent science facilities available for instruction, in order of descending frequency, were chalkboards, electrical outlets, bulletin boards, running water, gas outlets, demonstration tables, equipment storage cases, blinds for darkening rooms, library of textbooks in the science room, exhibit cases, photography room, wall and window tables, preparation room, and fume hoods. Other items in table 7 were available to fewer than 20 percent of the science teachers.

Considering the relationship between school size and the presence or absence of the various facilities for teaching science, a greater percent of the large schools had a greater variety of facilities than

did the small schools. Examples of this were a darkroom for photography and equipment storage cases. In an occasional instance, the small schools had an advantage, such as classroom libraries and reading tables.

In response to a specific question (not reported in table 8), 612, or 27.7 percent, of the science teachers reported their facilities needed replacement; while 876, or 39.6 percent, said these were inadequate in size.

Table 8.—Number and Percent of Public High School Science Teachers Answering "Yes" as to Adequacy and Usability of Equipment, by Size of School: 1958

Item	Number and percent in schools having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
1	2	3	4	5	6	7	8	9	10	11
Teacher-demonstration equipment adequate	69	41.6	104	41.8	244	42.0	717	58.1	1,134	51.3
Large amount of broken equipment, usable if repaired	22	13.3	26	10.4	71	12.2	133	11.0	252	11.4
Need for new and modern demonstration equipment	122	73.5	182	73.1	444	76.4	769	63.3	1,517	68.6
Student laboratory equipment adequate	55	33.1	77	30.9	191	32.9	510	42.0	833	37.7
Need for more modern equipment for student laboratory	122	73.5	174	69.9	408	70.2	731	60.2	1,435	64.9
Supply of glassware adequate	80	48.2	129	51.8	352	60.6	843	69.4	1,404	63.5
Supply of general equipment (ring stands, clamps, stoppers, etc.) adequate	107	64.5	159	63.9	407	70.1	922	75.9	1,595	72.2
Supply of chemicals adequate	86	51.8	138	55.4	368	63.3	878	72.3	1,470	66.5

Table 8 shows the number and percent of affirmative answers from the 2,210 science teachers to items dealing with the present status of their equipment.

Slightly more than one-half of the science teachers felt that the available demonstration equipment was adequate. A few more than one-ninth reported a large amount of broken equipment which could be used if repaired, while approximately two-thirds affirmed the need for new and modern demonstration equipment. Furthermore, approximately one-third rated the student laboratory equipment as adequate, and slightly fewer than two-thirds felt the need for more modern equipment.

In considering the adequacy of other laboratory items, approximately two-thirds of the science teachers indicated that the supply of glassware and chemicals was satisfactory, while about three-fourths felt that the supply of general equipment such as ring stands, clamps, stoppers, etc., was adequate.

The influence of school size on available equipment was discernible. On all items, the science teachers in the large schools indicated more satisfaction with their equipment than did those in small schools. The latter indicated a greater need for new and modern demonstration and student laboratory equipment than did the former.

Teaching Kits

Data pertaining to the use of teaching kits in the various science courses are found in table 9. These data reveal that fewer than one-third of the science teachers used kits more often than "rarely." General science teachers and biology teachers used them to a greater extent than did other science teachers; advanced general science teachers used them the least.

Table 9.—Number and Percent of Public High School Science Teachers Reporting Certain Degrees of Frequency in Their Use of Kits, by Course: 1958

Course	Number and percent using kits—								Total	
	Never		Rarely		Moderately		Frequently			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
General science	521	46.9	254	22.9	258	23.2	77	6.9	1,110	50.2*
Biology	436	43.1	248	24.5	249	24.6	79	7.8	1,012	45.8
Chemistry	379	53.8	163	23.2	118	16.8	44	6.2	704	31.9
Physics	309	53.7	124	21.6	100	17.4	42	7.3	575	26.0
Advanced general science	131	66.2	31	15.7	23	11.6	13	6.5	198	9.0

NOTE: Percents shown under the "Total" column in tables 9 through 14 are based upon replies from 2,210 science teachers participating in this survey.

Improvised Equipment

Table 10 gives data on the use of improvised equipment in science courses.

Approximately one-half or more of the science teachers were using improvised equipment. Seven out of every ten physics and general science teachers were using this type of equipment, while six out of every ten biology and advanced general science teachers were using it. Chemistry teachers used it less than other science teachers.

Table 10.—Number and Percent of Public High School Science Teachers Reporting Certain Degrees of Frequency in Their Use of Improvised Equipment, by Course: 1958

Course	Number and percent using equipment—								Total	
	Never		Rarely		Moderately		Frequently			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
General science	68	5.9	275	23.9	546	47.6	259	22.6	1,148	51.9
Biology	65	6.2	318	30.3	488	46.5	179	17.0	1,050	47.5
Chemistry	85	11.7	291	40.2	282	39.0	66	9.1	724	32.8
Physics	16	2.7	148	25.2	297	50.5	127	21.6	588	26.6
Advanced general science	20	12.4	43	26.7	62	38.5	36	22.4	161	7.3

Borrowed Equipment

Data on the sources which science teachers used for borrowing equipment appear in table 11.

Table 11.—Number and Percent of Public High School Science Teachers Reporting Use of Various Sources for Borrowing Equipment, by Size of School: 1958

Source	Number and percent in schools having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Industry	23	13.9	25	10.0	79	13.6	232	19.1	359	16.2
Doctor's office	16	9.6	29	11.6	79	13.6	187	15.4	311	14.1
Garage	41	24.7	44	17.7	90	15.5	126	10.4	301	13.6
Store	34	20.5	37	14.9	82	14.1	137	11.3	290	13.1
Hospital	7	4.2	6	2.4	37	6.4	144	11.9	194	8.8
Filling station	33	19.9	30	12.0	53	9.1	75	6.2	191	8.6
Engineer	4	2.4	6	2.4	21	3.6	78	6.4	109	4.9

Since any one teacher may have been in a school which borrowed equipment from more than one source, it was impossible to determine the exact number of teachers using such equipment. The totals for any one source, however, actually reveal the number of teachers who were using borrowed equipment.

Table 11 discloses the fact that industry was the largest single source of borrowed equipment. The next three sources, in order of their descending frequency, were doctors' offices, garages, and stores.

Schools in the small enrollment categories borrowed equipment to a greater extent from garages, filling stations, and stores than did the larger schools, while the reverse was true in the case of hospitals, doctors' offices, and industry.

Purchase of Equipment

Table 12 shows the extent to which various procedures for purchasing equipment were used.

Table 12.—Number and Percent of Public High Schools Using Certain Procedures for Purchasing Science Equipment, by Size of School: 1958

Procedure	Number and percent having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Contract basis	1	0.6	12	4.8	40	6.9	292	24.1	345	15.6
Central purchasing agency	26	15.7	36	14.5	89	15.3	604	49.8	755	34.2
Purchase by school principal	41	24.7	57	22.9	101	17.4	106	8.7	305	13.8
Purchase by school superintendent	89	53.6	133	53.4	257	44.2	260	21.4	739	33.4
Purchase by supervisor	13	7.8	19	7.6	24	4.1	96	7.9	152	6.9
Purchase by head of science department	24	14.5	43	17.3	120	20.7	229	18.9	416	18.8
Purchase by science teacher	57	34.3	100	40.2	226	38.9	256	21.1	639	28.9

A wide variation existed in the procedures. Approximately one-third of the teachers indicated that their schools made purchases through a central agency; another one-third, that the superintendent made them. Other purchasing procedures, in order of descending frequency, were the following: by the science teachers, by the department head, through school contracts, by the principal, and by the science supervisor. The total of the percents exceeds 100 since two or more procedures were used in some schools.

The data also disclose a variation among schools in the several enrollment categories. Large schools used a central purchasing agency, while small ones placed the major responsibility in the hands

of the superintendent. In schools with enrollments under 500, one-third of the science teachers handled their own purchases.

School Funds for Buying Equipment

Table 13 shows how school funds, including laboratory fees charged to cover breakage, were used for buying science equipment.

Table 13.—Number and Percent of Public High School Science Teachers Answering "Yes" to Questions on Certain Financial Aspects of Their Work, by Size of School: 1958

Item	Number and percent in schools having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Annual budget for purchase of new equipment	70	42.2	127	51.0	258	44.4	790	65.1	1,245	56.3
Annual budget for purchase of consumable materials (chemicals, etc.)	58	34.9	109	43.8	242	41.6	744	61.3	1,153	52.2
Purchase of equipment and supplies permitted without restrictions	41	24.7	38	15.3	95	16.4	155	12.8	329	14.9
Laboratory fee charged in specialized science courses to cover breakage	15	9.0	26	10.4	109	18.8	272	22.4	422	19.1
Money from fees allowed to be spent without restrictions	12	7.2	15	6.0	53	9.1	104	8.6	184	8.3

A few more than one-half of the science teachers reported that their schools had an annual budget for science equipment and consumable supplies. Purchase of equipment without administrative restrictions was possible in the case of only one-seventh of the teachers. About one-fifth taught in schools which collected a student laboratory fee to cover breakage and about one-half disclosed the fact that such fees could be spent for equipment and supplies without administrative restrictions.

The budgetary and purchasing procedures varied somewhat in the four enrollment categories. Annual budgets were more common in the large schools, while more freedom in purchasing appeared in the small schools.

The percentage total of any one column in table 13 exceeds 100 since a teacher could have replied "yes" to more than one item.

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Out-of-School Sources for Buying Equipment

Table 14 gives data on certain out-of-school sources for buying science equipment.

Table 14.—Number and Percent of Public High School Science Teachers Who Reported Certain Out-of-School Sources for Buying Equipment, by Size of School: 1958

Source	Number and percent in schools having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Parent-teacher association	12	7.2	18	7.2	18	3.1	57	4.7	105	4.8
Industry	4	2.4	4	1.6	22	3.8	58	4.8	88	4.0
School benefit (e.g., a play)	9	5.4	15	6.0	26	4.8	26	2.1	76	3.5
Interested parent	0	.0	5	2.0	16	2.8	46	3.8	67	3.0
Science fair or exhibit of pupils' scientific projects	1	.6	1	.4	11	1.9	30	2.5	43	1.9
Scientific society (American Chemical Society)	1	.6	1	.4	8	1.4	22	1.8	32	1.4
Service club (e.g., Rotary)	2	1.2	5	2.0	7	1.2	12	1.0	26	1.2

Any one teacher may have been in a school which used more than one out-of-school source for buying equipment; hence, it was impossible to determine the exact number of teachers using the sources. The totals for any one source, however, actually reveal the number of teachers using it.

In order of frequency, the out-of-school sources were the following: parent-teacher association, industry, school benefit (e.g., a play), interested parent, fair or exhibit of pupils' scientific projects, scientific society, service club.

There was some variation in the use of out-of-school sources among the four enrollment categories. More teachers in large schools reported the use of such sources than did teachers in small schools. The small schools, however, depended to a greater extent on the PTA and school benefits than did the large ones; while the latter more frequently used industry, interested parents, and school science fairs or exhibits of pupils' scientific projects.

Summary of Findings

The findings were based upon data supplied by 928 high schools. The most numerous among these schools were the 6-year (or junior-

senior) and the regular 4-year. Approximately two-thirds had enrollments of 200 or more and about one-third, 500 or more. Every geographic area of the United States was represented in the sample.

Types of Rooms

The types of rooms used most by general science teachers were combination classrooms and laboratories equipped for all sciences, and combination classrooms and laboratories equipped for two sciences. About one-seventh of these teachers were using rooms primarily equipped for nonscience courses. In the large schools, the most common type of room was the combination classroom and laboratory equipped for a single science area.

Teachers of biology reported presentation rooms and laboratories similar to those used by general science teachers.

Slightly more than one-third of the chemistry teachers were using combination classrooms and laboratories equipped for all sciences, while another third were using combination classrooms and laboratories equipped for one or two science courses. The most common types used by chemistry teachers in the large schools were the combined classrooms and laboratories equipped for a single science and separate recitation and laboratory rooms.

Teachers of physics reported having presentation rooms and laboratories similar to those used by chemistry teachers.

Facilities and Equipment

Approximately 8 out of every 10 science teachers indicated that they had the following facilities in their rooms: running water, gas outlets, electrical outlets, demonstration tables, storage cases, bulletin boards, and chalkboards.

Four to 6 out of every 10 said that their classrooms contained exhibit cases, library of textbooks, and darkening facilities for projection purposes. Furthermore, one teacher in three reported having a darkroom for photography; and about one in four, fume hoods, preparation rooms, and wall and window tables.

Fewer than 6 percent of the teachers had a television receiver, animal room, greenhouse, nature trail, garden plot, reforestration area, school camp, radio room, science museum, school farm, or weather station. About 1 in 10 had a demonstration table on wheels.

Large schools as a group had a wider variety of facilities than did small schools.

Approximately one-half of the science teachers indicated that their demonstration equipment was adequate; slightly more than one-third that the student laboratory equipment was adequate. Approximately two-thirds indicated the need for new and modern demonstration and laboratory equipment.

Teachers in the large schools on the whole felt that their facilities were a little more satisfactory than did teachers in the small schools.

Teaching Kits and Improvised Equipment

Science kits were little used by science teachers. Approximately one in four used them moderately to frequently; the same ratio seldom used them; and five in ten, never. Improvised equipment was far more popular than kits: approximately 7 out of every 10 science teachers as a whole used it extensively, while 1 out of every 4 sometimes used it. Chemistry teachers varied somewhat from this general pattern by making less use of improvised equipment.

Borrowed Equipment

A relatively small percentage of the science teachers used borrowed equipment. School size seemed to have little to do with the use of borrowed equipment. Sources, in order of decreasing frequency, were industries, doctors' offices, garages, stores, hospitals, and filling stations.

Purchase of Equipment

The most frequently used procedures for buying equipment were, in order of decreasing frequency, through a central agency, by the superintendent of schools, and by the individual science teacher. Some variation appeared among the enrollment categories. As a rule, the large schools favored a central purchasing agency and the small ones placed the responsibility on the superintendent.

Sources of Funds for Buying Equipment

Funds for equipment were obtained from sources both in and out of school. Slightly more than one-half of the teachers reported that their schools had annual budgets for equipment and supplies. Nine-

teen percent said that a student laboratory fee was collected to cover breakage.

Funds from out-of-school sources were not abundant. Principal sources, in order of decreasing frequency, were parent-teacher association, industries, school benefits (e.g., plays), and interested parents.

Concluding Statements

1. Combination classrooms and laboratories equipped for two or more science areas are used more extensively than any other type of room. This type of presentation and laboratory facility is replacing the more traditional separate classrooms and laboratories found in many schools three decades ago. Too many schools today are using for science instruction simply a regular classroom without laboratory facilities.

2. Some of the facilities usually associated with good science teaching were rarely found in the classrooms or on the school's premises. In this category are an exhibit case, a dark room for photography, a laboratory preparation room, a greenhouse or plant growing room, an animal house or room, and a campus weather station.

Even though the findings of this study tend to indicate an inadequate quantity of equipment in many high schools, science teachers as a group were attempting to give their pupils first-hand science learning experience by making extensive use of improvised equipment. Teachers preferred this type of equipment to science kits.

3. Since out-of-school sources for borrowing science equipment or for buying equipment and supplies are meagre, it becomes increasingly important that school boards and administrators provide annual budgets for these purposes. Such budgets were reported for only about one-half of the high schools. Where they were found, instead of all orders being pooled and submitted for bids—the method used by most successful business concerns—purchases were made primarily by the superintendent, but also by individual science teachers ordering directly from supply houses.

Facilities and Equipment for Mathematics

Items of Study

This study, based on replies from 2,293 mathematics teachers in public high schools, classified according to size and type, attempted to find out the extent to which certain types of facilities and equipment [1] were available to these teachers. The present report includes the number and percent who replied to the following questionnaire items:

1. The number of linear feet of classroom chalkboard.[2]
2. The number of linear feet of classroom bulletin board.[2]
3. Frequency in use of improvised equipment.[2]
4. Teachers' preferences for certain types of classroom chairs, desks, and tables.[2]
5. Ranking certain equipment, materials, and teaching aids.[2]
6. Ranking the two problems: getting improved library facilities and getting and using visual aids.[2]

Characteristics of the Sample

The number of public high schools in the sample, by size, type, and geographical distribution, are shown in the section on science. (See table 1 and distribution list following shortly thereafter.)

Table 15 shows the distribution of mathematics teachers in the sample by size and type of school. The percentage distribution of the teachers in the sample was as follows: junior high school, 12.6; regular 4-year high and junior-senior high school, 76.5; senior high school, 9.4.

The latest comparable data for all classroom teachers in the United States are for 1951–1952. At that time the percentage distribution of all classroom teachers was as follows: junior high school, 18.3; regular 4-year high school and junior-senior high school, 62.1; senior high school, 19.6. However, since the small high schools are usually regular 4-year ones, where a single teacher may teach several subjects,

[1] Sources of specific information on facilities and equipment for teaching mathematics appear in the bibliography of this bulletin, pp. 41–42.

[2] Data compiled according to size of high school.

[3] Data compiled according to size and type of high school.

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the percent of mathematics teachers in these schools would be greater than the percent of mathematics teachers in all schools of the sample.

Table 15.—Number of Public High School Mathematics Teachers in the Study, by Size and Type of School: 1958

Size of high school (number of pupils)	Type of high school				
	Incomplete	Junior	Junior-senior and 4 year	Senior	Total
1	2	3	4	5	6
1–99	9	6	126		140
100–199	6	9	227		242
200–499	5	46	512	18	581
500 or more	14	229	889	198	1,330
Total	33	290	1,754	216	2,293

Details of Findings

Chalkboards and Bulletin Boards

Table 16 (based on 2,293 replies from mathematics teachers in high schools of different sizes) shows that the number of linear feet of classroom chalkboard most commonly provided was between 30 and 69.[4]

Table 16.—Number and Percent of Public High School Mathematics Teachers Reporting Various Lengths of Classroom Chalkboard, by Size of School: 1958

Linear feet	Number and percent in schools having—								Total [5]	
	1–99 pupils [1]		100–199 pupils [2]		200–499 pupils [3]		500 or more pupils [4]			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
0–9	3	2.2	6	2.5	14	2.4	26	1.9	49	2.1
10–29	63	45.0	113	46.7	229	39.4	422	31.7	827	36.1
30–69	65	46.4	95	39.2	278	47.9	737	55.4	1,175	51.2
70–99	2	1.4	9	3.7	29	5.0	61	4.6	101	4.4
100–139	0	.0	5	2.1	8	1.4	13	1.0	26	1.1
140 or more	2	1.4	2	.8	2	.3	13	1.0	15	.6

[1] 140 teachers reporting; 5 (3.6 percent) not reporting.
[2] 242 teachers reporting; 12 (5 percent) not reporting.
[3] 581 teachers reporting; 21 (3.6 percent) not reporting.
[4] 1,330 teachers reporting; 58 (4.4 percent) not reporting.
[5] 2,293 teachers reporting; 96 (4.2 percent) not reporting.

[4] In about 51 percent of the sample.

This is the modal length for each size category except the one having 100–199 pupils. In that category, about 47 percent had from 10 to 29 linear feet.

In the complete sample, only about 6 percent of the teachers reported more than 69 linear feet of classroom chalkboard.

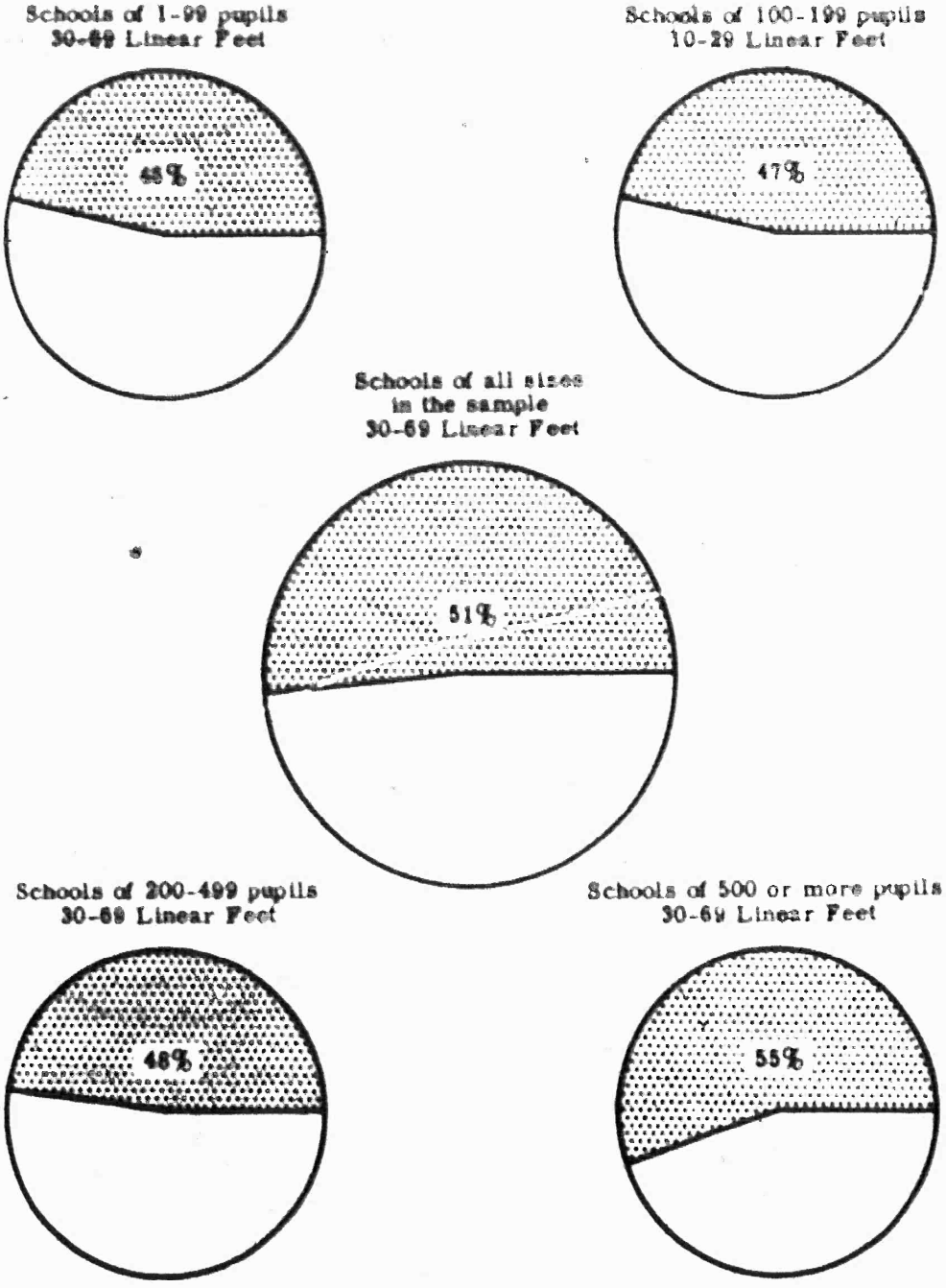

Figure 1.—**Number** of Linear Feet of Chalkboard in Public **High School Mathematics Classrooms, by Size** of School: 1968

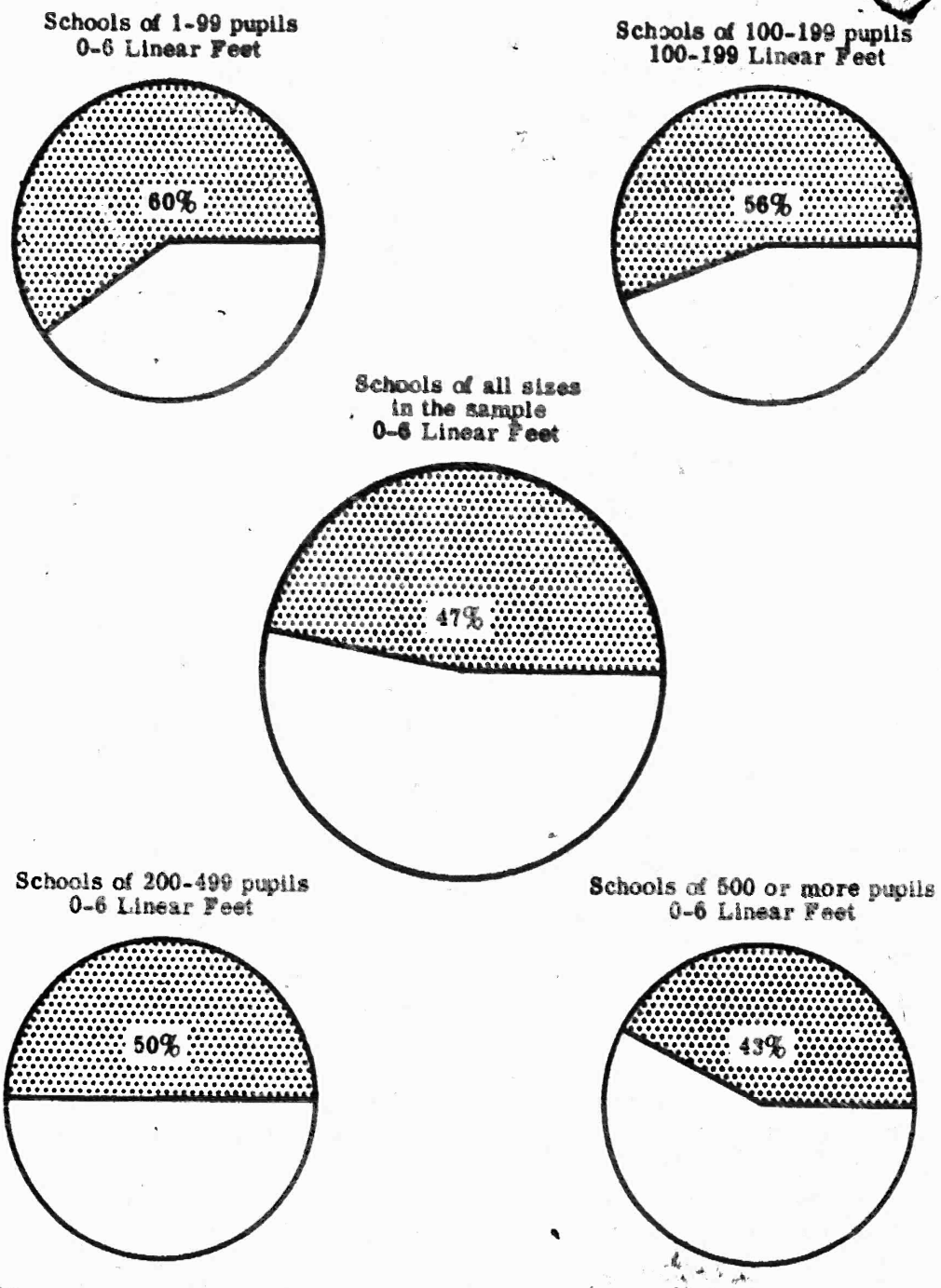

Figure 2.—Number of Linear Feet of Bulletin Board in Public High School Mathematics Classrooms, by Size of School: 1958

Table 17 (based on 2,293 replies) shows that 0–6 linear feet is the modal length of classroom bulletin board in each of the school-size categories. About 71 percent of the schools in the sample, had 0–12 linear feet and only about 11 percent had 21–50 linear feet.

Table 17.—Number and Percent of Public High School Mathematics Teachers Reporting Various Lengths of Classroom Bulletin Board, by Size of School: 1958

Linear feet	Number and percent in schools having—								Total [1]	
	1–99 pupils [1]		100–199 pupils [2]		200–499 pupils [3]		500 or more pupils [4]			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
0–6	84	60.0	135	55.8	293	50.4	567	42.6	1,079	47.1
7–12	34	24.3	62	25.6	140	24.1	308	23.2	544	23.7
13–20	11	7.9	22	9.1	63	10.9	212	15.9	308	13.4
21–36	6	4.3	12	4.9	50	8.6	137	10.3	205	8.9
37–50	3	2.1	6	2.5	13	2.2	35	2.6	57	2.5
51–70	0	.0	0	.0	7	1.2	16	1.2	23	1.0
70 or more	0	.0	0	.0	4	.7	10	.8	14	.6

[1] 140 teachers reporting; 2 (1.4 percent) not reporting.
[2] 242 teachers reporting; 5 (2.1 percent) not reporting.
[3] 581 teachers reporting; 11 (1.9 percent) not reporting.
[4] 1,330 teachers reporting; 45 (3.4 percent) not reporting.
[5] 2,293 teachers reporting; 63 (2.8 percent) not reporting.

In schools enrolling 500 or more pupils, more linear feet of mathematics classroom bulletin board were available than indicated by the modal length (0–6 linear feet). In fact, only slightly under 50 percent of all the schools in the 500-or-more category reported from 7 to 36 linear feet.

Improvised Equipment

Table 18 shows that out of a total sample of 2,293 mathematics teachers (in schools of all sizes) 74 (about 3 percent) made no reply; 195 (about 9 percent) used improvised equipment frequently; 1,161 (about 51 percent), occasionally; and 863 (about 38 percent) never.

The data show these general trends:

1. As the size of the school increases, the percent of mathematics teachers who use improvised equipment decreases. Thus, it appears that frequency of use of improvised equipment is inversely related to the number of pupils in a school.
2. With the exception of teachers in schools having 200–499 pupils, the inverse relationship holds for those who reported occasional use of improvised equipment.
3. The percent of mathematics teachers who never used improvised equipment increased directly with the increase in size of school.
4. For schools of all sizes in the sample, approximately 1 out of 12 (about 8 percent) of the mathematics teachers used improvised equipment frequently; approximately 1 out of 2 (about 50 percent), occasionally; and approximately 2 out of 5 (about 40 percent), never.

Table 18.—Number and Percent of Public High School Mathematics Teachers Reporting Certain Degrees of Frequency in Their Use of Improvised Equipment, by Size of School: 1968

Use	Number and percent in schools having—								Total [1]	
	1–99 pupils [1]		100–199 pupils [2]		200–499 pupils [3]		500 or more pupils [4]			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Frequent	18	12.9	30	12.4	51	8.8	96	7.2	195	8.5
Occasional	81	57.9	125	51.7	303	52.2	652	49.0	1,161	50.6
Never	36	25.7	76	31.4	207	35.6	544	40.9	863	37.6

[1] 140 teachers reporting; 5 (3.6 percent) not reporting.
[2] 242 teachers reporting; 11 (4.5 percent) not reporting.
[3] 581 teachers reporting; 20 (3.4 percent) not reporting.
[4] 1,330 teachers reporting; 38 (2.9 percent) not reporting.
[5] 2,293 teachers reporting; 74 (3.2 percent) not reporting.

Table 19 and figure 3 show that about the same percent (approximately 8 to 11) of mathematics teachers in the various types and sizes of high schools used improvised equipment frequently.

Table 19.—Number and Percent of Public High School Mathematics Teachers Reporting Certain Degrees of Frequency in Their Use of Improvised Equipment, by Type of School: 1968

	Number and percent in high schools classified as—								Total [1]	
	Junior [1]		Junior-senior or regular [2]		Senior [3]		Incomplete [4]			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Frequent	23	7.9	146	8.3	23	10.6	3	9.1	195	8.5
Occasional	150	51.7	894	51.0	98	45.4	19	57.6	1,161	50.6
Never	107	36.9	653	37.2	92	42.6	11	33.3	863	37.6

[1] 290 teachers reporting; 10 (3.5 percent) not reporting.
[2] 1,754 teachers reporting; 61 (3.5 percent) not reporting.
[3] 216 teachers reporting; 3 (1.4 percent) not reporting.
[4] 33 teachers reporting.
[5] 2,293 teachers reporting; 74 (3.2 percent) not reporting.

In the senior high schools about 45 percent of the mathematics teachers; in the junior, junior-senior, and regular 4-year high schools slightly more than 50 percent; and in the incomplete high schools, about 58 percent used improvised equipment occasionally.

Forty-three percent (the highest) of the mathematics teachers who reported that they never used improvised equipment were those teaching in senior high schools. About 37 percent in the junior,

junior-senior, and regular 4-year high schools, and about 33 percent in the incomplete high schools reported they never used improvised equipment.

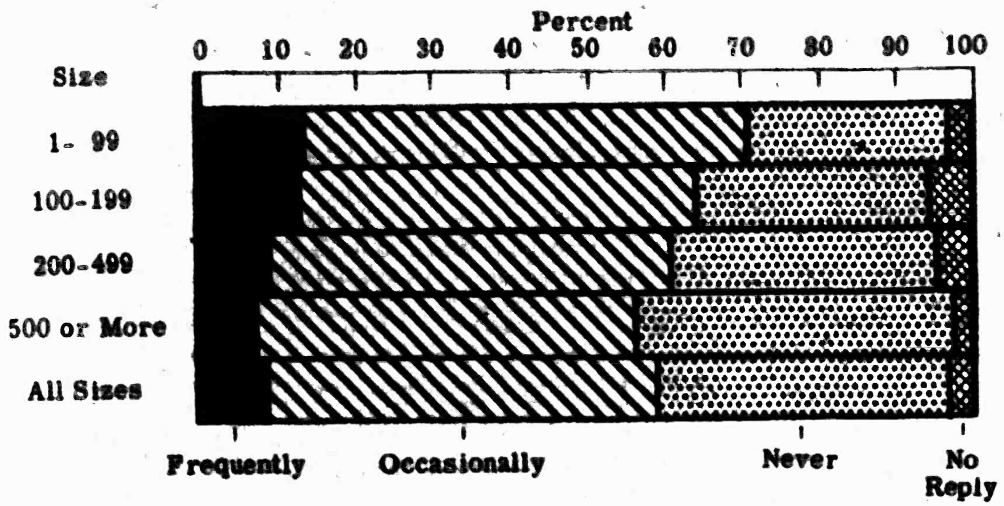

Figure 3.—Use of Improvised Equipment by Public High School Mathematics Teachers, by Size of School: 1958

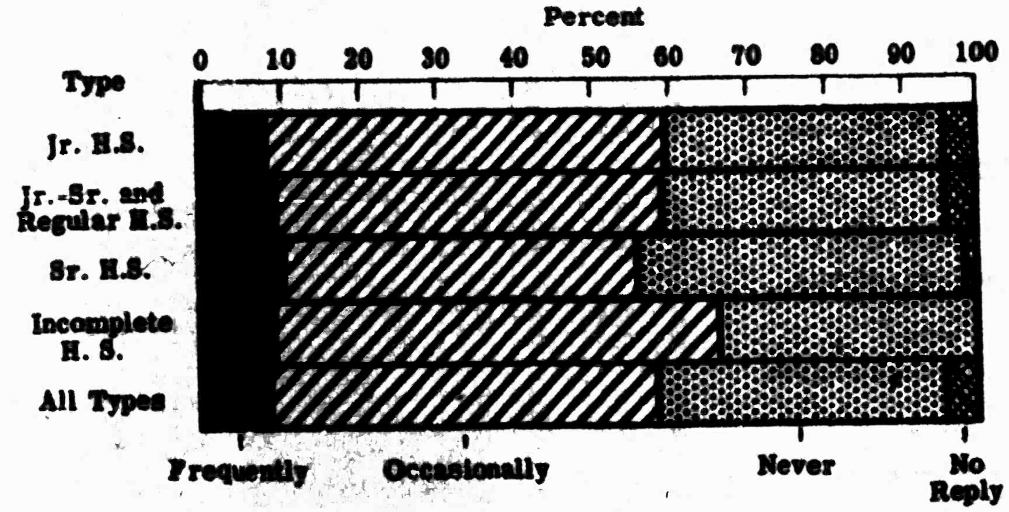

Figure 4.—Use of Improvised Equipment by Public High School Mathematics Teachers, by Type of School: 1958

From the total sample of 2,293 mathematics teachers, the numbers who reported using improvised equipment, frequently, occasionally, and never, are respectively: 195 (8.5 percent); 1,161 (50 percent); and 863 (37.6 percent).

Classroom Chairs, Desks, and Tables

Table 20 shows replies from about two-thirds of the mathematics teachers in the sample. Caution should be used in generalizing on any item in the table when it reveals that a large percentage of the teachers sampled did not reply.

Table 20.—Number and Percent of Public High School Mathematics Teachers Preferring Certain Types of Classroom Chairs, Desks, and Tables, by Size of School: 1958

Article	Number and percent in schools having—								Total [1]	
	1–99 pupils [1]		100–199 pupils [2]		200–499 pupils [3]		500 or more pupils [4]			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Movable armchairs:										
Yes	63	45.0	97	40.1	215	37.0	394	29.6	769	33.5
No	31	22.1	76	31.4	179	30.8	442	33.2	728	31.8
Unstated	46	32.9	69	28.5	187	32.2	494	37.2	796	34.7
Stationary armchairs:										
Yes	17	12.1	51	21.1	93	16.0	233	17.5	394	17.2
No	61	43.6	85	35.5	235	40.5	513	38.6	895	39.0
Unstated	62	44.3	105	43.4	253	43.5	584	43.9	1,004	43.8
Movable desks:										
Yes	45	32.1	76	31.4	182	31.3	417	31.3	720	31.4
No	39	27.9	86	35.5	188	32.4	412	31.0	725	31.6
Unstated	56	40.0	80	33.1	211	36.3	501	37.7	848	37.0
Stationary tables and movable chairs:										
Yes	24	17.1	35	14.5	79	13.6	150	16.0	288	12.6
No	46	32.9	98	40.5	227	39.1	544	40.5	915	39.9
Unstated	70	50.0	109	45.0	275	47.3	626	43.5	1,090	47.5
Movable tables and chairs:										
Yes	34	24.3	58	24.0	111	19.1	240	18.1	443	19.3
No	40	28.6	84	34.7	219	37.7	479	35.0	822	35.9
Unstated	66	47.1	100	41.3	251	43.2	611	45.9	1,028	44.8
Combination of previous items:										
Yes	17	12.1	51	21.1	93	16.0	233	17.5	394	17.2
No	61	43.6	85	35.5	235	40.5	513	38.6	895	39.0
Unstated	62	44.3	105	43.4	253	43.5	584	43.9	1,004	43.8
None of previous items:										
Yes	45	32.1	76	31.4	182	31.3	417	31.3	720	31.4
No	39	27.9	86	35.5	188	32.4	412	31.0	725	31.6
Unstated	56	40.0	80	33.1	211	36.3	501	37.7	848	37.0

[1] 140 teachers reporting.
[2] 242 teachers reporting.
[3] 581 teachers reporting.
[4] 1,330 teachers reporting.
[5] 2,293 teachers reporting.

The mathematics teachers, according to table 20, were about equally divided (33.5 percent *for;* 31.8 percent *against*) in their preference for movable armchairs. Stationary armchairs were not particularly popular: the preference was about 2 to 1 against them

(39.0 percent *against;* 17.2 percent *for*). Movable desks were preferred and not preferred by about the same percent: 31.4 percent *for;* 31.6 percent *against*. Stationary tables and movable chairs were not preferred by these mathematics teachers, who reported about 3 to 1 against their use: 39.9 percent *against;* 12.6 percent *for*. Movable tables and chairs, too, were not popular with these teachers. They reported about 2 to 1 against their use: 35.9 percent, *against;* 19.3 percent *for*. They were slightly more than 2 to 1 against combinations of the various types named above: 39.0 percent *against;* 17.2 percent *for*. Their replies to the item "none of these types" were about equally divided: 31.4 percent *yes;* 31.6 percent *no*.

In general, the mathematics teachers did not express strong endorsement of any one type of general classroom furniture. They were about equally divided in their reactions to movable armchairs, and movable desks; but strongly against stationary armchairs, stationary tables and movable chairs, movable tables and chairs, and combinations of these conventional types.

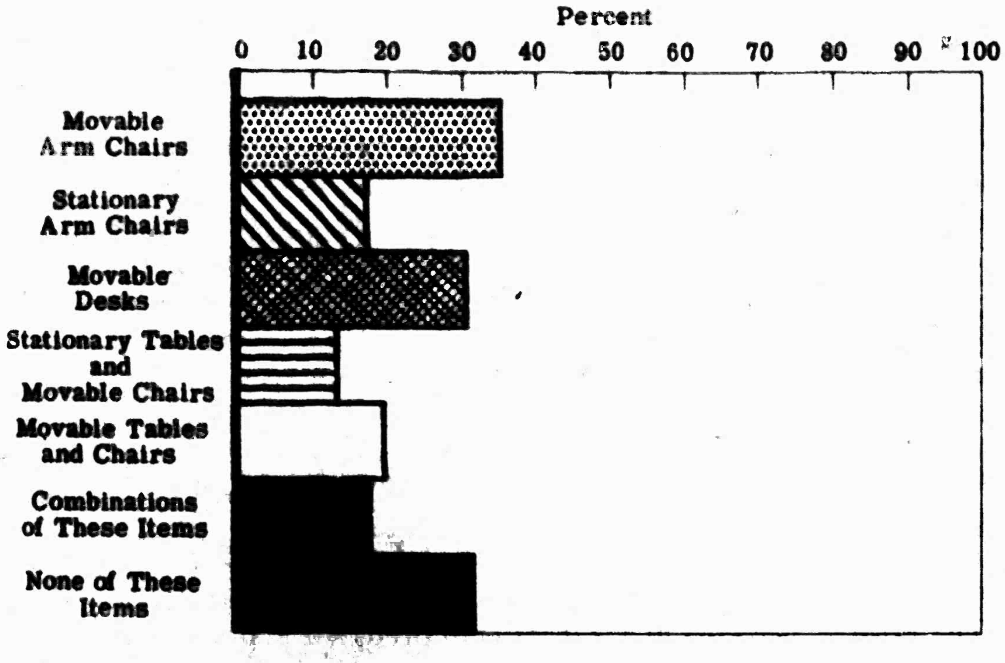

Figure 5.—Preferences of Public High School Mathematics Teachers for Student Chairs, Desks, and Tables, by Size of School: 1958

Table 21 indicates, by type of school, the preferences of mathematics teachers for classroom chairs, desks, and tables.

In general, the data indicate that movable armchairs were preferred by 34 percent and not preferred by 32 percent. These percents do not vary appreciably for teachers in junior, junior-senior, regular 4-year, or senior high schools. It should again be noted that of the 2,293

Table 21.—Number and Percent of Public High School Mathematics Teachers Preferring Certain Types of Classroom Chairs, Desks, and Tables, by Type of School: 1958

Article	Number and percent in high schools classified as—								Total [6]	
	Junior [1]		Junior-senior or regular [2]		Senior [3]		Incomplete [4]			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
Movable armchairs:										
Yes	65	23.3	599	34.1	69	31.9	16	48.5	769	33.5
No	81	27.9	570	32.5	69	31.9	8	24.2	728	31.8
Unstated	124	42.8	585	33.4	78	36.2	9	27.3	796	34.7
Stationary armchairs:										
Yes	50	17.2	307	17.5	33	15.3	4	12.1	394	17.2
No	91	31.4	703	40.1	86	39.8	15	45.5	895	39.0
Unstated	149	51.4	744	42.4	97	44.9	14	42.4	1,004	43.8
Movable desks:										
Yes	101	34.8	543	30.9	63	29.2	13	39.4	720	31.4
No	72	24.8	582	33.2	63	29.2	8	24.2	725	31.6
Unstated	117	40.4	629	35.9	90	41.6	12	36.4	848	37.0
Movable charts and stationary tables:										
Yes	25	8.6	237	13.5	21	9.7	5	15.1	288	12.6
No	102	35.2	712	40.6	89	40.9	13	39.4	915	39.9
Unstated	163	56.2	805	45.9	107	49.5	15	45.5	1,090	47.5
Movable tables and chairs:										
Yes	44	15.2	347	19.8	42	19.4	10	30.3	443	19.3
No	89	30.7	649	37.0	73	33.8	11	33.3	822	35.9
Unstated	157	54.1	758	43.2	101	46.8	12	36.4	1,028	44.8
Combination of the above:										
Yes	24	8.3	174	9.9	19	8.8	2	6.1	219	9.5
No	91	31.4	652	37.2	73	33.8	14	42.4	830	36.2
Unstated	175	60.3	928	52.9	124	57.4	17	51.5	1,244	54.3

[1] 290 teachers reporting.
[2] 1,754 teachers reporting.
[3] 216 teachers reporting.
[4] 33 teachers reporting.
[5] 2,293 teachers reporting.

teachers in the sample, only about two-thirds responded with usable data.

Stationary armchairs were preferred by only 17.2 percent of the teachers, and found undesirable by 39 percent (more than double). The ratio of percents of teachers who preferred stationary armchairs to those who did not was slightly greater in the junior high school than in the senior, junior-senior, or regular 4-year high school.

Taken as a whole, the 31.4 percent of mathematics teachers in the sample who preferred movable classroom desks was approximately the same as for those who did not prefer them (31.6 percent). In the junior high school about 10 percent more teachers preferred movable desks than those who preferred other types. From the group of

junior-senior and regular 4-year high schools (the largest group in the sample) about 31 percent of the mathematics teachers favored movable desks, and about 33 percent did not. In the senior high school category about 29 percent favored movable desks, and the same percent did not favor them.

By a 3-to-1 ratio the mathematics teachers disfavored stationary tables and movable chairs. About 35 percent in the junior high schools did not prefer stationary tables and movable chairs, and about 9 percent did. In combined junior-senior high schools and the regular 4-year high schools, about 14 percent preferred this type of equipment, while about 41 percent did not. About 46 percent did not indicate a preference. In the senior high schools, about 10 percent found this type of equipment desirable, and about 41 percent did not. About 15 percent in the incomplete high schools favored stationary tables and movable chairs, while slightly more than 39 percent did not. For the entire groups, it was about one out of three who favored them.

The junior high school mathematics teachers who preferred movable tables and chairs were only half the number of those who did not prefer them; 15 percent of the former and 31 percent of the latter. Among these teachers in junior-senior and regular 4-year high schools, about 20 percent favored this type of furniture, and 37 percent did not. About 19 percent in the senior high schools favored it, and 34 percent did not. Considering the total picture, slightly more than half (19 percent) as many mathematics teachers favored movable tables and chairs as those who did not (36 percent).

In some schools, combinations of the various types of furniture discussed above were preferred. About 36 percent of the mathematics teachers answering the questionnaire did not favor combinations. The ratio of the percent of teachers who preferred combinations to those who did not was 9.5 to 36, or slightly more than 1 to 4.

Perhaps it is safe to assume that variance in teachers' preferences for one or another type of classroom chairs, desks, and tables may be due, at least in part, to particular teaching procedures and to pupil grade level. For example, where flexible and informal teaching procedures are followed, movable furniture may be most suitable. On the other hand, where teachers find that the noise caused by younger pupils in moving desks, tables, or armchairs is a source of irritation, or a disruptive influence, leading to avoidable problems of discipline, then stationary furniture or combinations of movable and stationary desks, armchairs, and tables may be more satisfactory.

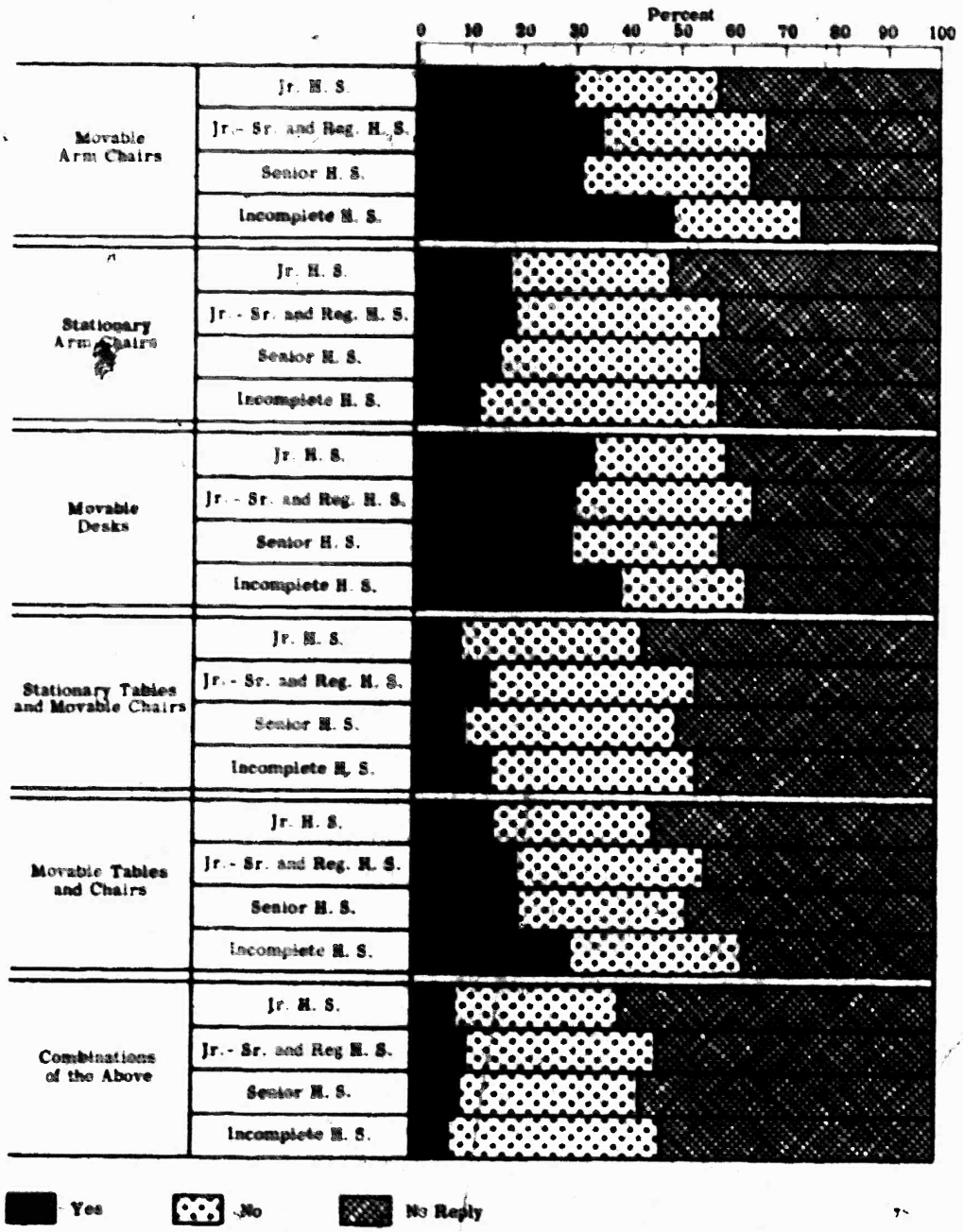

Figure 6.—Preferences of Public High School Mathematics Teachers for Student Chairs, Desks, and Tables, by Type of School: 1958

Equipment, Materials, and Teaching Aids

Mathematics teachers were asked to check, from a list (see table 22), three items which were or would be of most value to them. The number and percent of responses for each item are shown in order of frequency of selection.

Table 23.—Equipment, Materials, and Teaching Aids Selected by Public School Mathematics Teachers as One of Three Items Most Valuable to Them, in Order of Frequency of Selection: 1958

Item [1]	Number of times selected [2]	Percent of total selections
Mathematics models	1,151	16.7
Standardized tests	951	13.8
Assistance in checking homework	843	12.3
Supplementary books	827	12.0
Graph boards	663	9.6
Workbooks	555	8.1
Filmstrips	249	3.6
Worktables	238	3.5
Storage room	221	3.2
Small adjacent laboratory	160	2.3
Bookcases	156	2.3
Provision for darkening room	84	1.2
Movie projector	51	.8
Water available in room	37	.5

[1] Other items were selected a total of 167 times.
[2] 526 teachers (7.7 percent of the total number in the study) did not make any selections.

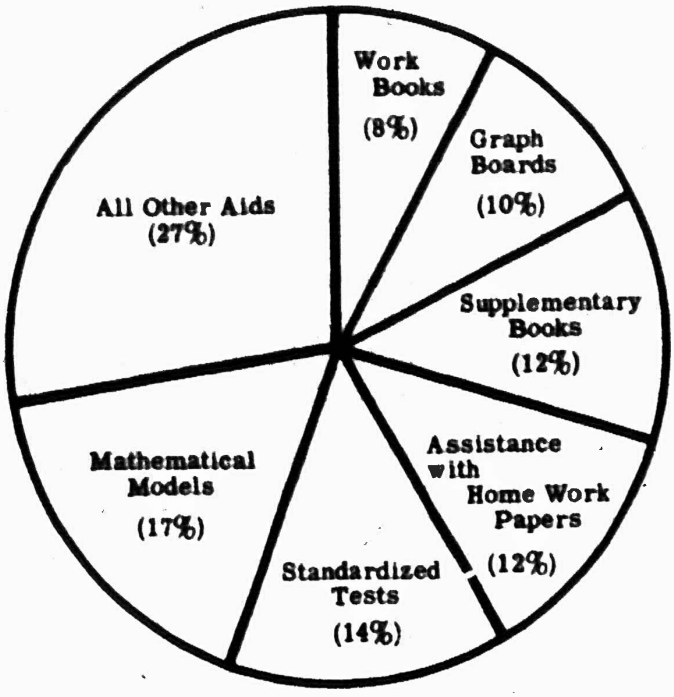

Figure 7.—Percentages of Public High School Mathematics Teachers Selecting Certain Teaching Aids As Most Valuable to Them: 1958

At this point, some questions might well be posed as to the reasons which may have prompted the mathematics teachers to make their three choices. For example:

1. Is there a tendency toward a greater use of visual aids, instruments, gadgets, models, and the like in order to motivate and encourage pupils to discover relationships for themselves and seek the general principles? Or is there a tendency to use models and other visual aids in order to make

teaching more meaningful to many pupils who may or may not be able to work with symbolic abstractions alone?

2. Is there a tendency toward a greater acceptance of responsibility for measuring the outcomes of individual and group learning, and comparing the results with national norms—then using the results to improve instruction and attain higher pupil achievement?
3. Are the requests for assistance in checking homework and attending to the myriad of clerical duties involved in teaching becoming more vocal?
4. Are mathematics teachers becoming more interested than previously in acquiring and using supplementary textbooks and library reference materials to improve instruction and learning?

The evidence on these points is by no means conclusive. More specific evidence is required before positive statements can be made concerning possible trends.

Problem Areas

The mathematics teachers were asked to select 5 out of 15 problem areas listed in the questionnaire and rank them in order of greatest to least concern by the use of the numbers 1, 2, 3, 4, and 5, respectively. Only 2 of the 15 problem areas dealt with facilities; neither of them was ranked among the first five choices. Hence, these two problem areas do not appear to be especially important ones to mathematics teachers.

Table 23 shows that about 96 percent of the mathematics teachers ranked "Getting Improved Library Facilities" lower than position No. 5 among the problem areas listed in the questionnaire.

Table 23.—Number and Percent of Public High School Mathematics Teachers Giving Certain Rank Numbers to the Problem Area, "Getting Improved Library Facilities," in Relation to the Five Problem Areas of Greatest Concern to Them, by Size of School: 1958

Rank number of problem area [1]	Number and percent in schools having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
1	1	0.7	1	0.4	2	0.3	1	0.1	5	0.2
2	3	2.2	6	2.5	2	.3	7	.5	18	.8
3	0	0	5	2.1	6	1.0	14	1.1	25	1.1
4	6	4.3	3	1.2	8	1.4	8	.6	25	1.1
5	3	2.1	4	1.7	12	2.1	7	.5	26	1.1
Item not ranked among first five	127	90.7	223	92.1	561	94.9	1,283	97.2	2,194	95.7
Total	140	100.0	242	100.0	591	100.0	1,320	100.0	2,293	100.0

[1] In descending order of importance.

However, since 2,194 of the teachers out of a total of the 2,293 included in the sample did not rate this item in one of the upper five positions, several pertinent questions arise:

1. Does it follow from the data at hand (see table 23) that public high school mathematics teachers generally do not make extensive use of library facilities, assuming that such facilities exist?
2. What is implied by the fact that only 4 percent of the mathematics teachers rated this item in one of the first five places? Does it simply mean that to them improved library facilities is not one of the five items of greatest concern? If so, then the question arises: "Why did 12 percent of these same teachers check 'Supplemental Books' as one of their most valuable items of equipment?" Is there an implied distinction between supplementary books stored and/or used in the classroom, and books stored and/or used in the library? Actually, there is a dearth of good library books and pamphlets suitable for the maturity, interest, and reading levels of high school mathematics pupils. Here, then, is a fine opportunity for many cooperative writing projects between the mathematics and the English, history, science, art, and other departments of the public high schools.

Table 24 shows that 1,923 (83.9 percent) of the mathematics teachers, from the total sample of 2,293, did not rank "Obtaining and Using Visual Aids" in any of the upper five positions. Hence, it is probably safe to conclude that the mathematics teachers who responded to the questionnaire did not consider the problem an important one for them.

Table 24.—Number and Percent of Public High School Mathematics Teachers Giving Certain Rank Numbers to the Problem Area, "Obtaining and Using Visual Aids," in Relation to the Five Problem Areas of Greatest Concern to Them, by Size of School: 1958

Rank number of problem area [1]	Number and percent in schools having—								Total	
	1–99 pupils		100–199 pupils		200–499 pupils		500 or more pupils			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	2	3	4	5	6	7	8	9	10	11
1	3	2.1	2	0.8	5	0.9	8	0.6	18	0.8
2	3	2.1	2	.8	7	1.2	18	1.4	30	1.3
3	8	5.7	15	6.2	17	2.9	43	3.2	83	3.6
4	6	4.3	15	6.2	34	5.9	60	4.5	115	5.0
5	5	3.6	11	4.6	42	7.2	65	4.9	123	5.4
Item not ranked among first five	115	82.2	195	81.0	476	81.9	1,136	85.4	1,923	83.9
Total	140	100.0	242	100.0	581	100.0	1,330	100.0	2,293	100.0

[1] In descending order of importance.

In the following figure, circle graphs are used to show the ranks and percents according to school size.

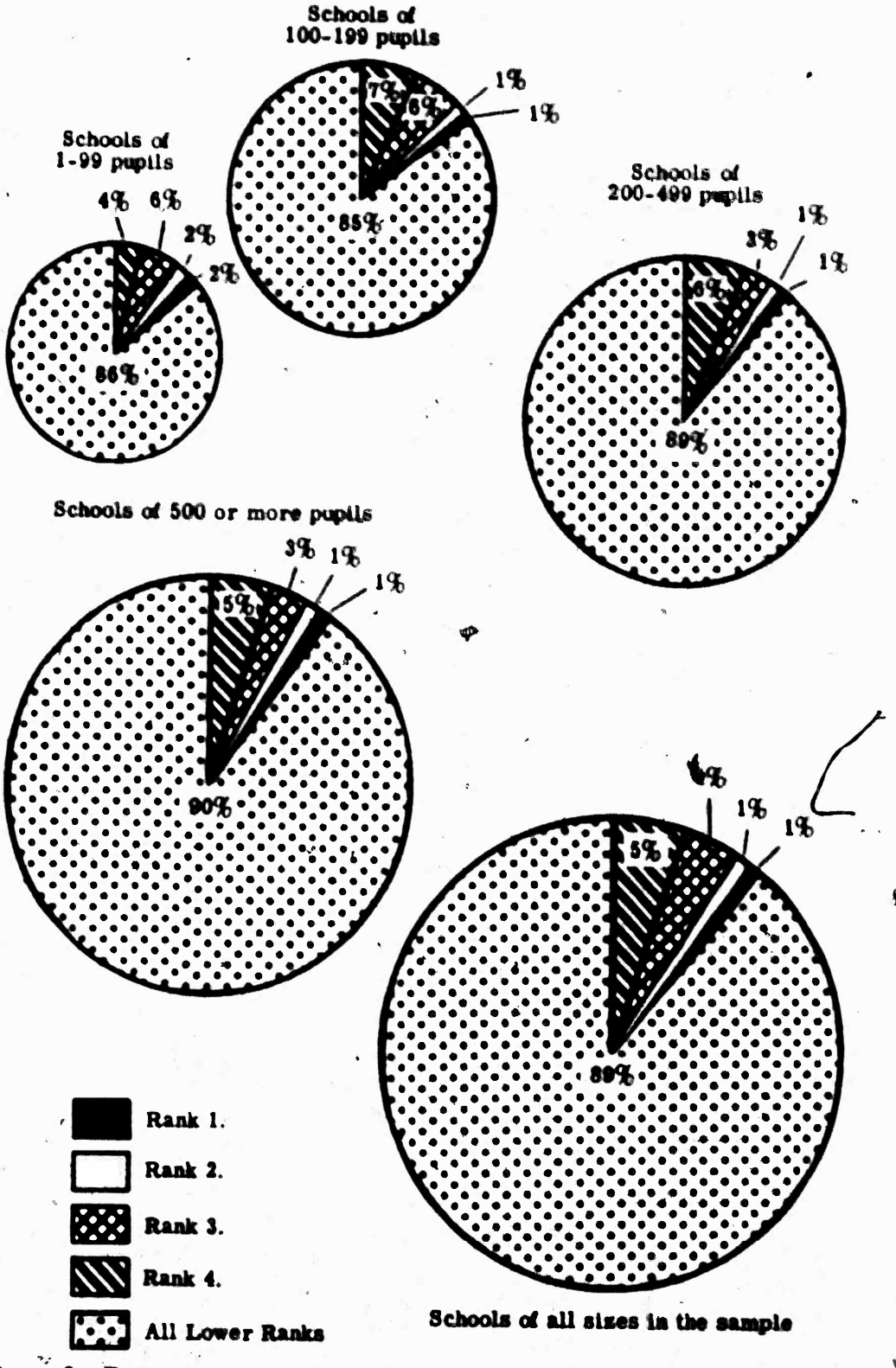

Figure 8.—Percentages of Public High School Mathematics Teachers Ascribing Certain Ranks to the Problem of Obtaining and Using Visual Aids, by Size of School: 1968

Summary of Findings

Following is a brief recapitulation of the findings from the questionnaire sent to mathematics teachers in public high schools:

1. The number of public high school mathematics teachers participating in this study was 2,293. (See table 15.)
2. The modal length of chalkboard in the mathematics classroom, for all sizes of schools, was between 30 and 69 linear feet. (See table 16 and figure 1.)
3. The modal length of bulletin board in the mathematics classroom, for all sizes of schools, was between 0 and 6 linear feet. (See table 17 and figure 2.)
4. The mathematics teachers used improvised equipment to the following extent: occasionally (about 51 percent); never (about 38 percent); frequently (about 9 percent).

   About 3 percent of the teachers did not reply to the item.
5. The percent who used improvised equipment and the percent who used it occasionally both decreased as the size of the school increased. (See table 18 and figure 3.)
6. Improvised equipment was used occasionally by approximately the same percent of the mathematics teachers in junior, junior-senior, and regular 4-year high schools, and by a slightly smaller percent in the senior high schools. It was used frequently by about 50 percent in the incomplete high schools. The mathematics teachers in the senior high schools used improvised equipment most frequently (about 11 percent), and those in the junior high schools least frequently (about 8 percent).

   The percent who never used improvised equipment was largest (about 43 percent) in the senior, and least (about 33 percent) in the incomplete high school group. (See table 19 and figure 4.)
7. Taking schools of all sizes together, the study shows that the mathematics teachers preferred movable armchairs over all other types of furniture for classroom seating. (See table 20 and figure 5.)
8. From a list of 14 items of equipment, materials, and teaching aids, the teachers rated the following six as most valuable: mathematical models, standardized tests, assistance in checking homework, supplementary books, graph boards, workbooks. (See table 22 and figure 7.)
9. The problem of "getting improved library facilities" for mathematics teaching was ranked lower than No. 5 by about 96 percent of all the teachers in the sample. (See table 23.)
10. The problem of "obtaining and using visual aids" for mathematics teaching was ranked lower than No. 5 by approximately 84 percent of the teachers in the sample.

The evidence fails to indicate that public high school mathematics teachers are not interested in using visual aids. It may mean, for example, that the problem of obtaining visual aids and devising techniques for using them effectively is no longer as serious as it may have been some years ago. (See table 24 and figure 8.)

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Appendix

_____ (1) _____ (2) _____ (3) _____ (4) _____ (5)
Do not write in the spaces above

Budget Bureau No. 51-R748
Approval Expires May 31, 1960

NSS-SEC-9-S

Questionnaire
on
Science Education in Public High Schools

*(To be filled in by **each** person **who teaches** one or more **classes** in science in **grades 9-12**)*

1. NAME OF SCHOOL: _____

CITY or COUNTY: _____ STATE: _____

In attempting to improve instruction in mathematics and science, national organizations and committees have been handicapped by a lack of basic information on a national level. How much time is being devoted to certain topics in mathematics and science? How heavy is the teaching load of science and mathematics teachers? How are they getting along financially? Will the age of teachers in these areas result in many vacancies in the near future? Some of these data are personal but essential for planning on a State or national level. The information from this questionnaire will be confidential--only the composite information of the entire survey will be made public. Please return it promptly. Only a sample of teachers is being used in this study; your response is important in making the sample representative.

2. PERSONAL DATA: (Please Check)

A. 1 ☐ Male 2 ☐ Female

B. 1 ☐ Married 2 ☐ Single

C. 1 ☐ White 2 ☐ Non-White

D. Age 1 ☐ Under 25 2 ☐ 25-34
3 ☐ 35-44 4 ☐ 45-54
5 ☐ 55 or over

E. **Dependents** (Use number reported for Federal income tax **purposes** last year)

0 ☐ None 3 ☐ Three
1 ☐ One 4 ☐ Four
2 ☐ Two 5 ☐ Five or more

F. **Total years of teaching experience** (any subject, any grade, count this year)

1 ☐ One 4 ☐ 10-15
2 ☐ 2-3 5 ☐ 16-25
3 ☐ 4-9 6 ☐ 26 or more

G. Total years of experience teaching high school **science** (grades 9-12, count this year)

1 ☐ One 4 ☐ 10-15
2 ☐ 2-3 5 ☐ 16-25
3 ☐ 4-9 6 ☐ 26 or more

H. Years of Continuous Teaching.
Some teachers have had their teaching experience interrupted by other employment, illness, or for other reasons. Please check the total years of latest continuous (uninterrupted) teaching experience. (Count this year)

1 ☐ One 4 ☐ 10-15
2 ☐ 2-3 5 ☐ 16-25
3 ☐ 4-9 6 ☐ 26 or more

3. INCOME

A. **Indicate** to the nearest dollar the gross annual **salary you expect to receive for this school year from your regular school position.** $ _____

B. The above salary **represents** work for **the following number of months:**

1 ☐ 7 or less 3 ☐ 9 5 ☐ 11
2 ☐ 8 4 ☐ 10 6 ☐ 12

C. **Additional Earned Income.** How much income from **salaries, wages, commissions, or fees--in addition to your regular school salary--will you receive during the 1957-58 school year from each of the following sources? Make estimates if necessary. Write in the amount even though it is zero.**

1. From a second school job such as, night school or summer school $ _____

2. From a **non-teaching job:** $ _____

D. Did you teach in this school system last year?

1 ☐ Yes 2 ☐ No

If the answer is "Yes" indicate the increase in salary you received this year.

1 ☐ None 3 ☐ $100-299

2 ☐ Less than $100 4 ☐ $300 or more

E. Check the principle used in determining salary increase in your school.

1 ☐ Merit basis only

2 ☐ Periodic increment only

3 ☐ Combination of merit and periodic increment

4 ☐ Irregular cost of living increases

5 ☐ Other (specify) _____

4. OTHER EMPLOYMENT

A. Indicate the number of years you were gainfully employed full-time in occupations other than teaching. (Do not include military service unless you intend making it your career)

1 ☐ 0-1 2 ☐ 2-3 3 ☐ 4-5

4 ☐ 6-10 5 ☐ 11-15 6 ☐ or more

B. Indicate whether you took part in the following activities this past summer (1957)

Yes	No	
1 ☐	2 ☐	Study in a college or university
1 ☐	2 ☐	Professional reading
1 ☐	2 ☐	Professional writing (text books or magazine articles)
1 ☐	2 ☐	Preparation of instructional materials for your science classes
1 ☐	2 ☐	Attendance at an institute or workshop sponsored by the National Science Foundation or by industry
1 ☐	2 ☐	Teaching of science and/or mathematics
1 ☐	2 ☐	Teaching but not science and/or mathematics
1 ☐	2 ☐	Employment (not teaching) where science and mathematics skills were frequently used.
1 ☐	2 ☐	Employment (not teaching) where science and mathematics skills were not frequently used
1 ☐	2 ☐	Worked on a revision of your State or local curriculum in science or mathematics

5. ACADEMIC PREPARATION

A. Please check in the first column the one field in which you have the greatest number of undergraduate college semester hours; in the second column the field which ranks second in number of undergraduate semester hours; repeat this procedure in columns three and four for graduate semester hours.

Field	Undergraduate 1 Major	Undergraduate 2 Minor	Graduate 3 Major	Graduate 4 Minor
Education	1 ☐	1 ☐	1 ☐	1 ☐
Science	2 ☐	2 ☐	2 ☐	2 ☐
Mathematics	3 ☐	3 ☐	3 ☐	3 ☐
Physical Education	4 ☐	4 ☐	4 ☐	4 ☐
Social Studies	5 ☐	5 ☐	5 ☐	5 ☐
English	6 ☐	6 ☐	6 ☐	6 ☐
Other (specify) _____	7 ☐	7 ☐	7 ☐	7 ☐

B. How many college semester hours have you taken in mathematics

_____ 1. below or prerequisite to the calculus?

_____ 2. the calculus and above? (Include graduate courses)

C. Estimate your approximate average grade for each undergraduate subject. (Check one)

	Approximate Average Grade A-	B+	B	B-	C	D
Science	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Mathematics	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Education	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

D. Indicate by a check degree received and date.

Date	Bachelor's	Master's	Doctor's
Before 1925	1 ☐	1 ☐	1 ☐
1925-34	2 ☐	2 ☐	2 ☐
1935-44	3 ☐	3 ☐	3 ☐
1945-49	4 ☐	4 ☐	4 ☐
1950-54	5 ☐	5 ☐	5 ☐
Since 1954	6 ☐	6 ☐	6 ☐
Not received	7 ☐	7 ☐	7 ☐

E. Indicate the type of institution from which you received the Bachelor's degree and the Master's degree.

Bachelor's degree	Master's degree	Institution
1 ☐	1 ☐	Teachers college
2 ☐	2 ☐	College (or School) of Education in university
3 ☐	3 ☐	Other college (or School) in university
4 ☐	4 ☐	Liberal arts college
5 ☐	5 ☐	None of the above

6. WORKLOAD

A. Please check the number of class periods you devote each day to the following areas.

Areas	Number of class periods: None	One	Two	Three	Four	Five or more
Mathematics	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Science	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Social Studies	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
English	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Physical Education --Athletics	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Guidance	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Study Hall	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Committee Work	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Administration	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

B. Please indicate by a check whether you sponsor the following activities this year.

Yes	No	Activity
1 ☐	2 ☐	Mathematics contests
1 ☐	2 ☐	Science contests
1 ☐	2 ☐	Athletic contests
1 ☐	2 ☐	School assemblies
1 ☐	2 ☐	Mathematics or science club
1 ☐	2 ☐	Supervision of school grounds
1 ☐	2 ☐	Field trips
1 ☐	2 ☐	Student council
1 ☐	2 ☐	School paper
1 ☐	2 ☐	Student book store or concession
1 ☐	2 ☐	Lunch room
1 ☐	2 ☐	Other (specify) _____

C. Indicate the approximate number of hours each week you devote to extra curricular duties.

0 ☐ None 2 ☐ 2-3

1 ☐ One 3 ☐ 4 or more

D. Indicate whether you have had the following type of assistance in teaching this year.

Yes	No	Assistance
1 ☐	2 ☐	Student Teacher
1 ☐	2 ☐	Paid Pupil Assistant
1 ☐	2 ☐	Non-certified Adult
1 ☐	2 ☐	None
1 ☐	2 ☐	Other (specify)_____

7. FACILITIES AND EQUIPMENT

A. On the line to the left of each science course listed below which you teach, write in the one number which best indicated the type of facility available for the course

Types of Facilities

1. Combination classroom and laboratory with facilities for a single science
2. Combination classroom and laboratory with facilities for two sciences (e.g.) General Science and Biology)
3. Combination classroom and laboratory with facilities for all sciences (multi-purpose room)
4. Separate recitation room and laboratory
5. Few special facilities for teaching science in classroom
6. Room primarily equipped for non-science courses

_____ (a) General Science

_____ (b) Biology

_____ (c) Chemistry

_____ (d) Physics

_____ (e) Advanced General Science

B. Facilities Available

Indicate by checking if the following facilities are available for instruction in most of your classes.

Yes	No	Facility
1 ☐	2 ☐	Water available
1 ☐	2 ☐	Gas outlets
1 ☐	2 ☐	Electrical outlets
1 ☐	2 ☐	Fume hoods
1 ☐	2 ☐	Facilities are old and in need of replacement
1 ☐	2 ☐	Facilities are inadequate in size
1 ☐	2 ☐	Demonstration tables
1 ☐	2 ☐	Equipment storage cases
1 ☐	2 ☐	Exhibit cases
1 ☐	2 ☐	Library of text books in the room
1 ☐	2 ☐	Rooms can be darkened for slide and movie projection
1 ☐	2 ☐	Rooms are fitted for television reception
1 ☐	2 ☐	Rooms have classroom libraries and reading tables
1 ☐	2 ☐	Rooms have bulletin boards
1 ☐	2 ☐	Rooms have chalkboards
1 ☐	2 ☐	Rooms have wall and window tables
1 ☐	2 ☐	Animal room
1 ☐	2 ☐	Greenhouse (separate)
1 ☐	2 ☐	Plant growing room
1 ☐	2 ☐	Nature trail
1 ☐	2 ☐	Preparation room
1 ☐	2 ☐	Garden plot
1 ☐	2 ☐	Reforestation area
1 ☐	2 ☐	Project room (separate)
1 ☐	2 ☐	Project areas for individuals
1 ☐	2 ☐	School camp
1 ☐	2 ☐	Radio room or shack
1 ☐	2 ☐	Science museum
1 ☐	2 ☐	School farm
1 ☐	2 ☐	Weather station

Yes	No	Facility
1 ☐	2 ☐	Dark room for photography
1 ☐	2 ☐	Demonstration table on wheels
1 ☐	2 ☐	Other (specify)

C. Adequacy of science equipment

Indicate the adequacy and condition of the equipment available for science teaching in your school by checking the appropriate boxes.

Yes	No	Equipment
1 ☐	2 ☐	The available teacher demonstration equipment is adequate
1 ☐	2 ☐	There is a large amount of broken equipment which could be used if repaired
1 ☐	2 ☐	There is need for new and modern demonstration equipment
1 ☐	2 ☐	The available student laboratory equipment is adequate
1 ☐	2 ☐	There is need for more modern equipment for student laboratory
1 ☐	2 ☐	The supply of glassware is adequate
1 ☐	2 ☐	The supply of general equipment such as ringstands, clamps, stoppers, etc. is adequate
1 ☐	2 ☐	The supply of chemicals is adequate

D. Science Teaching Kits

For each science course listed below which you teach write in the space provided the number of the item which describes the extent to which you make use of such things as weather kits, soil testing kit, light kit etc.

Item

1. Kits never used
2. Kits seldom used
3. Kits used to a moderate extent
4. Kits frequently used.

No. of Item	Courses
(a) ____	General Science
(b) ____	Biology
(c) ____	Chemistry
(d) ____	Physics
(e) ____	Advanced General Science

E. Purchase of Equipment

Please indicate by checking the appropriate boxes the general plan of purchasing equipment in your school.

Yes	No	
1 ☐	2 ☐	(a) Is the science equipment in your school purchased on a contract basis?
1 ☐	2 ☐	(b) Is the equipment purchased by a central purchasing agency?
1 ☐	2 ☐	(c) Is the equipment purchased by the school principal?
1 ☐	2 ☐	(d) Is the equipment purchased by the school superintendent?
1 ☐	2 ☐	(e) Is the equipment purchased by the supervisor?
1 ☐	2 ☐	(f) Is the equipment purchased by the Head of the Science Department?
1 ☐	2 ☐	(g) Is the equipment purchased by the science teacher?

Other (specify)

1 ☐ 2 ☐ (h) _____

F. Improvised Equipment

For each science course listed below which you teach, indicate the extent to which equipment is improvised from materials found locally, such as home-made equipment, pieces obtained from a local radio or television shop, a garage, an auto grave yard etc. Write in the number of the appropriate item opposite the courses.

Item

1. Equipment never improvised
2. Equipment seldom improvised
3. Equipment improvised to a moderate extent
4. Equipment frequently improvised

Courses

_____ (a) General Science

_____ (b) Biology

_____ (c) Chemistry

_____ (d) Physics

_____ (e) Advanced General Science

G. Borrowed Equipment

Indicate if you ever borrow equipment for science teaching from any of the sources listed below.

Yes	No	Sources
1 ☐	2 ☐	(a) A local hospital
1 ☐	2 ☐	(b) A local doctor
1 ☐	2 ☐	(c) A local engineer
1 ☐	2 ☐	(d) A local industry
1 ☐	2 ☐	(e) A local garage
1 ☐	2 ☐	(f) A filling station
1 ☐	2 ☐	(g) Local stores

Other (specify)

1 ☐ 2 ☐ (h) _____

H. Funds for Science Equipment

Indicate how funds for the purchase of science equipment are allocated by checking the appropriate boxes.

Yes	No	
1 ☐	2 ☐	Do you have an annual budget for purchase of new equipment?
1 ☐	2 ☐	Do you have an annual budget for the purchase of consumable materials such as chemicals, etc.?
1 ☐	2 ☐	Are you permitted to purchase equipment and supplies without restrictions?
1 ☐	2 ☐	Do you charge a laboratory fee in the specialized science courses to cover breakage?
1 ☐	2 ☐	Are you allowed to spend the money from fees without restriction?

I. Indicate sources other than school budgets from which you have received funds for the purchase of science equipment. Check the appropriate boxes.

Yes	No	
1 ☐	2 ☐	(a) From a Parent-Teacher Association
1 ☐	2 ☐	(b) From a local service club (e.g. Rotary).

Yes	No		
1 ☐	2 ☐	(c)	From a school benefit (e.g. play)
1 ☐	2 ☐	(d)	From a science fair or exhibit
1 ☐	2 ☐	(e)	From an interested parent
1 ☐	2 ☐	(f)	From a local scientific society (e.g.) American Chemical Society)
1 ☐	2 ☐	(g)	From a local industry
			Other (specify)
1 ☐	2 ☐	(h)	_____

A. CONTENT AND ORGANIZATION OF SCIENCE COURSES

For each of the science courses listed below that you teach indicate by checking the appropriate box to the left of the topic whether you include that topic in your course. To the right check the boxes to indicate whether class demonstrations or individual laboratory experiments are included in the course.

A. Biology

Do you teach the course? 1 ☐ Yes 2 ☐ No

If answer is "no" proceed to part (B) General Science

Included in Course		Topic	Class Demonstration		Student Laboratory	
Yes	No		Yes	No	Yes	No
1 ☐	2 ☐	Characteristics of living things	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Human body (Structure function)	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Behavior (conditioning, learning, human)	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Health and disease	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Reproduction	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Heredity (eugenics, euthenics	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Plants and animals of the past	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Interdependence	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Food, photosynthesis, diet	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Classification of living things	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Conservation of living things	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Evolution	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Biology and atomic energy	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Other (specify)	3 ☐	4 ☐	5 ☐	6 ☐

_____

B. General Science

Do you teach the course? 1 ☐ Yes 2 ☐ No

If answer is "no" proceed to part (C) Chemistry

Included in Course		Topic	Class Demonstration		Student Laboratory	
Yes	No		Yes	No	Yes	No
1 ☐	2 ☐	Air	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Weather	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Water	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Food	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Heat	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Machines	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Universe	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Solar system	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Light	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Sound	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Magnetism	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Electricity	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Plants	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Animals	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Health	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Rocks and soils	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Disease	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Conservation	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Transportation	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Communication	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Human body	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Atomic energy	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Other (specify)	3 ☐	4 ☐	5 ☐	6 ☐

_____

C. **Chemistry**

Do you teach the course 1 ☐ Yes 2 ☐ No

If the answer is "no" proceed to part (D) Physics

Included in Course		Topic	Class Demonstration		Student Laboratory	
Yes	No		Yes	No	Yes	No
1☐	2☐	Properties of matter, elements compounds	3☐	4☐	5☐	6☐
1☐	2☐	Water, hydrogen and oxygen	3☐	4☐	5☐	6☐
1☐	2☐	Symbols, formulas, valence, equations	3☐	4☐	5☐	6☐
1☐	2☐	Carbon and its oxides	3☐	4☐	5☐	6☐
1☐	2☐	Atoms, molecules, periodic classification	3☐	4☐	5☐	6☐
1☐	2☐	Acids, bases and salts	3☐	4☐	5☐	6☐
1☐	2☐	Ionization and electrolysis	3☐	4☐	5☐	6☐
1☐	2☐	Oxidation and reduction	3☐	4☐	5☐	6☐
1☐	2☐	Sulfur, oxides and sulfuric acid	3☐	4☐	5☐	6☐
1☐	2☐	The Halogens	3☐	4☐	5☐	6☐
1☐	2☐	Nitrogen, nitric, acid and ammonia	3☐	4☐	5☐	6☐
1☐	2☐	The Atmosphere	3☐	4☐	5☐	6☐
1☐	2☐	Metals and metallurgy	3☐	4☐	5☐	6☐
1☐	2☐	Common heavy metals	3☐	4☐	5☐	6☐
1☐	2☐	Common light metals	3☐	4☐	5☐	6☐
1☐	2☐	Organic compounds	3☐	4☐	5☐	6☐
1☐	2☐	Fuels and by-products	3☐	4☐	5☐	6☐
1☐	2☐	Colloids	3☐	4☐	5☐	6☐
1☐	2☐	Boron and silicon	3☐	4☐	5☐	6☐
1☐	2☐	Nuclear fission and radio isotopes	3☐	4☐	5☐	6☐
1☐	2☐	Crystals and solid state structure	3☐	4☐	5☐	6☐
1☐	2☐	Modern synthetics	3☐	4☐	5☐	6☐
1☐	2☐	Other (specify)	3☐	4☐	5☐	6☐

D. **Physics**

Do you teach the course? 1 ☐ Yes 2 ☐ No

If answer is "no" proceed to part (E) Advanced General Science

Included in Course		Topic	Class Demonstration		Student Laboratory	
Yes	No		Yes	No	Yes	No
1☐	2☐	Matter and energy	3☐	4☐	5☐	6☐
1☐	2☐	Mechanics of solids	3☐	4☐	5☐	6☐
1☐	2☐	Mechanics of liquids	3☐	4☐	5☐	6☐
1☐	2☐	Mechanics of gases	3☐	4☐	5☐	6☐
1☐	2☐	Molecular physics	3☐	4☐	5☐	6☐
1☐	2☐	Force and motion	3☐	4☐	5☐	6☐
1☐	2☐	Machines	3☐	4☐	5☐	6☐
1☐	2☐	Work, power and energy	3☐	4☐	5☐	6☐
1☐	2☐	Heat	3☐	4☐	5☐	6☐
1☐	2☐	Sound	3☐	4☐	5☐	6☐
1☐	2☐	Light	3☐	4☐	5☐	6☐
1☐	2☐	Magnetism and electricity	3☐	4☐	5☐	6☐
1☐	2☐	Alternating current	3☐	4☐	5☐	6☐
1☐	2☐	Electronics	3☐	4☐	5☐	6☐
1☐	2☐	Wave mechanics	3☐	4☐	5☐	6☐
1☐	2☐	Quantum theory	3☐	4☐	5☐	6☐
1☐	2☐	Relativity	3☐	4☐	5☐	6☐
1☐	2☐	Nuclear physics	3☐	4☐	5☐	6☐
1☐	2☐	Other (specify)	3☐	4☐	5☐	6☐

E. **Advanced General Science**

Do you teach the course? 1 ☐ Yes 2 ☐ No

Included in Course		Topic	Class Demonstration		Student Laboratory	
Yes	No		Yes	No	Yes	No
1 ☐	2 ☐	Fire, fuels, and heat	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Work, power and machines	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Astronomy	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Weather and climate	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	The Earth	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Materials of construction	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Light and radiation	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Sound	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Electricity	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Atomic energy	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Electronics, radio and television	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Modern synthetics	3 ☐	4 ☐	5 ☐	6 ☐
1 ☐	2 ☐	Other (specify)	3 ☐	4 ☐	5 ☐	6 ☐

_____

F. **Plan of Course Organization**

For each course listed below which you teach, write on the line to the left the number of the one type of course organization which most accurately describes your course.

Types of Course Organization

1. Follows a basic text
2. Follows a state-prepared course of study
3. Follows a locally prepared course of study
4. Follows no course of study but uses local problems, a problem solving approach with local resource materials.

(a) _____ General Science

(b) _____ Biology

(c) _____ Chemistry

(d) _____ Physics

(e) _____ Advanced General Science

G. **Basis of Course Organization**

For each course listed below which you teach, write on the line to the left the number of the course organization which most accurately fits your course.

Basis of Course Organization

1. Course organized around basic science principles
2. Course based on logical divisions of subject matter, (e.g. heat, light, machines, oxygen, metals, etc.)
3. Course based on environmental units (e.g. air, weather, communications, food, transportation)
4. Course organized around broad problems significant to the pupil (e.g. How is pure water obtained?)
5. Course organized around textbook problems within logical subject matter divisions.

(a) _____ General Science

(b) _____ Biology

(c) _____ Chemistry

(d) _____ Physics

(e) _____ Advanced General Science

9. METHODS OF TEACHING

A. For each course listed below which you teach, select the pair of items, one from **classroom methods**, the other from **classroom activities** which best describes the practice in your course. Write in the first column of lines to the left the number of the one item of the classroom methods" which best describes the method you use most commonly. Write in the second column of lines the number of the one item selected from the "activities" group which best suggests the type of activity you use most commonly.

Classroom Methods

1. Recitations from textbooks assignments
2. Free discussion based on topical assignments
3. Problem-solving or developmental lessons based on pupil-defined problems
4. Problem-solving lessons based on problems stated in text book

Classroom Activities	Description of Practice		
	Column 1 mark best	Column 2 mark next best	Courses
1. With teacher demonstrations	_____ (a)	_____	General Science
2. With teacher and pupil demonstrations from textbook or workbook	_____ (b)	_____	Biology
3. With pupil projects and reports	_____ (c)	_____	Chemistry
4. With individual or small group laboratory work	_____ (d)	_____	Physics
5. With no demonstration, laboratory or project work	_____ (e)	_____	Adv. Gen. Science

B. Class Activities

Under each science course you teach, check yes if you commonly use one of the activities listed and no if you do not use it commonly.

Class Activity Types	Gen. Science		Biology		Chemistry		Physics		Adv. Gen. Sci.	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
(a) Discussion led by teacher	0	1	2	3	4	5	6	7	8	9
(b) Discussion led by pupil	0	1	2	3	4	5	6	7	8	9
(c) Teacher lecture or explanation	0	1	2	3	4	5	6	7	8	9
(d) Teacher demonstration	0	1	2	3	4	5	6	7	8	9
(e) Laboratory	0	1	2	3	4	5	6	7	8	9
(f) Supervised individual study	0	1	2	3	4	5	6	7	8	9
(g) Supervised class project study	0	1	2	3	4	5	6	7	8	9
(h) Supervised small group project	0	1	2	3	4	5	6	7	8	9
(i) Pupil recitation	0	1	2	3	4	5	6	7	8	9
(j) Library reading	0	1	2	3	4	5	6	7	8	9
(k) Preparation of reports	0	1	2	3	4	5	6	7	8	9
(l) Visual aids	0	1	2	3	4	5	6	7	8	9
Other (specify)										
(m) _____	0	1	2	3	4	5	6	7	8	9

C. Problem Solving

For each science course you teach, check "yes" if provision is made in teaching for promoting the listed problem solving abilities. Check "no" to each provision as not made.

Problem Solving Abilities	Gen. Science		Biology		Chemistry		Physics		Adv. Gen. Sci.	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1. Identifying and stating assumptions	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
2. Defining problems	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
3. Setting up controlled experiments	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
4. Interpreting evidence	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
5. Making applications of generalizations	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
6. Formulating conclusions and generalizations from evidence	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
7. Proposing and testing hypotheses	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
Other (specify)										
8. _____	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

D. Use of Projects in Class

For each science course you teach, check one box to indicate the emphasis placed on student projects in relation to class work.

Course	Not Used	Required as part of course	Not Required but encouraged
General Science	1 ☐	2 ☐	3 ☐
Biology	1 ☐	2 ☐	3 ☐
Chemistry	1 ☐	2 ☐	3 ☐
Physics	1 ☐	2 ☐	3 ☐
Advanced General Science	1 ☐	2 ☐	3 ☐

E. Time for Preparation

Indicate the approximate number of minutes of preparation required of pupils for each class period in science.

Course	None	5-15	16-30	31-45	More Than 45
General Science	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Biology	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Chemistry	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Physics	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Advanced General Science	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

F. Provision for Rapid Learners

Please indicate by checking the appropriate boxes, the extent to which you use the following methods in providing for the rapid learner.

Procedures	None	Seldom	Often
1. Encourage students to compete for superior scholarship awards	1 ☐	2 ☐	3 ☐
2. Individual encouragement and personal guidance	1 ☐	2 ☐	3 ☐
3. Participation in science fairs with projects	1 ☐	2 ☐	3 ☐
4. Encourage study of the applications of science and mathematics	1 ☐	2 ☐	3 ☐
5. Encourage each pupil to work at his own rate but require the student to continue regular class work	1 ☐	2 ☐	3 ☐
6. Encourage student self-evaluation	1 ☐	2 ☐	3 ☐
7. Encourage pupil to set up special experiments and demonstrations	1 ☐	2 ☐	3 ☐
8. Provide opportunities to work as laboratory assistant	1 ☐	2 ☐	3 ☐
9. Provide opportunity for enrichment with advanced study	1 ☐	2 ☐	3 ☐
10. Encourage students to make aids to instruction	1 ☐	2 ☐	3 ☐
11. Provide special science seminars	1 ☐	2 ☐	3 ☐
12. Encourage enrichment through advanced reading	1 ☐	2 ☐	3 ☐
Other (specify) 13. _____	1 ☐	2 ☐	3 ☐

10. LABORATORY AND DEMONSTRATION

A. Basis of Laboratory Work

For each science course you teach, check the one box which most accurately indicates the basis for laboratory work.

Basis of Laboratory Work	Gen. Sci.	Biol.	Chemistry	Physics	Adv. Gen. Sci.
(a) Experiments taken from a manual or workbook	1 ☐	1 ☐	1 ☐	1 ☐	1 ☐
(b) Teacher - prepared laboratory guide sheets	2 ☐	2 ☐	2 ☐	2 ☐	2 ☐
(c) Experiments taken from the textbook	3 ☐	3 ☐	3 ☐	3 ☐	3 ☐
(d) Problem solving with pupil defined laboratory exercises	4 ☐	4 ☐	4 ☐	4 ☐	4 ☐
(e) Other (specify) _____	5 ☐	5 ☐	5 ☐	5 ☐	5 ☐

B. Laboratory Procedures

For each science course you teach, check the one laboratory procedure used most commonly.

Procedure	Gen. Sci.	Biol.	Chemistry	Physics	Adv. Gen. Sci.
1. Individual laboratory work	1 ☐	1 ☐	1 ☐	1 ☐	1 ☐
2. Pupils grouped in pairs	2 ☐	2 ☐	2 ☐	2 ☐	2 ☐
3. Pupils grouped 3 or more to a group	3 ☐	3 ☐	3 ☐	3 ☐	3 ☐
4. Teacher demonstration	4 ☐	4 ☐	4 ☐	4 ☐	4 ☐
5. Pupil demonstration	5 ☐	5 ☐	5 ☐	5 ☐	5 ☐
6. Other (specify) _____	6 ☐	6 ☐	6 ☐	6 ☐	6 ☐

C. Scheduling Laboratory Work

For each science course you teach, indicate the one method most commonly used for scheduling laboratory work.

Type of Scheduling	Gen. Sci.	Biol.	Chemistry	Physics	Adv. Gen. Sci.
(a) None scheduled	1 ☐	1 ☐	1 ☐	1 ☐	1 ☐
(b) Regular single periods	2 ☐	2 ☐	2 ☐	2 ☐	2 ☐
(c) Regular double periods	3 ☐	3 ☐	3 ☐	3 ☐	3 ☐
(d) A flexible laboratory schedule	4 ☐	4 ☐	4 ☐	4 ☐	4 ☐
(e) Integrated laboratory and recitation	5 ☐	5 ☐	5 ☐	5 ☐	5 ☐
(f) Laboratory optional	6 ☐	6 ☐	6 ☐	6 ☐	6 ☐
(g) Other (specify) _____	7 ☐	7 ☐	7 ☐	7 ☐	7 ☐

D. Indication of Present Practice.

For each science course you teach, check the one box which indicates your present practice.

Practice	Gen. Sci.	Biol.	Chemistry	Physics	Adv. Gen. Sci.
1. More emphasis on student laboratory and less on teacher demonstration.	1 ☐	1 ☐	1 ☐	1 ☐	1 ☐
2. More emphasis on teacher demonstration and less on student laboratory work.	2 ☐	2 ☐	2 ☐	2 ☐	2 ☐
3. More emphasis on balance between teacher demonstration and student laboratory work.	3 ☐	3 ☐	3 ☐	3 ☐	3 ☐

11. TEXTBOOKS

A. For the courses you teach, check the appropriate boxes to indicate the practice regarding textbooks and supplementary materials.

Yes	No	Practice
1☐	2☐	(a) Is a single basic textbook used?
1☐	2☐	(b) Do pupils have choice of textbooks?
1☐	2☐	(c) Are textbooks loaned to the pupil by the school?
1☐	2☐	(d) Are textbooks rented by the pupil?
1☐	2☐	(e) Are textbooks purchased by the pupil?
1☐	2☐	(f) Are locally prepared resource materials used in place of a textbook?
1☐	2☐	(g) Is the textbook supplemented by locally prepared work sheets?
1☐	2☐	(h) Is the textbook supplemented by a workbook?

B. Selection of Textbooks

Indicate the general practice of adopting high school science textbooks used in your school by checking the boxes for the items which apply.

Textbooks Adopted By:	From an Adopted List		Unrestricted Adoption	
	Yes	No	Yes	No
(a) Persons outside your school system	1☐	2☐	3☐	4☐
(b) Officials in the school system	1☐	2☐	3☐	4☐
(c) Department heads in your school system	1☐	2☐	3☐	4☐
(d) Committees of teachers in your school system	1☐	2☐	3☐	4☐
(e) Individual schools	1☐	2☐	3☐	4☐
(f) Individual teachers	1☐	2☐	3☐	4☐
(g) Other (specify)				
_____	1☐	2☐	3☐	4☐

C. Science Subjects Taught.

Please give the required information for each science subject you teach.

Subject	Grade Level of Most Students in Class				No. of Sections	Length of Periods	No. of Periods Per Week	No. of Weeks of Course	Enrollment	
	9	10	11	12					Boys	Girls
1. General Science	1☐	2☐	3☐	4☐	___	___	___	___	___	___
2. Biology	1☐	2☐	3☐	4☐	___	___	___	___	___	___
3. Chemistry	1☐	2☐	3☐	4☐	___	___	___	___	___	___
4. Physics	1☐	2☐	3☐	4☐	___	___	___	___	___	___
5. Adv. Gen. Sci.	1☐	2☐	3☐	4☐	___	___	___	___	___	___
6. Other (specify)										
_____	1☐	2☐	3☐	4☐	___	___	___	___	___	___

D. Textbooks Used in Your Classes

Please give the required information about text books for each science subject you teach. (If no textbook is used, write "None.")

Subject	Title of Textbook(s) Used	Author(s)	Date of Publication	Your Rating of Text in Meeting Pupil Needs: Excellent	Good	Fair	Poor
1. General Science	1.	1.	1.	1 ☐	2 ☐	3 ☐	4 ☐
2. Biology	2.	2.	2.	1 ☐	2 ☐	3 ☐	4 ☐
3. Chemistry	3.	3.	3.	1 ☐	2 ☐	3 ☐	4 ☐
4. Physics	4.	4.	4.	1 ☐	2 ☐	3 ☐	4 ☐
5. Adv. Gen. Sci.	5.	5.	5.	1 ☐	2 ☐	3 ☐	4 ☐
6. Other (specify) _____	6.	6.	6.	1 ☐	2 ☐	3 ☐	4 ☐

12. AIDS TO TEACHING

A. Indicate by checking the appropriate boxes whether or not you use the following sensory aids in your teaching.

Yes	No	Sensory Aids	Yes	No	Sensory Aids
1 ☐	2 ☐	(a) Commercial charts	1 ☐	2 ☐	(h) Sound motion pictures
1 ☐	2 ☐	(b) Homemade charts	1 ☐	2 ☐	(i) Silent motion pictures
1 ☐	2 ☐	(c) Commercial pamphlets	1 ☐	2 ☐	(j) Television
1 ☐	2 ☐	(d) Micro projector	1 ☐	2 ☐	(k) Film strips
1 ☐	2 ☐	(e) Slide projector	1 ☐	2 ☐	(l) Flannel board
1 ☐	2 ☐	(f) Opaque projector	1 ☐	2 ☐	(m) Commercial display
1 ☐	2 ☐	(g) Purchased models	1 ☐	2 ☐	(n) Other (specify) _____

B. Reference Materials

Indicate the adequacy of the science reference materials in your school by checking the appropriate boxes

Yes	No	Reference Materials
1 ☐	2 ☐	(a) Is there an adequate quantity of general reference sources in your school? (e.g. encyclopedias?)
1 ☐	2 ☐	(b) Is there an adequate number of general reference books on science subjects?
1 ☐	2 ☐	(c) Is there a library of general reference books on science housed in the science department?
1 ☐	2 ☐	(d) Are general reference books (not textbooks) on science housed in the various science classrooms?
1 ☐	2 ☐	(e) Are other science textbooks than the adopted text available in the main school library?
1 ☐	2 ☐	(f) Are other science textbooks than the adopted text kept in classroom libraries?
1 ☐	2 ☐	(g) Does the school subscribe to any weekly periodical devoted exclusively to science? (e.g. Science Newsletter)
1 ☐	2 ☐	(h) Does the school library get any scientific journals such as Scientific American, Scientific Monthly, Science?
1 ☐	2 ☐	(i) Does the school library get popular science magazine such as Popular Science Monthly or Popular Mechanics?
1 ☐	2 ☐	(j) Does your school library receive any professional science teaching magazines such as The Science Teacher or School Science and Mathematics?

C. Indicate the types of assistance you have had in your teaching from such sources as local scientists, scientific or other industry. Check the appropriate blanks.

Yes	No	Type of Assistance
1 ☐	2 ☐	(a) Furnished speakers
1 ☐	2 ☐	(b) Aided in counselling pupils
1 ☐	2 ☐	(c) Furnished science equipment
1 ☐	2 ☐	(d) Furnished useful books and/or pamphlets
1 ☐	2 ☐	(e) Sponsored field trips
1 ☐	2 ☐	(f) Furnished useful films
1 ☐	2 ☐	(g) Furnished career literature
1 ☐	2 ☐	(h) Scientists used in classroom teaching
1 ☐	2 ☐	(i) Scientists used in instructing teachers
1 ☐	2 ☐	(j) Help with science club activities
1 ☐	2 ☐	(k) Help with Science Fair activities

13. PROBLEMS IN TEACHING

A. Select five of the areas listed below and rank them in order of greatest concern to you as a teacher. The problem of greatest concern mark 1, the next in rank mark 2, etc.

___ 1. Acquiring and teaching new or modern concepts in science.

___ 2. Improving my ability to present scientific concepts in an interesting manner.

___ 3. Securing an adequate textbook

___ 4. Supplying supplementary problems material

___ 5. Obtaining and using visual aids

___ 6. Getting improved library facilities

___ 7. Providing career guidance material in science

___ 8. Arranging and conducting field trips

___ 9. Finding adequate preparation time for experiments and demonstrations

___ 10. Improving laboratory experiments and demonstrations

___ 11. Improvising simple equipment

___ 12. Providing for the superior pupil

___ 13. Knowing how to teach problem solving or scientific method

___ 14. Finding good science projects

___ 15. Finding time for helping individual pupils

___ 16. Other (specify) _____

B. Indicate by a check whether the areas listed below you feel the need for further work to improve as a science teacher.

Yes	No		Yes	No	
1 ☐	2 ☐	Astronomy	1 ☐	2 ☐	Bio-Chemistry
1 ☐	2 ☐	Botany	1 ☐	2 ☐	Nuclear Physics
1 ☐	2 ☐	Zoology	1 ☐	2 ☐	Nuclear Chemistry
1 ☐	2 ☐	Geology	1 ☐	2 ☐	Mathematics
1 ☐	2 ☐	Genetics	1 ☐	2 ☐	Ecology
1 ☐	2 ☐	Gen. Physics	1 ☐	2 ☐	Meteorology
1 ☐	2 ☐	Gen. Chemistry	1 ☐	2 ☐	Organic Chemistry

1 ☐ 2 ☐ Other specify ___ _____

14. PROFESSIONAL PARTICIPATION

A. For each magazine you read, indicate the frequency by writing in a 1, a 2, or a 3 on the line to left of the magazine after the following plan

1 means - do not read

2 means - read thoroughly

3 means - read about one article per issue.

Magazines

_____ (a) American Biology Teacher

_____ (b) Journal of Chemical Education

_____ (c) School Science and Mathematics

_____ (d) Science Education

_____ (e) School Science Review

_____ (f) The Science Counselor

_____ (g) The Science Teacher

_____ (h) Earth Science

_____ (i) National Geographic

_____ (j) Science

_____ (k) Science News Letter

_____ (l) Science News Letter

_____ (m) Physics Today

_____ (n) Science Digest

_____ (o) Popular Mechanics

_____ (p) Scientific American

_____ (q) Science World

B. Check the one box with the **highest** number that indicates your participation in the professional organizations

Pay Dues	Attend Meeting	Participate in Program	Committee Work	Past or Present Officer	Organization
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(a) National Education Association
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(b) State Education Association
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(c) National Science Teachers Association
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(d) National Association for Research in Science Teaching
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(e) Central Association of School Science and Mathematics Teachers
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(f) National Association of Biology Teachers
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(g) American Association of Physics Teachers
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(h) American Association for the Advancement of Science
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(i) American Chemical Society
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(j) American Institute of Biological Science
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(k) State or Local Academy of Science
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(l) State Science Teachers Association
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(m) Astronomical League
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(n) Local Science Teachers Association
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(o) American Nature Study Association
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	(p) Other (specify) _____

15. DECIDING TO BE A SCIENCE TEACHER

A. Indicate by a check when you decided to become a science teacher.

1 ☐ Before entering high school
2 ☐ In grades 9 or 10
3 ☐ In grades 11 or 12
4 ☐ While a freshman or sophomore in college
5 ☐ While a junior or senior in college
6 ☐ After college
7 ☐ Do not know

B. Check the one most important factor which influenced your decision to become a science teacher.

0 ☐ A high school teacher
1 ☐ A college teacher
2 ☐ Your parents
3 ☐ A particular course in high school
4 ☐ A particular course in college
5 ☐ A scientist or mathematician
6 ☐ A guidance counselor
7 ☐ A school principal
8 ☐ Natural interest in science
9 ☐ Person unknown
x ☐ Other (specify) _____

C. Check one box to indicate any career ambition you may have had prior to your decision to become a teacher.

01 ☐ Engineering	07 ☐ Law
02 ☐ Science	08 ☐ Medicine
03 ☐ Agriculture	09 ☐ Religion
04 ☐ Business	10 ☐ Nursing
05 ☐ Teaching in another field	11 ☐ Military
06 ☐ Teaching was first ambition	12 ☐ Other (specify)

Do you expect science teaching to be your career?

1 ☐ Yes 2 ☐ No

_____ (1) _____ (2) _____ (3) _____ (4) _____ (5)
Do not write in the spaces above

Budget Bureau No. 51-S715
Approval expires May 31, 1958

SEC-9-H

Questionnaire
on
Mathematics Education in Public High Schools

(To be filled in by each person who teaches one or more classes in mathematics in grades 9-12.)

1. NAME OF SCHOOL: _____

CITY OR COUNTY: _____ STATE: _____

In attempting to improve instruction in mathematics and science, national organizations and committees have been handicapped by a lack of basic information on a national level. How much time is being devoted to certain topics in mathematics and science? How heavy is the teaching load of science and mathematics teachers? How are they getting along financially? Will the age of teachers in these areas result in many vacancies in the near future? Some of these data are personal but essential for planning on a State or national level. The information from this questionnaire will be confidential—only the composite information of the entire survey will be made public. Please return it promptly. Only a sample of teachers is being used in this study; your response is important in making the sample representative.

2. PERSONAL DATA: (Please Check)

A. 1 ☐ Male 2 ☐ Female

B. 1 ☐ Married 2 ☐ Single

C. 1 ☐ White 2 ☐ Non-white

D. Age 1 ☐ Under 25 3 ☐ 25-34 3 ☐ 35-44 4 ☐ 45-54 5 ☐ 55 or over

E. Dependents (Use number reported for Federal income tax purposes last year):

0 ☐ None 3 ☐ Three
1 ☐ One 4 ☐ Four
2 ☐ Two 5 ☐ Five or more

F. Total years of teaching experience (any subject, any grade; count this year)

1 ☐ One 4 ☐ 10-15
2 ☐ 2-3 5 ☐ 16-25
3 ☐ 4-9 6 ☐ 26 or more

G. Total years of experience teaching high school mathematics (grades 9-12; count this year)

1 ☐ One 4 ☐ 10-15
2 ☐ 2-3 5 ☐ 16-25
3 ☐ 4-9 6 ☐ 26 or more

H. Years of Continuous Teaching.
Some teachers have had their teaching experience interrupted by other employment, illness or for other reasons. Please check the total years of latest continuous (uninterrupted) teaching experience. (Count this year)

1 ☐ One 4 ☐ 10-15
2 ☐ 2-3 5 ☐ 16-25
3 ☐ 4-9 6 ☐ 26 or more

3. INCOME

A. Indicate to the nearest dollar the gross annual salary you expect to receive for this school year from your regular school position. $ _____

B. The above salary represents work for the following number of months:

1 ☐ 7 or less 3 ☐ 9 5 ☐ 11
2 ☐ 8 4 ☐ 10 6 ☐ 12

C. Additional Earned Income. How much income from salaries, wages, commissions, or fees—in addition to your regular school salary—will you receive during the 1957-58 school year from each of the following sources? Make estimates if necessary. Write in the amount even though it is zero.

1. From a second school job such as, night school or summer school: $ _____

2. From a non-teaching job: $ _____

D. Did you teach in this school system last year?

1 ☐ Yes 2 ☐ No

If the answer is "Yes" indicate the increase in salary you received this year.

1 ☐ None 3 ☐ $100-299

2 ☐ Less than $100 4 ☐ $300- or more

E. Check the principle used in determining salary increase in your school.

1 ☐ Merit basis only

2 ☐ Periodic increment only

3 ☐ Combination of merit and periodic increment

4 ☐ Irregular cost-of-living increase

5 ☐ Other (specify) _____

OTHER EMPLOYMENT

A. Indicate the number of years you were gainfully employed full time in occupations other than teaching. (Do not include summer employment. Do not include military service unless you once intended making it your career.)

1 ☐ 0-1 2 ☐ 2-3 3 ☐ 4-5

4 ☐ 6-10 5 ☐ 11-15 6 ☐ 16 or more

B. Indicate whether you took part in the following activities this past summer (1957):

Yes	No	
1 ☐	2 ☐	Study in a college and university
1 ☐	2 ☐	Professional reading
1 ☐	2 ☐	Travel
1 ☐	2 ☐	Professional writing
1 ☐	2 ☐	Attendance at a workshop or institute for 1 week or less
1 ☐	2 ☐	Attendance at a workshop or institute for more than 1 week
1 ☐	2 ☐	Teaching of mathematics and/or science
1 ☐	2 ☐	Teaching but not mathematics and/or science
1 ☐	2 ☐	Employment (not teaching) where mathematics and science skills were frequently used
1 ☐	2 ☐	Employment (not teaching) where mathematics and science skills were seldom used

5. ACADEMIC PREPARATION

A. Please check in the first column the one field in which you have the greatest number of undergraduate college semester hours; in the second column, the field which ranks second in number of undergraduate semester hours; repeat this procedure in columns three and four for graduate semester hours.

Field	Undergraduate 1 Major	Undergraduate 2 Minor	Graduate 3 Major	Graduate 4 Minor
Education	1 ☐	1 ☐	1 ☐	1 ☐
Science	2 ☐	2 ☐	2 ☐	2 ☐
Mathematics	3 ☐	3 ☐	3 ☐	3 ☐
Physical Education	☐	4 ☐	4 ☐	4 ☐
Social Studies	5 ☐	5 ☐	5 ☐	5 ☐
English	6 ☐	6 ☐	6 ☐	6 ☐
Other	7 ☐	7 ☐	7 ☐	7 ☐

B. How many college semester hours have you taken in mathematics

_____ 1. below or prerequisite to the calculus?

_____ 2. the calculus and above? Include graduate courses.

C. Estimate approximate average grade for each undergraduate subject. (check one)

Subject	Approximate Average Grade A-	B+	B	B-	C	D
Science	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Mathematics	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Education	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

D. Indicate by a check degrees received and date.

Date	Bachelors	Masters	Doctors
Before 1925	1 ☐	1 ☐	1 ☐
1925-34	2 ☐	2 ☐	2 ☐
1935-44	3 ☐	3 ☐	3 ☐
1945-49	4 ☐	4 ☐	4 ☐
1950-54	5 ☐	5 ☐	5 ☐
Since 1954	6 ☐	6 ☐	6 ☐
Not Received	7 ☐	7 ☐	7 ☐

E. Indicate the type of institution from which you received the Bachelor's Degree and the Master's Degree.

Bachelor's Degree	Master's Degree	Institution
1 ☐	1 ☐	Teachers college
2 ☐	2 ☐	College (or School) of Education in university
3 ☐	3 ☐	Other college (or school) in university
4 ☐	4 ☐	Liberal arts college
5 ☐	5 ☐	None of the above

6. Check below to indicate the extent to which you read the following professional periodicals:

Never	Seldom	Occasionally	Regularly	Periodicals
1 ☐	2 ☐	3 ☐	4 ☐	THE MATHEMATICS TEACHER
1 ☐	2 ☐	3 ☐	4 ☐	SCHOOL SCIENCE AND MATHEMATICS
1 ☐	2 ☐	3 ☐	4 ☐	PHYSICS TODAY
1 ☐	2 ☐	3 ☐	4 ☐	SCIENCE EDUCATION
1 ☐	2 ☐	3 ☐	4 ☐	THE SCIENCE TEACHER
1 ☐	2 ☐	3 ☐	4 ☐	THE ARITHMETIC TEACHER

7. Textbooks Used. Give information for only the courses you teach.

COURSE	RATING OF TEXT IN TERMS OF PUPIL NEEDS Excel.	Good	Fair	Poor	BASIC TEXTBOOK(S) USED	AUTHOR OF TEXTBOOK
Gen. Math. 9th	1 ☐	2 ☐	3 ☐	4 ☐		
Gen. Math. 10th	1 ☐	2 ☐	3 ☐	4 ☐		
Gen. Math. 11-12	1 ☐	2 ☐	3 ☐	4 ☐		
Elem. Algebra	1 ☐	2 ☐	3 ☐	4 ☐		
Pl. Geometry	1 ☐	2 ☐	3 ☐	4 ☐		
Int. Algebra	1 ☐	2 ☐	3 ☐	4 ☐		
Trigonometry	1 ☐	2 ☐	3 ☐	4 ☐		
Solid Geometry	1 ☐	2 ☐	3 ☐	4 ☐		
H.S. Arithmetic	1 ☐	2 ☐	3 ☐	4 ☐		
Other Math. (specify)						
_____	1 ☐	2 ☐	3 ☐	4 ☐		

8. Data on Mathematics courses you teach in grades 9-12.

No. of classes	Courses	Enrollment	Ability of pupils: Above Av.	Av.	Below Av.
_____	Gen. Math. 9th	_____	1 ☐	2 ☐	3 ☐
_____	Gen. Math. 10th	_____	1 ☐	2 ☐	3 ☐
_____	Sr. Consumer Mathematics	_____	1 ☐	2 ☐	3 ☐
_____	H.S. Arithmetic	_____	1 ☐	2 ☐	3 ☐
_____	Elem. Algebra	_____	1 ☐	2 ☐	3 ☐
_____	Pl. Geometry	_____	1 ☐	2 ☐	3 ☐
_____	Int. Algebra	_____	1 ☐	2 ☐	3 ☐
_____	College Algebra	_____	1 ☐	2 ☐	3 ☐
_____	Trigonometry	_____	1 ☐	2 ☐	3 ☐
_____	Solid Geometry	_____	1 ☐	2 ☐	3 ☐
_____	Analytic Geom.	_____	1 ☐	2 ☐	3 ☐
	Other Math. (specify)				
	_____		1 ☐	2 ☐	3 ☐

9. PUPIL'S MARK

In determining the final mark of the course what percentage of the mark is usually determined by the following:

_____ % Homework _____ % Final Test

_____ % Class Participation _____ % Other

_____ % Daily and Weekly tests

10. Approximate Number of Class Periods Devoted to Certain Topics in Mathematics

Even though the following selected topics may be taught with other topics throughout the course, please estimate the time, in class periods, you devote primarily to instruction in these topics.

A. General Mathematics 9th

_____ Operations with whole numbers

_____ Arithmetical fractions

_____ Percentage

_____ Consumer problems

_____ Informal geometry

_____ Elem. algebra

_____ Statistical graphs

_____ Insurance

_____ Income tax

_____ Installment buying

B. Elementary Algebra

____ Statistical graphs	____ Quadratics
____ Graphing an equation	____ Ratio-proportion
____ Factoring	____ Inequalities
____ Roots & radicals	____ Infer. Geom.
____ Trigonometry	____ Applications

C. Plane Geometry

____ Proof by superposition	____ Areas of polygons
____ Constructions	____ Trigonometry
____ Similar triangles	____ Solid geometry
____ Indirect proof	____ Reasoning in life situations

11. WORK LOAD

A. Please check the number of class periods you devote each day to the following areas.

Area	None	One	Two	Three	Four	Five or More
Mathematics	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Science	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Social Studies	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
English	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Physical Education—Athletics	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Guidance	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Study Hall	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Committee Work	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Administration	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

B. Please indicate by a check whether you sponsor the following activities this year.

Yes	No	Activity
1 ☐	2 ☐	Mathematics Contests
1 ☐	2 ☐	Science Contests
1 ☐	2 ☐	Athletic Contests
1 ☐	2 ☐	School Assemblies
1 ☐	2 ☐	Mathematics or Science Club
1 ☐	2 ☐	Supervision of School Grounds
1 ☐	2 ☐	Field Trips
1 ☐	2 ☐	Student Council
1 ☐	2 ☐	School Paper
1 ☐	2 ☐	Student Book Store or Concession
1 ☐	2 ☐	Lunch Room
1 ☐	2 ☐	Other (specify) _____

C. Indicate the approximate number of hours each week you devote to extra-curricular duties.

0 ☐ None 2 ☐ 2-3

1 ☐ One 3 ☐ 4 or more

D. Indicate whether you have had the following type of assistance in teaching this year.

Yes	No	Assistance
1 ☐	2 ☐	Student Teacher
1 ☐	2 ☐	Paid Pupil Assistant
1 ☐	2 ☐	Non-certified adult
1 ☐	2 ☐	None
1 ☐	2 ☐	Other (specify)

12. EQUIPMENT

A. Please check the approximate number of linear feet of chalkboard in your classroom.

1 ☐ 0-9 3 ☐ 30-69 5 ☐ 100-139

2 ☐ 10-29 4 ☐ 70-99 6 ☐ 140 or more

B. Is the chalkboard sufficient to meet your needs?

1 ☐ Inadequate 2 ☐ Adequate

3 ☐ Too much

C. Please check the approximate number of linear feet of bulletin board in your classroom.

1 ☐ 0-6 4 ☐ 31-36

2 ☐ 7-12 5 ☐ 37-50

3 ☐ 13-30 6 ☐ 51-70

7 ☐ more than 70

D. Is the bulletin board sufficient to meet your needs?

1 ☐ Not enough

2 ☐ Adequate

3 ☐ Too much

E. Check whether you prefer the following types of furniture for your purposes of instruction.

Yes	No	Furniture
1 ☐	2 ☐	Movable armchairs
1 ☐	2 ☐	Stationary armchairs
1 ☐	2 ☐	Movable desks
1 ☐	2 ☐	Stationary tables and movable chairs
1 ☐	2 ☐	Movable tables and chairs
1 ☐	2 ☐	Combination of the above
1 ☐	2 ☐	None of the above

F. Please indicate the extent to which you or your students improvise equipment from material found locally or purchased from salvage firms.

1 ☐ Frequently

2 ☐ Occasionally

3 ☐ Never

13. METHOD

A. Please indicate the average percent of class time normally devoted to the following:

1. Discussion led by teacher _____ %
2. Discussion led by pupil _____ %
3. Teacher explanation demonstration or lecture _____ %
4. Supervised individual study _____ %
5. Supervised class project study _____ %
6. Supervised small group projects _____ %
7. Drill at desks _____ %
8. Chalkboard drill _____ %
9. Pupil recitation _____ %
10. Testing _____ %
11. Films and film strips _____ %
12. Other methods of instruction (please specify) _____ %

Total 100%

B. Please indicate the extent to which you use the following selected procedures with rapid learners.

None	Some	Much	Procedures
1 ☐	2 ☐	3 ☐	Encourage rapid learners to study the applications of mathematics to science
1 ☐	2 ☐	3 ☐	Encourage each pupil to work at his own rate but require the pupil to confine his work to the same topic as the other pupils
1 ☐	2 ☐	3 ☐	Encourage rapid learners to compete for awards given for superior scholarship
1 ☐	2 ☐	3 ☐	Urge participation in Science and Mathematics Fairs and Tournaments
1 ☐	2 ☐	3 ☐	Encourage pupils to make up problems by receiving data from own reading or experiment
1 ☐	2 ☐	3 ☐	Encourage pupils to make aids to instruction for the classroom
1 ☐	2 ☐	3 ☐	Assignment of special topics
1 ☐	2 ☐	3 ☐	Assignment of more difficult problems.
1 ☐	2 ☐	3 ☐	Use of rapid learners to assist slow learners
1 ☐	2 ☐	3 ☐	Secure mathematics or science guest speakers for your class

C. Indicate the extent to which you use supplementary material:

(a) Ditto or mimeographed

1 ☐ None 2 ☐ Some 3 ☐ Much

(b) Supplementary books

1 ☐ None 2 ☐ Some 3 ☐ Much

D. Indicate the approximate number of minutes out of class preparation that you expect of the average pupil for each class period in mathematics

1 ☐ None 2 ☐ 1-15 3 ☐ 16-30

4 ☐ 31-45 5 ☐ 46-60 6 ☐ 61 or more

E. Write in the spaces below the 3 numbers which correspond to the 3 items which are or would be of most value to you

Item	Write the number of the item selected
1. Work tables	
2. Bookcases	
3. Storage room	
4. Small adjacent laboratory	
5. Supplementary books	
6. Work books	
7. Standardized tests	
8. Film strips	
9. Movie projector	
10. Provision for darkening the room	
11. Water available in the room	
12. Mathematical models	
13. Assistance in checking home work	
14. Graphboard	
15. Other (specify)	

F. Please check whether the items below, in your opinion, would be very helpful to you in becoming a better teacher:

Yes	No	Activity
1 ☐	2 ☐	More college courses in mathematics
1 ☐	2 ☐	More college courses in teaching mathematics
1 ☐	2 ☐	More college courses in education
1 ☐	2 ☐	Attendance at mathematics workshops
1 ☐	2 ☐	Experience in industry
1 ☐	2 ☐	Group meetings with colleagues within building
1 ☐	2 ☐	Other (specify) _____

14. PROBLEMS IN TEACHING

Select five of the areas listed below and rank them in order of greatest concern to you as a teacher. The problem of greatest concern mark 1, the next in rank mark 2, etc.

_____ Acquiring and teaching new or modern concepts in mathematics.

_____ Improving my ability to present mathematical concepts in an interesting manner.

_____ Securing an adequate textbook

_____ Supplying supplementary problem material

_____ Obtaining and using visual aids

_____ Getting improved library facilities

_____ Providing career guidance material in mathematics

_____ Arranging and conducting field trips

_____ Finding time to prepare lessons

_____ Finding time to mark papers

_____ Finding time to visit homes of pupils

_____ Providing for the superior pupil

_____ Providing for the slow pupil

_____ Finding good mathematics projects

_____ Finding time for helping individual pupils

_____ Other (specify) _____

15. SUPERVISION

Indicate the amount of supervision you received this year. Include both individual and committee consultation.

Source of Supervision	Number of Hours	Rating: Inadequate	Adequate	More than Adequate
School Principal	_____	1 ☐	2 ☐	3 ☐
Head of Department	_____	1 ☐	2 ☐	3 ☐
Mathematics Supervisor for District, County, or City	_____	1 ☐	2 ☐	3 ☐
Mathematics Supervisor State Department of Education	_____	1 ☐	2 ☐	3 ☐
General Supervisor for the State Department of Education	_____	1 ☐	2 ☐	3 ☐
College or University Consultant	_____	1 ☐	2 ☐	3 ☐
Other (specify)	_____	1 ☐	2 ☐	3 ☐

16. DECIDING TO BE A MATHEMATICS TEACHER

A. Indicate by a check when you decided to become a mathematics teacher.

1 ☐ Before entering high school

2 ☐ In grades 9 or 10

3 ☐ In grades 11 or 12

4 ☐ While a freshman or sophomore in college

5 ☐ While a junior or senior in college

6 ☐ After college

7 ☐ Do not know

B. Check (by one) most important factor which influenced your decision to become a mathematics teacher.

0 ☐ A high school teacher
1 ☐ A college teacher
2 ☐ Your parents
3 ☐ A particular course in high school
4 ☐ A particular course in college
5 ☐ A scientist or mathematician
6 ☐ A guidance counsellor
7 ☐ A school principal
8 ☐ Natural interest in mathematics
9 ☐ Reason unknown
x ☐ Other (specify) _____

C. Check one box to indicate any career ambition you may have had prior to your decision to become a teacher.

01 ☐ Engineering
02 ☐ Science
03 ☐ Agriculture
04 ☐ Business
05 ☐ Teaching in another field
06 ☐ Teaching was first ambition
07 ☐ Law
08 ☐ Medicine
09 ☐ Religion
10 ☐ Nursing
11 ☐ Military
12 ☐ Other

D. Do you expect mathematics teaching to be your career?

1 ☐ Yes 2 ☐ No

17. Helpfulness of Graduate Mathematics Courses: In general, to what extent have your graduate college mathematics courses been helpful in your present position?

1 ☐ Have had no graduate courses in mathematics
2 ☐ Very helpful
3 ☐ Fairly helpful
4 ☐ Not very helpful
5 ☐ Not helpful at all

18. Helpfulness of Undergraduate Mathematics Courses: In general to what extent have your undergraduate college mathematics courses been helpful in your present position?

1 ☐ Have had no undergraduate courses in mathematics
2 ☐ Very helpful
3 ☐ Fairly helpful
4 ☐ Not very helpful
5 ☐ Not helpful at all

19. Helpfulness of Education Courses:

1 ☐ Have had no education courses
2 ☐ Very helpful
3 ☐ Fairly helpful
4 ☐ Not very helpful
5 ☐ Not helpful at all

20. Helpfulness of Practice Teaching

1 ☐ Have had no practice teaching
2 ☐ Very helpful
3 ☐ Fairly helpful
4 ☐ Not very helpful
5 ☐ Not helpful at all

GPO 881701

(1) (2) (3) (4) (5)

Do not write in the spaces above

Budget Bureau No. 51-R710
Approval expires May 31 1964

SEC 9-P

Questionnaire
on
Mathematics and Science Education
in Public High Schools

(To be filled in by the high school principal)

1. NAME OF SCHOOL _____ CITY OR COUNTY _____ STATE _____

In attempting to improve instruction in mathematics and science, national organizations and committees have been handicapped by lack of basic information on a national level. How much time is being devoted to certain topics in mathematics and science? How heavy is the teaching load of science and mathematics teachers? How are they getting along financially? Will the age of teachers in these areas result in many vacancies in the near future? Some of these data are personal but essential for planning on a State or national level. The information from this questionnaire will be confidential--only the composite information of the entire survey will be made public. Please return it promptly. Only a sample of high schools is being used in this study, your response is important in making the sample representative.

2. Give the data for your high school requested below.

Courses	Was course offered since school year 1953-54?		Grade level of most pupils in the course the last time it was taught.				Present enrollment in each course. (If being offered)	Number of sections
Mathematics	Yes	No	9th	10th	11th	12th		
U. S. Arithmetic	1☐	2☐	3☐	4☐	5☐	6☐		
General mathematics	1☐	2☐	3☐	4☐	5☐	6☐		
Elementary algebra	1☐	2☐	3☐	4☐	5☐	6☐		
Intermediate algebra	1☐	2☐	3☐	4☐	5☐	6☐		
Plane geometry	1☐	2☐	3☐	4☐	5☐	6☐		
Solid geometry	1☐	2☐	3☐	4☐	5☐	6☐		
Trigonometry	1☐	2☐	3☐	4☐	5☐	6☐		
College algebra	1☐	2☐	3☐	4☐	5☐	6☐		
Analytical geometry	1☐	2☐	3☐	4☐	5☐	6☐		
Mathematical analysis	1☐	2☐	3☐	4☐	5☐	6☐		
Advanced General Math.	1☐	2☐	3☐	4☐	5☐	6☐		
Mathematics Review	1☐	2☐	3☐	4☐	5☐	6☐		
Consumer Mathematics	1☐	2☐	3☐	4☐	5☐	6☐		
Business Mathematics	1☐	2☐	3☐	4☐	5☐	6☐		
Other (specify)								
_____	1☐	2☐	3☐	4☐	5☐	6☐		

Courses	Offered in last 3 school years?		Grade level of most pupils				Present enrollment in each course	Number of sections
Science	Yes	No	9th	10th	11th	12th		
General science	1	2	3	4	5	6		
Biology	1	2	3	4	5	6		
Chemistry	1	2	3	4	5	6		
Physics	1	2	3	4	5	6		
Advanced General Science	1	2	3	4	5	6		
Aeronautics	1	2	3	4	5	6		
Astronomy	1	2	3	4	5	6		
Radio & Electronics	1	2	3	4	5	6		
Physiology	1	2	3	4	5	6		
Earth Science	1	2	3	4	5	6		
Other (specify)								
_____	1	2	3	4	5	6		

3. Are the following combinations offered?

Yes	No	Subjects
1	2	General Science alternates with Biology
1	2	Physics alternates with Chemistry
1	2	Plane Geometry alternates with Intermediate Algebra
1	2	Intermediate Algebra alternates with Trigonometry and Solid Geometry
1	2	General Mathematics alternates with Elementary Algebra

4. Indicate the extent to which you have had pressure, stimulation and encouragement from State or local groups for the improvement of science and/or mathematics instruction.

1 ☐ Considerable 3 ☐ Little

2 ☐ Some 4 ☐ None

5. Indicate the extent to which your science and mathematics instruction program has changed during the last three years as a result of the influences or pressures of State and local groups.

1 ☐ Considerable 3 ☐ Little

2 ☐ Some 4 ☐ None

6. High School Enrollment Data

Grade	Number of pupils		
	Boys	Girls	Total
Grade 7			
Grade 8			
Grade 9			
Grade 10			
Grade 11			
Grade 12			

7. Institutes or Workshops

A. Have any of your teachers attended a summer or year-long mathematics and/or science institute or workshop during the past two years?

1 ☐ Yes 2 ☐ No

If the answer is Yes,

(a) Have you observed any marked change in the effectiveness of the teacher(s) as a result?

1 ☐ Yes 2 ☐ No

(b) Have you observed any tendency on the part of the teacher(s) who attended the workshop to give other teachers the benefit of this experience?

1 ☐ Yes 2 ☐ No

B. Indicate the value in your **opinion** of **such** institutes or such workshops for science and mathematics teachers.

1 ☐ Extremely valuable 4 ☐ Of little value
2 ☐ Very valuable 5 ☐ No opinion
3 ☐ Valuable

8. **Graduation Requirements** in Mathematics and Science.

A. Number of Semesters of Mathematics

1. _____ College bound pupils
2. _____ All pupils

B. Number of **Semesters** of Science

1. _____ College bound pupils
2. _____ All pupils

9. **Specific-course requirements for graduation.**

A. Mathematics Courses	(check one) Required of All pupils	Some pupils	No pupils
1. General math. (9th)	1 ☐	2 ☐	3 ☐
2. Elem. algebra	1 ☐	2 ☐	3 ☐
3. Plane geometry	1 ☐	2 ☐	3 ☐
4. Intermediate algebra	1 ☐	2 ☐	3 ☐
5. Solid geometry	1 ☐	2 ☐	3 ☐
6. Trigonometry	1 ☐	2 ☐	3 ☐
7. Other (specify) _____	1 ☐	2 ☐	3 ☐

B. Science Courses			
1. General science	1 ☐	2 ☐	3 ☐
2. Biology	1 ☐	2 ☐	3 ☐
3. Chemistry	1 ☐	2 ☐	3 ☐
4. Physics	1 ☐	2 ☐	3 ☐
5. Physical science	1 ☐	2 ☐	3 ☐
6. Adv. gen science	1 ☐	2 ☐	3 ☐
7. Other (specify) _____	1 ☐	2 ☐	3 ☐

10. **Teaching Guides or Courses of Study**

A. **Is a locally developed teaching guide being used in your school**

(a) In Science? (b) In Mathematics?
1 ☐ Yes 2 ☐ No 1 ☐ Yes 2 ☐ No

B. Did your **teachers take part in developing** a local teaching guide or course of study last year

(a) In Science? (b) In Mathematics?
1 ☐ Yes 2 ☐ No 1 ☐ Yes 2 ☐ No

C. Do you plan to develop a local teaching guide or course of study this year

(a) In Science? (b) In Mathematics?
1 ☐ Yes 2 ☐ No 1 ☐ Yes 2 ☐ No

11. During the past five years the science and mathematics **course** requirements for high school graduation for pupils who plan to go to college have: (check one)

	IN-CREASED	DE-CREASED	NOT CHANGED	DO NOT KNOW
Science	1 ☐	2 ☐	3 ☐	4 ☐
Mathematics	1 ☐	2 ☐	3 ☐	4 ☐

12. Number of class periods in school day (check one)

1 ☐ Four or less 4 ☐ Seven
2 ☐ Five 5 ☐ Eight or more
3 ☐ Six

13. Length in minutes of most classes. (check only one)

1 ☐ 0-40 3 ☐ 46-50 5 ☐ 56-60
2 ☐ 41-45 4 ☐ 51-55 6 ☐ 61 or more

14. How many more free periods each day do the full-time teachers who teach only science have for preparing demonstrations, clearing up equipment, getting ready for laboratory work, etc., than other classroom teachers?

0 ☐ None 1 ☐ one 2 ☐ two or more
3 ☐ Have no teacher devoting full-time to science

15. Compare the amount of money spent per pupil for science equipment and materials this year with last year.

1 ☐ Increased 3 ☐ Not changed
2 ☐ Decreased 4 ☐ Information not available

16. A. Most of the supplementary science books are in

1 ☐ Library 2 ☐ Science classroom
3 ☐ Neither

B. Most of the supplementary **mathematics** books are in

1 ☐ Library 2 ☐ Mathematics classroom
3 ☐ Neither

17. By checking, indicate the number of science and/or mathematics teachers who have left your school to go into industry during the last two years to your certain knowledge.

1 ☐ None 3 ☐ 2-3 5 ☐ Do not know
2 ☐ One 4 ☐ 4 or more

18. New teachers of science and mathematics

A. Yes ☐ No ☐ Employed new teachers of science this year

B. Yes ☐ No ☐ Had difficulty in securing new science teachers

C. Yes ☐ No ☐ Employed new teachers of mathematics this year

D. Yes ☐ No ☐ Had difficulty in securing mathematics teachers

19. Does your school attempt to place superior science or mathematics pupils in summer industrial employment?

1 ☐ Yes 2 ☐ No

20. Does your school provide a summer school program for superior mathematics and science pupils?

1 ☐ Yes 2 ☐ No

21. For those courses in science and mathematics in which the pupils are grouped homogeneously, please indicate the criteria being used by placing the appropriate number of the item before the science or mathematics course in the table below to which it applies: (For example, if the pupils in general science are divided into sections on the basis of intelligence tests, place a 2 before general science, if on the basis of aptitude tests, place the number 1. If not grouped homogeneously in a subject, write in an 8.)

1. Aptitude tests
2. Intelligence tests
3. Achievement tests and/or previous grades
4. Pupil's interest
5. Parents' desires
6. Combination of above
7. None of the above
8. Not grouped homogeneously

SCIENCE COURSE	MATHEMATICS COURSE
____ General Science	____ General Mathematics
____ Biology	____ Elementary Algebra
____ Chemistry	____ Plane Geometry
____ Physics	____ Intermediate Algebra
____ Physical Science	____ Trigonometry

22. A. Are the practices listed below currently being used to increase enrollment in science and/or mathematics?

	Yes	No
1. Use of mathematics and science teachers for guidance counseling	1☐	2☐
2. Use of local scientists and engineers in class and assembly programs	1☐	2☐
3. Special school planned assembly programs about science and mathematics	1☐	2☐
4. Special parent-teacher programs about science and mathematics	1☐	2☐
5. Field trips to industry and institutions	1☐	2☐
6. School-sponsored science and mathematics clubs	1☐	2☐
7. Participation in science and mathematics fairs	1☐	2☐
8. Bulletin board publicity on mathematics and science	1☐	2☐
9. Displays of pupil projects in science and mathematics	1☐	2☐
10. Other (specify) _____	1☐	2☐

B. Circle the number in front of the one practice above, which in your judgment is the most effective.

23. Are the following types of supervisors or consultants available to science and mathematics teachers in your school?

TYPE OF SUPV. OR CONSULTANT	SCIENCE Yes	SCIENCE No	MATHEMATICS Yes	MATHEMATICS No
City or county supervisor				
General	1☐	2☐	1☐	2☐
Special	1☐	2☐	1☐	2☐
State Dept. supervisor				
General	1☐	2☐	1☐	2☐
Special	1☐	2☐	1☐	2☐
Consultant from college or university	1☐	2☐	1☐	2☐
Other (specify) _____	1☐	2☐	1☐	2☐

24. Please attach a copy of the daily schedule for your school to the questionnaire.

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