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INFLUENCES TENDING TO IMPROVE
THE WORK OF THE TEACHER
OF MATHEMATICS

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OF MATHEMATICS
THE AMERICAN REPORT
COMMITTEE NO. VIII



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THE AMERICAN REPORT.

Committee No. VIII. Influences Tending to Improve the Work of the Teacher of Mathematics in the United States.

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INFLUENCES TENDING TO IMPROVE THE WORK OF THE TEACHER OF MATHEMATICS.

I. GENERAL REPORT.

The six subcommittees of this committee have presented somewhat detailed reports. Some of the topics investigated by the subcommittees were naturally more fruitful than were others, and some of the reports were of necessity of a much more general nature than were others. It is the work of the chairman to summarize the different reports, adding such additional material and comment as may seem pertinent.

The report of the first subcommittee, Prof. Cole chairman, deals with the influence of "Scientific societies and periodical literature" in improving mathematical instruction. In this report Prof. Cole and his committee point out the very important work of the American Mathematical Society in improving higher mathematical instruction. This society has a history of 20 years, a membership of over 600, and includes and has included among its members almost every American mathematician of standing. The society issues a yearly volume of Transactions, in which the more important papers read before it are published, and a Bulletin, in which shorter original papers, reports, reviews, and notes of general interest are printed. Section A of the American Association for the Advancement of Science covers mathematics and astronomy and frequently holds joint meeting with the American Mathematical Society. Both of these associations, however, deal almost entirely with pure mathematics and with the advancement of mathematical knowledge rather than mathematical instruction and have only indirectly influenced the teaching of mathematics below the university. Only about 10 per cent of the membership of the American Mathematical Society consists of secondary-school teachers.

At many of the universities local mathematical clubs exist. These are composed of instructors and students, and many of the latter become teachers of mathematics in the secondary schools. About a dozen universities publish more or less important mathematical contributions, and a number of the State normal schools have issued special bulletins designed to improve the teaching of arithmetic in

the elementary schools of the State. Seven important mathematical magazines are issued, and four other magazines intended primarily for teachers in secondary schools contain mathematical articles from time to time.

The report of the second subcommittee, Prof. Le Gras chairman, deals with the work of "Teachers' associations and reading circles." Associations of teachers of mathematics are found in different parts of the United States, the committee listing 15 important mathematical societies, extending in location from New England to California and from Dakota to Arkansas, and nearly all of which have been organized during the past 10 years. The membership of these associations is made up almost entirely of the men and women who teach mathematics in the public and private secondary schools in the States or divisions in which the section or association is established. Many of these associations are in turn subdivided into a number of local sections, which meet from time to time for the reading of papers and the discussion of methods of teaching mathematics in the secondary schools. Most of these associations, clubs, or sections have written constitutions and by-laws, a full set of officers, dues, and stated meetings. The meetings are held at some high school or college, papers are prepared and read by the members and discussed by those present, and a luncheon between sessions commonly affords an opportunity for acquaintance and further discussion of a less formal kind. The purpose of nearly all of these associations, clubs, and sections is the improvement of the teaching of mathematics through an increase of interest in the subject and the extension of personal acquaintance among the teachers. Special committees frequently investigate and report upon certain definite topics related to the improvement of instruction in mathematics in the secondary schools. A number of syllabi of instruction have been prepared and printed; the relation of secondary and college work in mathematics has been discussed; conferences of instructors of mathematics in colleges and secondary schools have been held; and a few bulletins have been issued. The consideration of these reports and the discussion of the papers have awakened new interest in the subject of mathematical instruction and have led to better understanding and relations between the colleges and State departments of education on the one hand and the secondary schools on the other.

In 1905 the delegates from a number of these mathematical associations and clubs, present at the meeting of the National Educational Association at Asbury Park, took steps looking toward the formation of a national association, and in December, 1907, the American Federation of Teachers of the Mathematical and the Natural Sciences was formed. The purpose of this federation is the uniting of the different mathematical associations into a union, whereby the work

of each may be made available to all. Sound learning, good instruction, and an improvement of the work have resulted from the work of the different associations.

The report of the third subcommittee, Dr. Stamper chairman, deals with the effects and work of "Teachers' institutes." In this report the committee has traced briefly the history of teachers' institutes in America, explained their past and present service, and indicated in how far institute work deals with mathematical instruction. The teachers' institute in America had its beginnings as a voluntary movement to help teachers and began before the establishment of normal schools. As the normal school rose into a position of importance, the teachers' institute, which at first was a summer institute of some weeks' duration, declined in importance and was superseded by a shorter gathering, usually of three to five days' duration and commonly held in the winter months. Recently a revival of the old six-weeks' summer institute has come in the form of regular summer schools, established either by the State or by the normal schools, colleges, and universities as a voluntary undertaking, for the purpose of improving the teachers already in the service and of giving some instruction of a helpful kind to those about to enter the work who have not had the benefit of normal-school training.

The ordinary teachers' institute, as now held quite generally throughout the United States, is of short duration, usually three to five days. Such gatherings are generally called by the county school authorities, though they are sometimes held under the direction of the State educational authorities. Large cities commonly hold separate institutes. The purpose of these shorter institutes is the improvement of the teachers already in service, and not infrequently, the work of the institute is largely of an inspirational nature. Where the number of teachers present is sufficiently large, the institute is in part divided into sections for sectional work, and it is in these sections that any special work in mathematics is usually done. In the larger county and city institutes high-school sections are commonly organized, and these often have special work on instruction in secondary-school mathematics. These shorter institutes devote, on the average, perhaps two to three hours to subject matter and methods of teaching mathematics, chiefly arithmetic. The short duration of the sessions practically precludes anything else. Demonstrations of arithmetical work are not infrequently made by teachers before such gatherings, using children from the public schools of the vicinity.

In the summer schools, such as are now conducted by many universities and normal schools, and also by a few States as separate State affairs, the session is usually six weeks in length. Subject matter is treated as well as method, and receives the major emphasis. The colleges and universities enroll thousands of secondary-school

teachers during these summer sessions, and the normal schools similarly enroll thousands of present and prospective teachers in the elementary schools. Many of these pursue courses in algebra, geometry, and methods of instruction in mathematics.

The work done by the regular teachers' institute—of only a few days' duration—can not be said to be of special importance in advancing instruction in mathematics, except in so far as the method of instruction is improved by the presentation of new ways and new processes, but the summer schools do a distinct service in extending to teachers the opportunities for advanced mathematical instruction.

The report of the fourth subcommittee, Prof. Skinner chairman, on "State supervision and inspection," is a very carefully prepared report, analyzing the whole American scheme of school administration, and explaining the work of the State superintendent of education, the State board of education, the county superintendent of schools, the county board of education, the independent school district, and the methods of inspecting schools. The report is of necessity somewhat general in nature, as there is practically no State or county inspection of mathematical instruction separate from the general inspection of public schools, except in the case of a few State universities which inspect secondary schools, for accrediting purposes, by subjects instead of by schools. In so far as inspection takes place, it is in nearly all cases an inspection of the work of the school as a whole, the mathematical work being but a part.

This committee points out that our schools are organized in State and local systems, and not as a national system; that there is great difference between the States with regard to the efficiency of the State departments of education; that county supervision by a county superintendent is very general, but that the inspection made by these officers is almost entirely of elementary schools, where arithmetic is the only branch of mathematics taught; that in about one-fourth of the States definite provision has been made for the inspection of the work of the secondary schools by the State; that in many of the States of the North Central and Western Divisions of States the State university has voluntarily organized a very efficient system of inspection and accrediting of the secondary schools of the State; that there is as yet no supervision or inspection of the private and parochial schools of the State; and that the work of the different State universities and large private institutions, themselves uninspected by the State, has been one of the most important and potent influences in the elevation of the work of the schools below them.

The report of the fifth subcommittee, Dr. Jackson chairman, on the "Activities of publishers and their agents," points out the service rendered by the large book companies. The work of the publishing houses in hunting out and publishing good books by new and old

authors; the thoroughly organized force of agents who introduce the books to the teachers of the United States; and the many forms of educational advertising employed by the publishers to attract attention to the new books, and to explain their merits and usefulness—these are explained and dwelt upon. A number of publishers issue educational monographs, professional books, and works of reference, which serve to stimulate professional interest and to pave the way for the introduction of the new books and for advances in the methods of instruction in the schools. Perhaps in no country in the world do the large publishing houses do so much of an educational nature, or are their salesmen so well educated and so expert, as in America, and the result is that new ideas soon find their way to the teachers in the schools. In all of this work mathematics enters as a part only, but in so far as new and good works on this subject are published, the effect on the instruction in mathematics in the schools is good.

The report of the sixth subcommittee, Prof. Slaughter chairman, on "The teaching of mathematics in summer sessions of universities and normal schools," points out in some detail the very valuable service which has been rendered in recent years by the summer sessions. A relatively new feature in our educational work, the summer session has been received with unexpected favor, and each year witnesses a still further increase in the number of teachers and students attending and in the scope of the work offered. Prof. Slaughter lists 20 of the larger American universities and gives statistics as to courses in mathematics and number of students attending, and these tables reveal the large interest awakened by the extension of these new educational opportunities. What Prof. Slaughter points out as true for the larger universities and for teachers of mathematics in the secondary schools is also true to a much greater degree of the many summer sessions of the State normal schools and for the teachers in the elementary schools, in which arithmetic is the mathematical study. The attendance at the summer sessions of the different State normal schools in Illinois in 1910, for example, exceeded the attendance at the summer sessions of the University of Chicago and the University of Illinois combined. The same was true for a number of other States. The teachers in both the elementary and the secondary schools have shown a great eagerness to attend these summer sessions. The study of mathematics in them has received its share of students, and the teaching of mathematics has been, in consequence, greatly benefited. Even the university courses in the pedagogy of mathematical teaching have been fairly well attended, while in the normal schools the instruction has been chiefly along the pedagogical side.

II. SUBCOMMITTEE REPORTS.

SUBCOMMITTEE 1. SCIENTIFIC SOCIETIES AND PERIODICAL LITERATURE.

Like other professional men and women of to-day, the teacher of mathematics, whether in school or university, must see to it that his mind is kept in a growing state. From time to time he must get improved seed from association with his fellows, from modern books and journals, from the scholars and the leaders in the science. In America there is one large national society, the American Mathematical Society, whose activities during the 20 years of its existence have been practically coextensive with the great growth of higher mathematics in this country. Its membership of over 600 includes almost every American mathematician of standing. The meetings and sectional meetings, which are held ten times each year in different parts of the country, afford a most valuable opportunity for keeping in touch with the science and the men who represent it. Many of the more important papers read before the society are published in its Transactions. The Bulletin of the society contains shorter original papers, reports, and reviews, notes of general interest, and bibliography. The latter journal should be interesting to many teachers in secondary schools, who now form only about 6 per cent of the society's membership.

The annual meeting of the American Association for the Advancement of Science brings together each year a great body of teachers and scientists, at which the members find much of interest and value. Section A of the association covers mathematics and astronomy. Frequently the mathematical papers of section A are read in joint session with the American Mathematical Society. All members of the association receive the journal, *Science*, without extra charge.

The subject of teachers' associations is in charge of another committee. In the present report should further be mentioned the various academies of science, few of which, however, show any important output in mathematics. There are a few mathematical societies of local character. At most of the universities there are mathematical clubs, conducted by the graduate students under the direction of the faculty.

The following is a list of mathematical and other journals published in this country that are of special interest and value to teachers of mathematics:

- American Journal of Mathematics. Published quarterly, \$5. 4°. Baltimore, Md. (Advanced research.)
- Transactions of the American Mathematical Society. Published quarterly, \$5. 4°. New York. (Advanced research.)
- Annals of Mathematics. Published quarterly, \$2. 4°. Cambridge, Mass. General mathematics and research problems of a more or less elementary character. (Expository articles.)
- Bulletin of the American Mathematical Society. Ten numbers a year, \$5. 8°. New York. (General mathematics, book reviews, notes on current events, and bibliography.)
- American Mathematical Monthly. Published monthly, \$2. 8°. Springfield, Mo. (General mathematics and problems.)
- School Science and Mathematics. Nine numbers a year, \$2. 8°. Chicago, Ill. (General science, with department of mathematics.)
- Mathematics Teacher. Published quarterly, \$1. 8°. Syracuse, N. Y. (Devoted to mathematical pedagogy and related questions.)
- School Review. Ten numbers a year, \$1.50. 8°. Chicago, Ill. (General educational matters, with occasional articles on mathematics.)
- Journal of Pedagogy. Published quarterly, \$1.50. 8°. Syracuse, N. Y. (General educational matters, with occasional articles on mathematics.)
- Educational Review. Ten numbers a year, \$3. 8°. New York, N. Y. (General educational matters, with occasional articles on mathematics.)
- Education. Published monthly, \$3. 8°. Boston, Mass. (General educational matters, with occasional articles on mathematics.)

Several normal schools, colleges, and universities issue at more or less regular intervals bulletins, studies, and other publications devoted wholly or in part to mathematical science. The committee has made an effort to obtain as large a list as possible of these publications. To this end Prof. Gould prepared a circular letter and sent it to 160 institutions, including the leading universities, colleges, and normal schools. The circular invited information concerning any printed matter bearing on mathematics which was issued by the institutions and not contained in the regular journals nor published as textbooks. About 77 answers were received, and of these 61 report no publications of this kind.

Bryn Mawr College, Bryn Mawr, Pa., publishes college monographs on mathematics.

California State Normal School, Chico, publishes pedagogical bulletins on the teaching of arithmetic; lesson plans in arithmetic, etc.

The State normal school at San Jose, Cal., has issued a monograph on teaching arithmetic and a brief course in concrete geometry. (See California Education, 1909.)

The University of California, Berkeley, issues monographs and has a mathematical series in the publications of the University of California which contain researches by members of the mathematical department.

The University of Cincinnati, Cincinnati, Ohio, issues a bulletin and occasional mathematical studies.

Columbia University, New York, occasionally publishes mathematical monographs, several of which have appeared in the Teachers College Contributions to Education.

The University of Illinois, Urbana, prints a series of studies, some numbers of which are devoted to mathematical topics of general interest.

The State University of Iowa, Iowa City, has published occasional articles on mathematics in the Transit, a publication of the college of applied science.

The University of Kansas, Lawrence, publishes a science bulletin, some topics being mathematical; and the University of Missouri; Columbia, publishes the bulletin of the Laws Observatory. This latter is chiefly of astronomical interest.

The State normal schools at Lewiston, Idaho, and Charleston, Ill., have issued bulletins on mathematical pedagogy. The publications are not regular.

An occasional bulletin on topics in arithmetic is contributed by the Montana State Normal School, Dillon, and the State normal school at Milwaukee, Wis., contributes a quarterly bulletin containing discussions on elementary mathematics.

The list is closed with the University of Pennsylvania, Philadelphia, giving an irregular series mainly devoted to theses; and Princeton University, Princeton, N. J., in which the mathematics department issues a circular on advanced topics or of research work.

Notwithstanding the fact that a comparatively small number of affirmative replies were received, there can be little doubt that all the higher educational institutions issue occasional bulletins, studies, or outlines bearing on the teaching of mathematics.

SUBCOMMITTEE 2. TEACHERS' ASSOCIATIONS.

ASSOCIATIONS AND MEMBERSHIP.

Associations of teachers of mathematics exist in a large number of the principal territorial divisions of the United States, as, for instance, in New England, the Middle States, the Central States, and in the groups of States near the Pacific. The membership of each of these associations is made up of the men and women who teach mathematics in the secondary schools, both public and private, situated in the division in which the association is established. Among the members of any particular association are also some of the professors and instructors of mathematics in the universities and colleges located within the territory of that association.

LIST OF ASSOCIATIONS.

The most important associations are:

- Association of Mathematical Teachers in New England, membership about 250.
- Association of Teachers of Mathematics in the Middle States and Maryland, membership about 600.
- Central Association of Science and Mathematics Teachers, membership about 550.
- Association of the Teachers of Mathematics in Washington.
- Central Iowa Association of Science and Mathematics Teachers.
- Colorado Mathematics Association; membership about 60.
- Kansas Association of Mathematics Teachers.
- Mathematics section of the California Teachers Association, membership about 40.
- Mathematics round table of the Iowa State Teachers Association.
- Mathematics section of the Arkansas State Teachers Association.
- Missouri Society of Teachers of Mathematics and Science, membership about 110.
- North Dakota Association of Science and Mathematics Teachers, membership about 30.
- North Eastern Ohio Association of Science and Mathematics Teachers, membership about 150.
- Science and mathematics section of the high school department of the Pennsylvania State Teachers Association.
- South Dakota Association of Science and Mathematics Teachers.

It should be added that within some of these organizations branches or subgroups have been formed called "sections," whose membership is limited to those residing in a certain State or city and its environs; for instance, the Rhode Island Mathematics Teachers Association and the Connecticut State Teachers Association are affiliated with the New England Association, and within the Middle States Association are 5 sections: (1) The New York, (2) the Philadelphia, (3) the Syracuse, (4) the Rochester, and (5) the Pittsburgh. The teachers in a group of schools will sometimes form an organization, as the Association of Teachers of Mathematics in the High Schools of the City of New York.

ORGANIZATION—PURPOSES—MEETINGS.

All these associations and sections have formally written constitutions and by-laws, which with the list of members are usually printed and distributed among the members. There is generally a full complement of officers, including a president or chairman and a council which controls the affairs of the association. The dues of members in the associations are as a rule \$1 a year and in the sections a smaller sum. The associations meet usually twice a year, (1) at the Easter recess and (2) at the Thanksgiving recess, with sometimes an additional meeting in midwinter. The sections have, in addition, about the same number of meetings. The meetings are held at some college or high school whose authorities are pleased to place at the disposal of the association or section all the necessary accommodation for a meeting. In the case of a general association, a meeting usually

consists of two sessions, one in the morning and one in the afternoon, with an opportunity between sessions for the members to lunch together in a social way.

The purposes of the associations are declared to be the *improvement of the teaching of mathematics*, the *increase of interest* in mathematics, and the encouragement of *personal acquaintance* among teachers of mathematics. The oldest of these associations was probably not organized before 1900. The largest and the most active are from 6 to 8 years old at this time.

The work of these associations is carried on by (1) the reading and discussion of papers at the meetings, and (2) by committees appointed to investigate and report upon certain definite elements of the teaching of mathematics in secondary schools. The papers are usually though not always written by members of the association or section to which they are presented.

We quote here a selected list of titles of such papers for illustration: Fundamental theorems and elementary algebra; Some problems in the teaching of elementary algebra; Mathematics in engineering; Mathematics in industrial schools; Mental geometry; Book problems; Special methods of teaching mathematics; The teaching of algebra and geometry for knowledge and power; The marking of papers in mathematics; Teaching pupils how to study; The graph in early algebra; Limits; Teaching of mathematics in elementary and secondary schools; Syllabus method in geometry; Modern tendencies; Intuition and logic in geometry; Some thoughts on space; Where the emphasis should be laid; What should be omitted in algebra.

The above list might be easily extended, but it may suffice to say that the discussion of these and other topics has served to awaken the teacher's interest and to sharpen his vision so that the teaching of mathematics has been improved and is certainly being improved.

Committees have from time to time been appointed to study given subjects. The New England association has had a committee on "Alleged defects in mathematical instruction," with special reference to arithmetic; another on "College entrance requirements in mathematics." A committee has drawn up a Syllabus of geometry which has been submitted to other organizations in the United States. The Middle States association has adopted a Syllabus of elementary and intermediate algebra, reported by a committee which is now at work on a Syllabus of advanced algebra. A committee has reported on "Uniform methods of marking papers in mathematics." The central association has also had a committee on a Syllabus for algebra and the committee has made a preliminary report. The work of the associations and of their committees has had an undoubted influence on (1) the relations between colleges and secondary schools, tending toward more uniform interaction between

the two and more definite conditions for college entrance examinations, and on (2) the State departments of education in the formation of syllabuses and in the conduct of examinations.

PUBLICATIONS.

The larger associations, such as those of New England and of the Middle States, have published bulletins from time to time. (In the central association these take the form of annual *Proceedings*.) In these bulletins the proceedings of the particular associations which publish them are recorded. The associations of New England and of the Middle States have issued several joint bulletins. The Middle States association now publishes a quarterly known as *The Mathematics Teacher*. It contains some of the papers read at association and sectional meetings and other matter of interest to teachers. *School Science and Mathematics* is the official organ of the Central Association of Science and Mathematics Teachers and of several other of the associations mentioned above. It devotes a considerable portion of its space to mathematics.

CLUBS.

In addition to the larger organizations there are some clubs located at certain institutions. Among these may be mentioned the "M. P. Club" composed of instructors in Harvard and in the Massachusetts Institute of Technology who are interested in mathematics and physics. This club has 120 members and has been in existence 28 years. There is also a flourishing students' mathematical club at Harvard. It has 60 members and meets once a fortnight. There is also a club of teachers of mathematics at Yale which meets once a fortnight and now has an existence of 30 years. Similar clubs, usually composed of instructors and advanced students, have long been in existence in other universities; for example, at Chicago, Columbia, Cornell, and Princeton.

The impetus to the formation of the associations and sections herein noted came from the colleges as well as from the secondary schools.

The American Federation of Teachers of the Mathematical and the Natural Sciences owes its inception to the formation of an executive committee from the delegates of a number of mathematical associations present at the meeting of the National Educational Association at Asbury Park, in 1905. In December, 1906, at a meeting of the American Association for the Advancement of Science, held in New York, 7 associations were represented by 27 delegates, and at the meeting of the Association for the Advancement of Science, held in Chicago in December, 1907, a larger number of associations were represented and the delegates drew up articles of federation to be

submitted for approval to the local associations. The federation is an instrument of union among the associations so that the work of each may be combined with that of others and so made available to all.

It will be noticed that some of the associations include both teachers of mathematics and teachers of various sciences. This is due to the fact that in a large number of schools mathematics and some science are taught by the same teacher, although the tendency to assign to the individual only one kind of work is rapidly increasing.

The associations have undoubtedly (1) sharpened the interest of teachers in their work; (2) wrought worthy changes in the quality and arrangement of matter to be taught; (3) improved everyday teaching; and (4) united schools and colleges into an organization which, with diminished waste of effort, works for sound learning and good education.

SUBCOMMITTEE 3. TEACHERS' INSTITUTES.

AIMS.

The teachers' institute is essentially an American institution. It is a peculiar product of a democracy in which Federal control of education is lacking. It was local in its origin and was a voluntary movement to help secure a higher standard of service in the teaching profession. Founded in a distinctive formative period in the development of American education, its growth has been closely associated with other movements intended to improve the preparation of teachers, especially with teachers' associations and with normal schools. The organization of these three influences tending to improve the work of the teacher was effectively brought about toward the end of the first half of the nineteenth century.

The institute aim is broader than that of the normal school, but is more specific than that of the teachers' association. The function of the teachers' institute is laid down by Henry Barnard, the founder of the system, as follows:

The object and legitimate scope of these meetings (institutes) must be, not to become a substitute for the patient, thorough, and protracted study which the mastership of any branch of knowledge requires; nor yet for the practical drilling which a well-conducted normal school alone can give; but to refresh the recollection of principles already acquired, by rapid reviews and by new and safe methods of presenting the same; to communicate hints and suggestions in aid of self-improvement, from wise and experienced instructors; to solve the difficulties and doubts of the inexperienced; and to enkindle, through the sympathies of numbers engaged in the same pursuits, the aspirations of a true professional feeling.¹

KIND OF INSTITUTES.

With respect to geographical units, teachers' institutes are classified into State, district, county, and city. The county institute is the most common and may be taken as the type. City institutes are

¹Barnard, Henry. *The American Journal of Education*, vol. 18, p. 277, Hartford, 1868.

common in most of the important cities of the United States and in many of the county seats in the various States. The State institute and the district institute are identical wherever the State officers have the management of the institute of the district.

In the smaller cities the teachers usually meet with the rural teachers in institute work. In the larger cities the institutes are generally separate from those of the county, district, or State. Thus, cities in California with 70 or more teachers are allowed to hold separate institutes. In some cities teachers' associations, teachers' clubs, or teachers' meetings take the place of the institute and often perform the same functions. In city institutes the work is frequently carried on in sections, after the manner of teachers' associations; that is, the different departments hold separate sessions. One or more general sessions complete the program.

ATTENDANCE.

Teachers are usually required to attend institutes when the sessions are held during the school year, but when held in the vacation they are rarely required to attend. Some States offer special inducements to secure the attendance of teachers during vacation. Teachers are usually paid their regular salaries while in attendance upon institutes. When they are held during vacation, salaries are not paid.

DURATION.

The number of institutes a year and the duration of each depend again upon the locality. The typical county institute is held once a year and lasts five days. When the session is more than a week the institute assumes more the character of a regular training school. In some States institutes are held several times in the year, the sessions being shorter, sometimes but a half day in length. Such institutes could properly be called teachers' meetings.

MODES OF CONDUCTING INSTITUTES.

Instructors employ a variety of modes in conducting institutes. The following are found in the different localities: Lecture plan, presentation of special method, lessons exemplified by classes, and recitation mode as in regular school work. One or more of these modes may be found in any one institute, the determining factor being primarily the locality.

The lecture mode is in common use in the cities and other localities where teachers have either received professional training or have opportunities to receive professional aid through other sources than institutes, namely, teachers' associations or teachers' clubs. In the use of this mode the instructor seeks to inspire rather than to instruct.

his listeners. He discusses the more general topics in the educational field. The lecture mode has become popular in some States and has given rise to a class of professional institute instructors who make it their chief work to lecture at institutes not only in one State but in several.

Much use is made of instruction in special method. This is common especially in communities where a large proportion of the teachers lack professional preparation, but it is also very common in rural communities even where teachers have been well trained. In the use of this mode the instructor deals with matters of detail in everyday work. He discusses the pros and cons of certain aspects in the development of subject matter. He gives special plans and devices and invites the teachers to raise questions for discussion.

In connection with the above mode, instructors occasionally illustrate their methods by class instruction, using pupils from the schools or in lieu of children choosing a group of teachers for illustrative purposes. This mode is especially valuable where the teachers are inexperienced or have had little professional training. Its use is generally restricted to primary methods.

In localities where the majority of teachers have had little academic or professional preparation the institute assumes more nearly the character of a regular school and the sessions are consequently of longer duration, usually about two weeks. Teachers are expected to prepare lessons and recite on the same. Attention is given to both subject matter and method.

INSTITUTE WORK AS IT RELATES TO MATHEMATICS.

The character of the institute work in arithmetic depends largely upon the aims of the institute itself. In institutes of two to six weeks' duration—those that have the character of summer normal—arithmetic is treated both as in regular school work and from the point of view of method. In localities where teachers have not generally had adequate academic and professional training especial attention is given to subject matter, and teachers are drilled after the ordinary school fashion.

In the typical county institute there is little time to drill teachers in the subject matter of arithmetic, the instructors usually confining their attention to the side of method. Perhaps the average institute gives from two to three hours to arithmetic during a five days' session. In this time the instructor may give his time wholly to the detail of special method or, perhaps, set before the institute the latest reforms and tendencies in the teaching of arithmetic.

The topics of a more general nature discussed by institute instructors may be those concerned with the enriching of the course of study, the making of arithmetic practical, the elimination of waste material,

the relative value of the topical and spiral plans in the arrangement of subject matter, the place of algebra and geometry in the elementary school, and others. In presenting special method the instructor may relate it to devices for the lower grades, the teaching of the fundamental operations, explanations of problems, special topics like percentage, etc. Instructors occasionally illustrate methods in early number work by classes from the schools.

It is not uncommon to find institutes where arithmetic is omitted from the program. This is especially the case in city institutes, where the meetings are apt to be only of an inspirational nature.

PRESENT TENDENCIES.

Tendencies vary.—There is a lack of unanimity in the tendencies and reforms in institute work throughout the United States. This is shown in the published reports, but especially in responses obtained from State and city superintendents. Some of the responses read as follows: "Toward sectional and local institutes;" "To county institutes (three days);" "Toward more work in methods;" "Toward summer normals;" "Back to methods;" "Toward the professional;" "Institutes replacing summer normals;" "Lecture method;" "Inspirational;" "Special method in industrial lines;" "Programs arranged for section work;" "More model teaching;" "Preliminary institute before opening of schools;" "Joint meetings with teachers' associations." The answers indicate a variety of aims. That which is considered a reform in one locality appears to be a step backward in another. It seems that there is a widespread demand for reform in institute work, but for the most part the efforts have been spasmodic.

Summer normals.—There is a strong tendency in certain sections of the country to substitute for the institute, either wholly or in part, the summer normal or training school. This has grown out of a tendency on the part of school authorities to have something well defined and covering a longer period of time, usually about six weeks. Many universities now offer summer courses that attract teachers of elementary and secondary schools, but these usually bear no relation to institute work.

Institutes for teachers of secondary schools.—In recent years there have been tendencies in certain quarters to provide institutes for secondary-school teachers, or, more commonly, to provide them separate sections in the regular institute. The tendency to enlist the cooperation of teachers of secondary schools in institute work is the result of or parallels the effort in recent years to secure for them better professional training. It has been the practice in most States to require the secondary teachers to attend the general institutes and fit in as best they may. In cities which hold institutes separate from those

of county or State there are usually provisions made for section work, to accommodate the teachers of secondary schools.

Little attention seems to be given to the mathematics of the high school, especially with respect to the technique of teaching. The topics of this character, which appear but too rarely on the institute programs, are largely of a general professional nature.

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In addition to the above references the committee has made use of school laws and educational reports from the various States and of answers to questionnaires sent to the various State superintendents of public instruction and to the city superintendents of many of the important cities of the United States. For a more complete bibliography, see that given in the report of the Illinois educational commission, which is mentioned above.

**SUBCOMMITTEE 4. STATE SUPERVISION AND INSPECTION
OF INSTRUCTION.**

It must be understood at the outset that there is at the present time almost no State supervision and inspection that applies to one subject rather than to another. The language of this report is therefore general and would apply as well to a report on State supervision and inspection in the teaching of Latin as in the teaching of mathematics.

The States differ widely in the amount and the character of the control exercised over the schools within their borders. In every case, however, some attempt at supervision is made, and in many very efficient systems have been established.

THE STATE SUPERINTENDENT.

Almost without exception the educational affairs of each State are administered by an officer called the State superintendent of public instruction, or the State school commissioner. In the majority of the States this officer is elected by the people for a term which varies from two to five years. He is usually elected "at the same time and in the same manner as other State officers." In a few States he is elected in a "nonpartisan" election; in a number of others he is appointed by the governor of the State or by a State board of education.

Among the duties performed by these officers the following may be mentioned: The apportionment of school funds, the collection and publication of school statistics, the hearing of appeals on questions of school law, the visitation of schools, the organization of teachers' institutes, holding school conventions of various kinds, the preparation of courses of study, the organization of new high schools, the publication of the school laws, the determination of textbooks to be used, the licensing of teachers.

The office carries with it great possibilities, but in only a few of the States are the possibilities fully realized. It is not probable that the office will be made the real power that it should be until it is wholly divorced from partisan politics and placed upon such basis that the incumbent shall have time and freedom to work out definite educational policies.

¹ In the preparation of this report the committee has obtained most of its information from a questionnaire addressed to the various State departments of education and from documents sent out by these departments. Much of the material relative to State boards of education and State and county superintendents may be found in detail in the "Digest of school laws," Chapter IV of the report of the United States Commissioner of Education for 1904, reprinted separately in 1907. Changes made in the State systems between 1904 and 1908 are amply treated in Prof. Edward C. Elliott's two bulletins, "State School Systems: Legislation and judicial decisions relating to public education," published by the Bureau of Education. The thanks of the committee are due Prof. Elliott not only for permission to use his large collection of State reports, but for suggestions made while the preparation of the report was under way. A portion of the material relating to the inspection of high schools by State universities is taken from an unpublished master's thesis prepared by Mr. Harold Steele at the University of Wisconsin in 1908.

STATE BOARDS OF EDUCATION.

A State board of education of some form exists in a majority of the States. In some States the State board consists of certain State officers who are members ex officio. The officers chosen for such duty are usually the governor; the chief legal adviser of the State, usually known as the attorney general; the State's auditing officer, known as the secretary of state or State auditor; and the State superintendent. Sometimes the State treasurer is included. Such boards usually serve in an advisory capacity to the State superintendent, and frequently their most important duty is to apportion the State school funds to the various districts.

A more efficient State board exists in some of the States, as in Louisiana, Tennessee, Washington, Virginia, and the Carolinas, where it is made up of two or three of the elective officers of the State together with four to seven members appointed by the governor or the State Senate. In several of the States the president of the State university or the president of the State normal school, or both, are members. In California the professor of pedagogy of the State university is also a member. In Virginia four members are chosen from the faculties of the State institutions.

The most efficient board is one like those in Massachusetts and New York, and in one or two of the far Western States, where the members are all appointed for long terms and where real power is lodged with the board.

In many of the States, as in Ohio and Wisconsin, there is a State board of examiners, whose duty is to issue teachers' certificates, frequently of an advanced character only, but who have no other duties in connection with the school system of the State.

In practically every instance the State superintendent is the administrative officer of the board, and indeed in many States the board serves only in an advisory capacity to this officer. In only a few States, as in New York, Massachusetts, and possibly in some of the other Atlantic Coast States, is the State board, as a board, a very definite and decisive influence in the educational affairs of the State. Recent legislation has very greatly increased the importance of the State boards of education in Virginia, North Carolina, and South Carolina.

Perhaps the most efficiently organized State board of education is that of the State of New York, which is known as the "Regents of the University of the State of New York" and which was created by legislative enactment in the year 1784. This "university" consists of "all institutions of higher education incorporated in the State," including the State library and the State museum, "and such other libraries, museums, or other institutions for higher education as may,

in conformity with the ordinances of the regents, after official inspection, be admitted to or incorporated by the university." The regents choose the State commissioner of education, who is the executive officer of the board and of the public-school system of the State. Upon him devolve all the powers and duties of the regents "in relation to the supervision of elementary and secondary schools, including all schools except colleges, technical and professional schools." It goes without saying that this board has exercised a very potent influence in the educational affairs of the State.

Of a different character are the administrative boards created in Iowa in 1909 and in South Dakota some 10 years earlier, for the purpose of administering the affairs of all the educational institutions supported by the State above the high schools in the respective States. In South Dakota the board consists of five members appointed by the governor, by and with the consent of the senate, while the Iowa board consists of nine members appointed in a similar way. The distinctive feature of the Iowa board consists in the fact that the details of its business are largely in the hands of a finance committee of three chosen by the board, but from outside of its own membership, and devoting their entire time to the work.

These boards represent new departures in educational administration and their work will be watched with great interest by educators all over the country.

In Minnesota there is a State high-school board organized for the specific purpose of supervising the work of the high schools. It consists of the State superintendent, the president of the State university, the president of the board of normal-school directors, one city superintendent or high-school principal, and one other person appointed by the governor.

THE COUNTY SUPERINTENDENT.

While the school systems of the States are for the most part under the direction of the State superintendent, the real administrative unit for the elementary schools outside of the large city systems is the county, the township, or the town. The town is the unit for the group of States known as the New England States, and the county is the unit in most of the Southern and in some of the Western States. In the majority of the States is a county superintendent who, like the State superintendent, is in some instances appointed and in others elected in a "nonpartisan" election, but as a rule he is elected at the same time and in the same manner as other officers are elected, and he is consequently to a greater or less degree a political partisan.

The county superintendent is expected to visit the schools in his jurisdiction, and to enforce the law as far as it applies to the elemen-

tary schools. In a few States he has sole charge of the certification of teachers for the elementary schools. Teachers in elementary schools usually make their reports to him, and he in turn transmits all statistical matter to the State superintendent. He is usually the intermediary between the school district and the State department. In only a few States does he have any supervision over secondary schools located in his territory, though in some Southern and Western States certain county high schools are under the direction of county boards of which he is a member and frequently the executive officer. In most States women are eligible to this office.

THE COUNTY OR THE TOWNSHIP SCHOOL BOARD.

Many States provide for a county school board which, like the county superintendent, has to do principally with the elementary schools, though in some States, as Colorado and Louisiana, where county high schools are authorized by law, the county board is the legally constituted authority to oversee such schools. In some States the function of licensing teachers rests with a county board of examiners.

In States where county boards do not exist there is sometimes a town or township board with functions analogous to those of the county board. In other States the school districts of a township are independent of each other, each one being governed by a local board of three members.

Neither the county board nor the township board is a supervisory body in the true sense, but rather a board having to do with the material side of the school management. They erect and maintain school buildings, contract for school supplies, care for school property, hire teachers, but have little to do with the course of study and the actual management of the school.

INDEPENDENT SCHOOL DISTRICTS.

In most States practically all the large cities have school systems which are independent of the State departments and are wholly under the control of the local authorities. In other cases the control exercised by the State department is very slight. It may be said, however, that the supervision given to such schools through the agencies of city superintendents and principals, and citizens' visiting committees, is much closer and much more effective than any that could possibly be given by any State department, however well organized.

Parochial schools, which exist in large numbers, are practically independent of governmental supervision in all States. Certain States require reports and seek to exact conformity to a course of study, but beyond the enforcement of compulsory-education laws for chil-

dren attending such schools the States have little authority over them. It is assumed by many that the State can have no authority over schools which are not supported, at least in part, by public taxation—an assumption which would be wholly untenable when applied to any other form of human activity receiving protection from the State.

THE SUPERVISION AND INSPECTION OF ELEMENTARY SCHOOLS.

The actual supervision of elementary schools is largely in the hands of local authorities. Nearly all the State departments of education make out courses of study, but only in a few States, as in Kentucky and Louisiana, is the adoption in detail of such course mandatory. Ordinarily the authority exercised over the course of study consists in approving or disapproving the course of study submitted by the school authorities. Frequently, as in Maryland, the State lays down a minimum program to be followed by all schools. Protests by the department are usually made effective through the withholding from the school of the State aid which is granted by most States to elementary and high schools. In the large cities the making of the course of study is usually in the hands of the city superintendent and the school board.

In about one-third of the States, as in Iowa, the elementary rural-school teacher is licensed by the State department; in the remaining States, for the most part by the county superintendent or by the county board. In all but a few of the States the questions for elementary teachers are prepared by the State department.

As has already been indicated, the supervision of the rural and village elementary schools is largely in the hands of the county superintendents. In many States the State department exercises relatively little influence in the management of such schools, and the distribution of State aid to them is made on the basis of the school census or attendance. However, several States, notably Massachusetts, New York, Wisconsin, and Virginia, maintain efficient systems of inspection through the State departments. In New York the counties are divided into supervisory districts, each in charge of a district superintendent for schools, elected by a board made up of two directors elected by each town within the borders of the district. The number of districts in a county varies from one to eight and is determined by the rural population. The powers of the superintendents are similar to those exercised by county superintendents in other States. Wisconsin has three men who give their entire time to the inspection of elementary schools. One of these confines his work wholly to the inspection of rural schools.

The recommendations of the inspector are largely advisory, but may be, and often are, made effective by the withholding of State

funds. The recommendations made by these inspectors cover almost every phase of school activity. Course of study, character of school administration, efficiency of teaching force, sanitary conditions, and even conditions in the community around the school, are taken into consideration.

The schoolroom work of elementary teachers in the cities and towns is, on the whole, effectively supervised by the city or town superintendent. That of the rural-school teacher is very much less effectively supervised by the county superintendent. In many States there is as yet no supervision worthy the name.

SUPERVISION AND INSPECTION OF SECONDARY SCHOOLS.

The statements made concerning the course of study and supervision for elementary schools in large city school systems apply in large measure to the high schools, which form a part of the same systems. To some extent the certification of high-school teachers for large city high schools is also in the hands of the superintendent and the school board. However, the situation so far as it concerns the high schools of the towns and smaller cities is quite different. The State department frequently prepares the course of study for secondary schools, and in some cases, as in Louisiana, the adoption of this course by the schools is mandatory. Frequently the certification of high-school teachers is in the hands of the State superintendent or a State board. In certain States, as in California and Minnesota, the minimum qualifications for secondary schools are determined by legislative enactment. For example, in California high-school certificates are granted on credentials only, except in certain unusual cases, and not on examination, and the candidate must have completed at least a year's graduate work in an institution conforming to the standards of the "Association of American Universities." In general, the certificates allowing the holder to teach in a secondary school are of three kinds: certificates granted to holders of a bachelor's degree from a reputable college or university, certificates granted to the holders of diplomas from normal schools, and State certificates for a long term or for life granted on examination.

The practice of the different States concerning the inspection of high schools varies widely. Indeed, it is somewhat difficult to draw a hard and fast line between the States which maintain a system of high-school inspection and those which do not. In most of the States the statute defining the duties of the State superintendent says that "he shall visit the schools." In some States, as in Illinois, the superintendents, acting under a liberal construction of this clause, have appointed inspectors to visit the high schools, who act as the personal representatives of the superintendents in the strictest

sense, while in others the office of high-school inspector has been created by definite legislative enactment.

Massachusetts and New York have maintained efficient systems of inspection for many years. Within the last two decades statutory provisions for carrying on the work by the State departments of education have been made by something like one-quarter of the States, and this number is constantly increasing.

The method of organizing and carrying on the work of high-school inspection also varies much. The inspectors are usually appointed by the State board, when one exists, or by the State superintendent if there is no State board.

In Indiana the members of the State board, which consists of the governor, the State superintendent, the superintendents of the three largest city school systems in the State, and three other educators appointed by the governor, are designated by law as the inspectors. In Vermont about 60 per cent of the schools belong to a "supervisors' union" which appoints its own inspectors. Only schools belonging to this union are inspected.

As a rule persons appointed as high-school inspectors are not required to present any specific credentials or to undergo any test of fitness, but are selected by reason of successful experience in school work and ability to do the work with the greatest effectiveness and the least friction. The method of appointment in New York is exceptional in that all appointments are made under civil-service rules.

Since the number of inspectors appointed in any State is small, it is impossible that they should be specialists in all the lines of work taught in the high schools. Indeed, the appointment of a specialist in any line except manual training and some of the so-called "vocational" subjects is rare. Exception must be made of the State of New York, where a group of related subjects is assigned to each inspector, the assignment being made with special regard to the qualifications of the inspector. For some time the civil-service examinations have been so arranged as to secure the appointment of inspectors who are specialists in the various lines of school work. In addition to the assignment of subjects, each inspector is placed in charge of a district and is held responsible for the work in that district.

In some States it is assumed that the inspectors will be changed when a new State superintendent comes into office, although even in those States where partisan politics is strongest the inspectors are comparatively free from political influence.

The recommendations of the inspectors are made effective by withholding State aid, which is liberally granted by most of the States maintaining such inspection. Indeed, the matter of State aid is one of the important factors in the situation.

That the inspection of the high schools by State authority has been a most efficient means of raising and maintaining standards is freely conceded on all sides. It is equally clear that we are likely to see the practice very considerably extended in the near future. One of the most significant movements in this direction is the recent inauguration of plans for State inspection, combined with liberal State aid, by several of the Southern States.

There is one other form of high-school inspection that has gained much prominence in the States which maintain strong State universities and which can scarcely be passed over in any discussion of State supervision and inspection. It is the inspection that has been done by the State universities with a view to "accrediting" the schools to the university. This system has its origin in the State of Michigan, when, in the year 1870, acting President Henry S. Frieze presented to the faculty of the university a plan for the inauguration of a system of university inspection designed "as a means of strengthening, consolidating, and elevating the whole State system." The system was inaugurated very shortly afterwards in Wisconsin and was then taken up by other States until now it is in force in the States of Michigan, Wisconsin, Illinois, Indiana, Ohio, Iowa, Nebraska, Missouri, Kansas, South Dakota, Colorado, Montana, Washington, and California. Some of the larger privately endowed universities of the Middle West, notably the University of Chicago, Northwestern University, and the University of Cincinnati, have adopted the same plan and send representatives to visit the high schools from which the majority of their students come.

At the outset the inspection made by the State universities was done in large part by the professors of pedagogy, but very soon the work grew to such proportions that other members of the teaching staff were called upon to assist. In the larger institutions it was found necessary to appoint men whose whole time might be given to the work. At the present time most of the institutions carrying on the inspection keep one man in the field during the greater part of the school year. This man usually acts as a sort of supervising officer for the whole work of inspection and calls other members of the faculty to his assistance as he needs them. In the University of Wisconsin, which is typical of the larger institutions, something like one-half of the inspection is done by the regular inspector and the remainder by about 25 members of the faculty. At first no inspection was made, except at the request of the school, and the expenses of the inspection were paid by the school, but at a later period inspection of all schools on the "accredited list" was made regularly, and the expenses were paid by the institution making the inspection. It is almost universally conceded that the inspection by the State universities has been one of the strong factors in raising the standard of the high

schools in the Middle Western States. It has been, to a considerable extent, inspection by specialists. Several inspectors are usually sent at one time to the larger schools, where each inspector examines the subject, or the group of subjects, in which he is particularly interested. Even in the case of the smaller schools, to which a single inspector is sent, he is usually selected with a view of giving special attention to those subjects in which it is suspected the school may be weak.

High-school inspection by the State universities has been severely criticized, frequently by public-school men, sometimes by the university men themselves. It has been urged that the inspection by specialists has been a detriment rather than a benefit to the schools, because the specialist has overemphasized the importance of his own subject and has not kept in mind the needs of the school or of the community. It is also urged (and this is the objection that is urged with most emphasis) that the inspection by the universities is made for the purpose of ascertaining whether the school is fitting the pupils for entrance to the university and with no regard for the usefulness of the high school to the community. In reply to this objection the advocates of university inspection insist that there is no antagonism between preparation for the university and preparation for life. It is admitted on all sides that the university inspection has done very much to bring the universities and the high schools into sympathetic relations with each other.

Perhaps one of the most serious objections to the university inspection lies in the fact that the small schools which have no hope of going on the "accredited list" receive no inspection at the time of their greatest weakness, when the inspection could accomplish most good.

The whole question of the relation of the universities to the high schools is a subject of sharp controversy in several States at the present time.

SUPERVISION OF SECONDARY SCHOOLS NOT SUPPORTED BY TAXATION.

There are in nearly every State a considerable number of secondary schools that are not supported by taxation. Many of these schools are under the control of religious denominations, and most of them are avowedly preparatory schools for the colleges and universities. They are, for the most part, chartered by the State, but ordinarily as business corporations rather than as educational institutions. A notable exception to this rule is the State of New York, where all institutions are chartered by the board of regents of the "university" of the State. In certain of the States such academies are requested to report to the State superintendent, but ordinarily the State makes

no attempt to supervise or inspect them. The State of New York, however, inspects academies chartered by the State.

Practically the only control that is exercised over these academies is that exercised by the interests supporting them and by the colleges and universities to which they send their pupils. In those States where the State universities maintain a system of school inspection the system is extended to the private academies as well as to the public high schools. In other States the only outside influence which tends to regulate these schools is found in the entrance examinations set by the colleges.

THE STATE NORMAL SCHOOLS.

The State normal schools, of which each State has one or more, usually stand in rather close relation to the State departments of education, though it can scarcely be said that they are supervised by the State departments, since their management is usually in the hands of special boards of directors appointed for the purpose. The influence of the State superintendent in the government of the normal schools is a consequence of his position as the head of the public-school system of the State and not the result of any statutory provision giving him a larger share in their government than belongs to other members of the governing board. It is the logical outcome of the fact that the normal schools are established for the purpose of training the teachers over whom the State superintendent has, as a rule, most authority.

SUPERVISION OF HIGHER INSTITUTIONS OF LEARNING.

The first colleges in this country were established in the New England States by religious denominations and for the definite purpose of educating men for the ministry. While the character and the control of these oldest colleges and universities have changed, the change has never been in the direction of State control. The institutions were established by charters granted by the State legislatures authorizing them to do certain work and to grant degrees to such persons as would complete a course of study; but the determination of the course of study and the conditions under which degrees might be granted have been wholly in the hands of the institutions themselves. It goes without saying that such institutions have been very sensitive to public opinion in so far as it affects the attendance of students and the attitude of the classes that are able to add to the endowments. State universities, in the proper meaning of the term, have been established in only two of the group of States lying north of the Potomac River and east of Ohio, viz, Maine and Vermont.

The earliest State universities were established by the States along the South Atlantic seaboard from Virginia southward. All the States

west of Pennsylvania and Virginia maintain State universities which were established, in the majority of cases, before the State passed beyond the Territorial stage. In practically every one of this great group of States the State university is the strongest educational institution in the State.

The State universities are for the most part supported by direct taxation, though several of them have been the recipients of large grants of land which will ultimately yield great endowments. The governing boards of the higher educational institutions which are supported wholly or in part by taxation are usually appointed by the governor of the State, though in some States, as Illinois and Michigan, they are elected directly by the people. In many States the State superintendent is a member ex officio of the board. In most States a board of visitors appointed by the governor examines the higher educational institutions annually. However, such boards usually make a report to the governing board rather than to the governor. These reports are often perfunctory, and in no case do the committees who make them have power to enforce their recommendations.

No real supervision over the State universities exists except such as makes itself felt through public opinion as it is able to affect legislative appropriations. It may be said that the governing boards and the faculties have been almost wholly free to shape the work of these universities as they please. They, and they alone, have established entrance and graduation requirements and have determined the character and scope of the instruction. Even the State legislatures, through whose munificence the universities have been enabled to reach their present state of development, have rarely taken any part in the educational policies of the institutions. Voluntary associations, like the Association of American Universities, the Association of New England Colleges, and State associations that have been organized in many States, have had indirectly the effect of supervision on many universities and colleges, in that they have done much to bring about uniformity, to establish higher standards, and to prevent the abuse of the degree-conferring power.

In this connection the far-reaching influence of the Carnegie Foundation for the Advancement of Teaching should not be overlooked. This foundation, established in 1905 through the munificence of Mr. Andrew Carnegie, is intended to furnish a pension system for professors in institutions on the "accepted list" of the foundation. Institutions under sectarian control are barred from participation. The foundation has established two sets of standards—one for privately endowed institutions, and another, in some respects higher, for tax-supported institutions. Institutions are admitted to the "accepted list" after an examination which covers entrance requirements, graduation requirements, financial resources, and administra-

tion. At the date of the fifth annual report of the foundation, made in September, 1910, the "acceptal list," comprised 67 institutions in the United States, of which 9 are tax-supported.

SUMMARY AND CONCLUSIONS.

1. There is no Federal supervision of education in the United States.
2. Some States maintain strong and efficient departments of supervision and inspection which are doing much to elevate standards of work in the public schools.
3. Many other States exercise little or no supervision through their State departments of education. This weakness is owing in great part to the political methods used in selecting the State superintendents, to their short tenure of office, and to insufficient provision for carrying on their work.
4. The efficiency of the State departments is on the whole greatest in those States where the State superintendent is an appointed officer.
5. State boards of education may be, and in several States are, very efficient agencies in the administration and supervision of the educational affairs of the States.
6. Nearly all the States maintain a system of county superintendence, but the county superintendents, who as a rule are chosen by popular election, have to do almost exclusively with the elementary schools.
7. About one-fourth of the States have made statutory provision for the inspection of secondary schools by their State departments, and in several others the State superintendents, acting under the constitutional or statutory provision which directs them to "visit the schools," have delegated the work to certain men who devote their entire time to the work of inspection. This system of State inspection, coupled with more or less liberal provisions for State aid, has been a most effective means of advancing the interests of secondary education.
8. In the group of States north of the Ohio River and extending westward from Pennsylvania to the Rocky Mountains, the State universities have established a strong system of high-school inspection with a view to securing better preparation for their students. This inspection has had great influence in elevating high-school standards in many States. It does not reach the smaller schools that are not yet strong enough to meet the entrance requirements of the universities and which perhaps stand in most need of careful inspection.
9. No attempt is made to supervise or inspect parochial schools or privately endowed schools of any grade. Practically the only restriction placed upon such schools is that pupils attending them must satisfy the compulsory education law of the State in which the

school happens to be situated. The strongest influence affecting the privately endowed secondary schools is found in the conditions under which their pupils are admitted to the colleges and the universities.

10. There is practically no supervision of any sort for the colleges and universities, whether privately endowed or supported by the State. Most of these institutions have boards of visitors appointed annually, but such boards have only the power to recommend and are not, as a rule, very effective. Public opinion has been the most effective external agency in shaping the development of higher institutions of learning. Voluntary associations among the universities themselves have done much to bring about uniformity and to maintain standards. The Carnegie Foundation for the Advancement of Teaching, which admits institutions to its "accepted list" after careful examination, promises to be an effective external agency for the promotion of high standards.

SUBCOMMITTEE '5. ACTIVITIES OF PUBLISHERS AND THEIR AGENTS.

PREPARATION OF TEXTBOOKS AND THE PROMOTION OF THEIR USE.

In America leading scholars are interested in making elementary textbooks, not so much for monetary consideration as for the desire to advance education. Many of these men feel that the theories of education which they advocate are not sufficiently tested until they have been applied to the subject matter of instruction; and, in order to make this test, they commonly produce textbooks embodying their ideas. Whenever a teacher or educator in any locality appears with a message, or makes an advance in educational theory or practice, the American publishers seek to obtain from him an expression of his discovery or method. The publisher's activity in this line gives to the country at large the advantage of the best educational thought prevailing in the various parts of the country.

In several subjects, notably mathematics, publishers generally make it a practice to employ supervising editors to supplement their regular editorial staff and thus make sure of high-grade mathematical scholarship. The supervising editors in turn solicit criticisms upon their manuscripts and proofs from the best teachers and scholars in the respective departments of mathematics; thus a textbook is commonly reviewed before publication by a half dozen or more representative teachers of mathematics in as many different sections of the country.

In addition to publishers' efforts to secure books of high scholarship and practical utility, there is another way in which their activity

advances the cause of education; namely, through their methods of salesmanship.

One means of promoting the sale of textbooks prevalent in the United States is through the use of sample copies. Acting on the assumption that a good article will recommend itself, publishers through their sources of information seek to know the places where books are about to be purchased, and send samples of their new publications for examination. So efficient has this method proved that publishers seldom refuse a request from a teacher who is willing to return the sample book after examination. These copies are usually accompanied by circulars and opinions from teachers, which plan furnishes an interchange of ideas and much publicity to the desirable qualities of the new books.

The more recent ideas in circularizing also have an educational value. The circulars of textbook publishers often take the form of monographs on the history of mathematics—showing, for example, how the development of the science demands a new textbook—or take the form of method lessons showing how a new book carries out accepted educational principles or represents an improved course of study corresponding to the graduation of material in a new textbook.

In addition to postal advertising, publishers have found it desirable to employ personal representatives to promote the sale of their textbooks. These agents are commonly given a course of instruction in the characteristics and merits of the mathematical textbooks, the sale of which they promote. This instruction is based upon the educational theory and practice of the schools and includes comparisons between the different competing publications designed for the same field. There is a growing tendency to employ special agents as well; that is, persons who have made a study of mathematics and its teaching. Their work is to promote sales by visiting the larger school units and lecturing on the teaching of mathematics and the use of modern textbooks.

In general, the activities named above apply to three classes of textbooks—those for elementary schools, those for high schools, and those for colleges. The elementary book naturally does not contain between its covers much educational theory. Its educational quality is shown chiefly by the selection and grading of its material. However, these books are often accompanied by manuals which treat quite extensively the theoretic phase of the subject and explain the educational value of the textbook. Publishers commonly furnish these manuals at nominal prices to teachers using the corresponding books and thus help to advance the cause of mathematical teaching. The promotion of the sale of elementary books is largely made through personal representatives of the publishers. Consequently, the characteristics and educational features of each book are brought first-

hand to the classroom teacher and often demonstrated in the schools by the publisher's agent. The high-school textbook, like the elementary book, is largely academic, and although it usually possesses a more pronounced educational flavor it is often supplemented by a teacher's manual, as in the case of the elementary book. The sale of secondary-school books is promoted somewhat more by correspondence than that of elementary books, but expert salesmen are employed in this field by nearly every schoolbook publisher. The college textbook, which is commonly a technical treatise on some phase of mathematics, is more often sold by correspondence alone.

PUBLICATION OF PROFESSIONAL BOOKS AND WORKS OF REFERENCE.

There is a sufficient demand from American teachers to induce publishers to bring out libraries or series of professional books which include works on the history, development, and pedagogy of mathematics.

Besides the practical study-text for the pupils' use and the purely professional book, publishers prepare reference textbooks; namely, more theoretic textbooks on mathematics, those which contain a richer course in the subject than is usually required for elementary classroom work and which furnish the theory and breadth of view necessary for good teaching. In this group should also be included books on special mathematical topics.

The aim of publishing houses, like that of other commercial institutions, is primarily to make money; hence they do not produce professional books and reference books by reason of their generosity. They publish both those which in their judgment will yield a profit from their own sales and those which will so stimulate the demand for better textbooks that the publishers will be remunerated in a reasonable time for their expense in thus advancing the cause of learning. It is not to be inferred, however, that several American book houses do not take pride in the enviable reputations which they have attained as patrons of science and education.

SUPPORT OF EDUCATIONAL JOURNALS.

There was a time when textbook houses edited and published at their own expense "educational journals." A periodical of this origin naturally reflected the favorite ideas of the house editing it, tended to mold public opinion in harmony with the commercial interests of that house, and discouraged an open forum of discussion. It is a gratifying fact that this condition no longer exists. Our educational journals as a class are now edited and circulated by persons who are not connected with publishers of textbooks, and who seek from textbook houses only such support as paid advertising affords. Private enterprises of this sort are liberally patronized by the

publishers of textbooks, and even the periodicals supported by the universities receive a modicum of such patronage.

CONTRIBUTIONS TO LIBRARIES, COLLECTIONS, AND EXHIBITS.

It is not uncommon for publishers to make their mathematical books available for school libraries and educational collections where they will be consulted by teachers or by those preparing to teach. The expense of this plan is incurred on the assumption that the use of good books is increased by liberally informing the teaching body of the merits of publications. The larger publishing houses also take special pains to display their mathematical books at State and national teachers' association meetings.

THE RELATION OF PUBLISHERS' ACTIVITIES TO SCHOOL LEGISLATION.

Twenty-two out of the forty-eight States comprising the United States proper have some form of what is known in America as the State adoption of textbooks. In this system one or more books in each subject of study is prescribed for use in the public schools for a period of years, ranging from four to six. The selection is made at published intervals from the competitive bids of publishers, by a textbook board. This board is usually composed of school officers or teachers, appointed by the governor of the State for each period of adoption, or is composed of persons holding educational or other civil positions, one of whose duties, as defined by law, is to serve on the textbook board. The obvious result of this system is to establish uniform textbooks in large units of territory, and to lessen the variety of the books used.

In States not having State adoption, textbooks are either furnished by the municipality free for the pupils' use or are bought by the pupils under the recommendation of the school authorities. This freedom of selection leads less to uniformity and perpetuation of standards and tends to a wider distribution and market for the publishers' offerings.

SUBCOMMITTEE 6. THE TEACHING OF MATHEMATICS IN SUMMER SESSIONS OF UNIVERSITIES AND NORMAL SCHOOLS.¹

SUMMER SESSIONS IN GENERAL.

Previous to the year 1891 there had been no general movement in this country to organize summer courses in connection with the schools, colleges, and universities. Certain summer courses for teachers had been offered at Harvard University as early as 1871, but

¹ This report was prepared by Prof. H. E. Slaught on short notice, when it was discovered at the last moment that no provision had been made for the important phase of work here treated in the assignment of jurisdiction to the original subcommittees. As there was not time for an exhaustive investigation, it was decided to gather data from a limited number of representative institutions and to draw such conclusions as might be possible on this basis.

not until 1891 were any regular courses in mathematics given. In 1891 also, certain courses in mathematics and Latin were offered in a summer session at the State normal school at Emporia, Kans., as a private undertaking of two instructors in the school. In like manner some summer courses were offered in the same year at the University of California, the University of Indiana, and the University of Minnesota. No doubt, complete data would show that similar beginnings were made about this time, or not much later at other institutions. Cornell University made a start in 1892, the University of Missouri and the University of Illinois in 1894, and the University of Texas in 1897. In most of these cases, if not all, the beginnings were made by a few instructors who carried on the work as a semi-private undertaking, depending wholly upon the tuition receipts for remuneration.

The University of Chicago was the first institution to embody in its constitution a provision for regular work during the summer (the "summer quarter"), conducted by the permanent faculty under conditions precisely similar to those in the other quarters (the autumn, the winter, and the spring) of the school year. President Harper maintained that to allow a great and costly university plant to stand idle during one-quarter of the year was neither good business nor good educational policy. He held that the advantages of college and university training should not be kept forever out of reach of those who were engaged in teaching and who could not afford to give up their positions in order to attend the university during the nine months from October to June. How keen was his prophetic vision and how great a boon he conferred upon the teachers of the country may be inferred from the data of attendance shown in the tables of statistics given below. On account of the Columbian Exposition in close proximity to the campus, no work was done at Chicago during the first summer (1892-93), but the work began with the summer quarter of 1894, with an attendance of 597 students, and the enrollment for the next seven summers, in order, was: 931, 1,048, 1,273, 1,434, 1,636, 1,674, 2,375.

The steadily growing attendance during these summer quarters, the serious character of the work done, the extent and variety of the courses offered both for elementary and advanced students, the participation of the regular university faculty in exactly the same manner as at any other session of the year,—these were new phenomena in educational development in this country which may well be characterized as the beginning of an epoch, namely, the adoption of the summer session as a part of the regular program in many colleges and universities.

It can not, however, be said that this program has been, or is likely to be, universally adopted by the colleges and universities. Indeed, in the nature of the case, only the larger institutions, and

especially the State universities, are likely to develop this phase of work strongly. Inasmuch as the constituency of the summer session is very largely from the ranks of teachers, it is natural that those institutions which have developed strong departments or schools of education should attract the larger numbers. One by one these institutions have organized the work of the summer session; usually at first in a tentative way, being in charge of a few instructors who might assume the responsibility and derive such revenue as the tuition fees would afford, later receiving official indorsement both as to financial responsibility and in the granting of credit toward degrees for work done in these courses. In many cases it is only recently that full credit for summer work has been accorded toward the bachelor's degree, and in very few instances even yet can credit toward the higher degrees be thus obtained. Wisconsin and Columbia, for example, explicitly provide that credit for work in the summer sessions may count toward the bachelor's and master's degree but not toward the doctor's degree. The extension of the credit privilege corresponds closely to the gradual development of the summer programs. Naturally, the beginnings were made in most cases with elementary courses only, and later advanced courses were gradually added. Chicago furnishes a notable exception to this manner of development. There the full curriculum of courses, elementary and advanced, could be found from the very outset, and all degrees conferred at any time during the year were included in the range for which credit could be received for work done during the summer quarter.

The following table shows certain general data concerning the summer sessions of 18 universities which are sufficiently representative to indicate the extent to which this phase of work has gained recognition.

TABLE I.—Attendance in summer sessions of universities.

Institutions.	Date of organizing summer courses.	Weeks in the summer session.	Attendance during five years.				
			1906	1907	1908	1909	1910
California.....	1891	6	706	522	661	819	1,051
Chicago.....	1894	12	2,688	2,605	3,050	3,264	3,370
Columbia.....	1900	6	1,043	1,392	1,908	1,946	2,629
Cornell.....	1892	6	642	755	841	899	987
Harvard.....	1871	6	779	809	1,116	903	873
Illinois.....	1894	9	423	562	555	631	665
Indiana.....	1890	12	682	721	1,005	1,139	1,107
Iowa.....	1900	6	281	344	363	303	347
Kansas.....	1903	6	254	289	377	374	390
Michigan.....	1894	8	1,034	1,070	1,085	1,224	1,234
Minnesota.....	1891	6	1,019	1,036	1,218	1,296	1,188
Missouri.....	1894	8	403	452	508	552	576
Ohio.....	1899	8	142	136	142	160	184
Ohio State.....	1903	8	388	426	503	642	639
Pennsylvania.....	1904	6	505	707	879	826	1,219
Tennessee.....		6		1,917	1,984	2,025	2,422
Texas.....	1899	7	444	550	623	741	848
Washington State.....	1904	6	198	243	235	288	301
Wisconsin.....	1899	6	650	750	1,025	1,125	1,263

¹Not fully reported.

Remarks on Table I.—At the University of California summer courses have been given since 1891, but the first regular summer session was held in 1900, since which time full credit toward the baccalaureate degree has been allowed for all summer courses of college grade. This is typical of many other institutions, for instance, at the University of Illinois summer courses were given since 1894, but the regular sessions granting credit for work of a college grade began in 1900.

The figures for the University of Minnesota and for the University of Texas include those registered for elementary work as well as those taking work of college grade. At the University of Texas the summer session is combined with a summer normal school. This arrangement prevails also in some other cases, for instance, at Tulane University, where the summer session was introduced in 1910.

The totals for the Summer School of the South, at Knoxville, include registrations in all grades of work for the training of teachers, from the kindergarten to elementary college courses, the large majority being in courses below college grade. This school is held at the University of Tennessee.

For further information concerning the attendance of teachers upon summer sessions in various kinds of schools, see a monograph by W. C. Ruediger, entitled "Agencies for the Improvement of Teachers in Service," published by the United States Bureau of Education.

MATHEMATICAL COURSES IN THE SUMMER SESSIONS.

The foregoing general statement with reference to the development of the summer sessions in American universities forms an appropriate background for the consideration of the work in mathematics, in particular, in these sessions. It appears that the courses in mathematics have been regarded in most cases as of special importance in these summer curricula. In fact, in several instances the work began with courses in mathematics and perhaps one other subject, and was gradually extended to include courses in all the regular departments as the number of students increased and the demand became apparent.

The courses offered in mathematics may be roughly divided into two classes: (1) Those intended primarily to emphasize the pedagogical aspect of the subject, and (2) those intended primarily to develop the subject matter for its own sake or as a prerequisite to other courses. The pedagogical courses include critical studies of the various elementary and secondary branches with reference to scientific interpretation and methods of presentation and also studies in the history of mathematics with special reference to the

needs of teachers in elementary and secondary schools. As yet there appear to have been no pedagogical courses offered for the special benefit of teachers of college mathematics, but it may be said that practically every course offered in the summer session becomes in a certain sense a pedagogical course, since so large a proportion of the students are teachers who are keenly alive to their opportunities for observation. In fact, it is a common occurrence in these summer courses for students to register for the purpose of studying the teacher quite as much as for studying the subject. Moreover, it is believed by many that the best pedagogical training comes through careful and diligent study of the subject matter under the guidance of an inspiring teacher who knows how to exhibit good methods and to impress them by example, rather than precept, upon the students. However, there is undoubtedly a growing tendency to attach greater importance to definite, scientific study of the art of teaching, and this tendency is shown in the increasing number of pedagogical courses offered in colleges and universities, especially in the summer sessions, and in this respect mathematics is well represented. Naturally such courses appear most strongly in those institutions in which the department of education, or the separate school of education, is most fully developed.

Of the courses intended primarily for the study of subject matter, comparatively few extending beyond elementary calculus are offered in summer sessions, except in one or two institutions, notably at Chicago and Wisconsin. This may be accounted for in two ways: (1) Because, in most cases, the great majority of students in the summer sessions are not prepared for advanced work; and (2) because the summer school usually has no endowment, and the receipts from tuition fees where the enrollment is comparatively small are not sufficient to provide the more expensive instruction in advanced courses. The following statement from the former director of the Harvard summer school is fairly typical of the way in which the mathematical work has developed in the summer sessions in other institutions:

Mathematical courses were first introduced into the Harvard summer school in 1891. Courses in solid geometry, plane trigonometry and college algebra have been given for the past 20 years. Courses in analytic geometry have been given regularly for the past 10 years; courses in calculus regularly for the past 7 years. In 1903 a course was given in the theory of functions, and, in 1909 a course in modern methods in geometry. In 1910 the following advanced courses were offered: Introduction to modern geometry, topics in the theory of functions, each with very small registration.

The following table shows certain data with respect to mathematics in summer sessions.

TABLE II.—Registration in mathematics courses.

Institutions.	Registration in mathematics courses.					Elementary courses, including calculus.	Advanced courses, beyond calculus.	Pedagogical courses.
	1906	1907	1908	1909	1910			
California.....	41	38	63	60	108	4	1	1
Chicago.....	296	316	350	380	433	12	4	3
Columbia.....	130	160	170	210	275	7	3	2
Cornell.....	(1)	(1)	(1)	369	375	8	2	2
Harvard.....	58	54	43	37	40	5		1
Illinois.....	110	136	152	183	164	5		1
Indiana.....	98	150	177	173	189	4	1	
Iowa.....	46	80	73	68	61	7		2
Kansas.....	13	21	13	20	39	3	1	
Michigan.....	(2)	(2)	(2)	(2)	(2)	6	6	1
Minnesota.....	(1)	(2)	(2)	(2)	(2)	3		
Missouri.....	95	98	56	79	85	5	1 or 2	1 or 2
Nebraska.....	33	38	30	32	42	4		
Oberlin.....	(1)	(1)	(1)	(1)	(1)	4		1
Ohio State.....	(1)	(1)	(1)	(1)	113	4	1	1
Pennsylvania.....	88	129	151	121	184	11		1
Tennessee.....								
Texas.....	348	420	454	446	542	3		2
Washington State.....	27	29	19	22	22	1		1
Wisconsin.....	142	117	249	225	242	9	4	

¹ Not reported.

² Average each year about 155.

³ Average of 100 each year.

⁴ Average of 35 each year.

⁵ Total registration in 1911, 250. None beyond calculus.

Remarks on Table II.—The data at hand do not make it clear in all cases whether the figures in the above table indicate the total registration or the actual number of different students, as in the case of Iowa, Kansas, and Oberlin. The numbers for Texas include attendance upon mathematics courses in a summer normal school which is held in connection with the summer school of the university.

At the University of Pennsylvania no advanced course in mathematics was offered in the summer of 1910, though three or four courses had been offered up to that time. (The data as to courses in all cases refer to 1910 unless otherwise specified.) Also the elementary courses include some preparatory subjects which will not be given hereafter.

At the University of Iowa, while no advanced courses are scheduled, those students in the summer sessions who desire some advanced work are cared for in small groups as far as possible.

At the University of Kansas no advanced courses have hitherto been offered. Two are offered in 1911.

The registration in mathematics at Indiana University and at the University of Chicago is given for the first six weeks of the summer sessions. The attendance is considerably diminished during the second six weeks. These are the only institutions reported in which the session consists of two terms of six weeks each.

At the University of Illinois, previous to 1910, courses in preparatory subjects were offered. The registration given in the table is exclusive of these courses.

At the University of Tennessee about one-half of the registrations in mathematics were in courses below college grade, and no courses are offered in mathematics beyond the calculus.

THE TRAINING OF TEACHERS.

In general, it may be said that a large number of those in attendance at the summer sessions are teachers spending a part or all of their vacation in study, but it does not follow that all are seeking the strictly pedagogical courses. In fact very many are pursuing courses for degrees and are therefore filling out requirements or choosing elective work in subject matter in which they are interested. It is true, however, that in most cases where special courses of a pedagogical character are given they are well attended and fully appreciated. On the other hand, there is a wide difference of opinion among the institutions offering summer work as to the usefulness of the pedagogical courses as compared with the content courses.

The following comments from reports of various institutions in the above list will illustrate these points with respect to the department of mathematics.

As seen from our enrollment the interest in summer-school mathematics is not very great, most teachers preferring work which does not demand so great a strain as the study of mathematics. Whatever work is done has a decidedly beneficial influence upon those who take it.

Only one course in the pedagogy of mathematics has been offered and this has not been largely attended. It is not possible to form any estimate as to the influence of this work in general upon the preparation of teachers of mathematics.

A course in algebra has been given from the first, arranged with special reference to broadening the point of view of the high-school teacher. Graphical methods are developed, the theory of complex numbers presented, and the notation of determinants explained. During the last four years a course in the history of mathematics has been offered, in which the development of geometry and algebra is traced as carefully as may be from the earliest times. A large proportion of the students in mathematics are enrolled in one or the other of these two courses for teachers, and their obvious interest in, and profit from, the work has been gratifying. It is believed that the direct influence of these summer courses upon the school teachers, by far the most numerous class of students in the session, is greater than that of any other work which we do during the academic year.

Of the advanced courses given in 1910, two were special courses intended for the training of teachers in mathematics. In the one year of their existence these two special courses for teachers attracted many students who showed much interest in the work. It is the estimate of the department of mathematics here that the summer sessions have had good influence upon the preparation of teachers of mathematics.

In general, the demand for the advanced courses in the summer sessions tends to increase, while that for the most elementary courses is stationary or decreasing. Many courses, especially those of intermediate character on such subjects as modern geometry, projective geometry, and selected topics in algebra, are especially adapted to teachers. Some of these courses are very stimulating to them and show them how to use the literature and textbooks in their subjects more adequately. Not a few of the teachers in attendance in mathematics in the summer sessions drift later into the university.

The special courses intended for the training of teachers in mathematics have been (1) a general course covering the usual high-school work and (2) conferences. It should be added, however, that great emphasis is laid on those aspects of all the courses which are specially helpful to teachers. The interest in these courses manifested by teachers and persons preparing to teach has been distinctly good. We think the summer work has had a decidedly beneficial influence on the preparation of teachers in mathematics. It seems repeatedly to have led teachers to enter the university for the purpose of completing their college courses. We have frequently heard encouraging remarks from teachers concerning the benefit they have derived from their summer work. Everything considered, the summer session seems to have had even a greater influence on the efficiency of teaching than the regular sessions.

No special courses in mathematics for the training of teachers are offered during the summer, this work being given during the regular year.

No course in mathematics is presented for the special purpose of teaching the students how to teach the subject, but frequent suggestions are given to that end. Most teachers who take them do so for the subject matter, as well as to observe how those in charge of the courses present them.

All those in the course for teachers take a great interest in the subject and do much collateral reading in our extensive pedagogical library in mathematics. All express themselves as greatly benefited by the course. Many in the course have had from three to ten years' experience in teaching.

During the past 10 years a course in the history and teaching of elementary mathematics has been given about five different times. Interest in these several courses intended for the training of teachers of mathematics, on the part of college students, has been very slight, registration in them being composed mainly of teachers in service. The influence of the summer courses upon the preparation of teachers of mathematics has been very helpful to the rather limited number of teachers who have attended the courses.

The courses in mathematics, especially the one for the training of teachers, have called forth a good deal of interest and have been very valuable and inspiring. Even more satisfactory is the teachers' course which we carry throughout the college year, enrolling both those who have taught mathematics and those who are looking toward teaching in secondary schools. We are convinced that the teaching efficiency of these students is greatly increased by reason of their facing in this way the various problems that they will meet at the outset of their teaching experience.

It may be noted that the establishment of well-organized schools of education, on the same basis as other professional schools, in some of the leading universities has had a marked influence upon the standards which the public schools are beginning to prescribe with respect to the preparation of their teachers, and wherever these professional schools for teachers hold summer sessions the attendance is large and increasing and the interest is rapidly growing. Some States are already prescribing by statute a minimum of work in education which must be fulfilled by all candidates for high-school positions. One of the leading States in this respect is California, where a year of postgraduate work including courses in education in the State university, or in a university of equally high standing, is demanded of all high-school teachers. The work in the summer

session is allowed to count toward fulfilling this requirement. The following extract is taken from the California report:

The majority of the students in the summer sessions are from the high schools of the State, with an increasing number of graduates of other institutions who are preparing to teach in our high schools. We require a year of graduate work for the high-school certificate, and have recently agreed to accept summer-session residence at the rate of four summer sessions for one year of the regular session. We find considerable interest among our best high-school teachers in the summer courses, and we believe we are able to help them to a broader view of the subjects which they have to teach. The demand which they make on us for these courses is increasing every year and is larger than we are able to meet for advanced work, owing to the fact that the administration still insists that the summer session must pay for itself.

Another feature of growing significance is the fact that the number of men, in proportion to the women, is steadily increasing in the professional schools of education, as is not the case in the ordinary normal schools. This is particularly noticeable in the summer sessions of the larger universities where the professional side of education is most largely developed. This seems to indicate that the demand for teachers, and particularly for men, with professional training is increasing, and teachers everywhere are beginning to recognize the necessity of such training in order to secure advancement in rank and salary. The first step is naturally the summer school, and this explains the rapidly increasing attendance upon these sessions all over the country and by all classes of teachers, from the elementary schools to the high schools and the colleges.

SUMMER SESSIONS IN NORMAL SCHOOLS.

Reports have been received from a limited number of representative normal schools in various parts of the country. In a general way it may be said that the normal schools in the East and in the far West do not hold summer sessions, and that those in the Middle West do hold summer sessions, often extending through 12 weeks. There are important exceptions to this statement, and of course there are many institutes and various kinds of summer schools for teachers which provide lectures and other forms of instruction through periods of from one to four weeks, but which are not here classed with those summer sessions which provide continuations of the regular work in normal schools. The following are extracts from replies received on the subject:

The two normal schools in New Jersey hold no summer session, since their services are not needed in view of the large opportunities offered in the universities of New York.

The only normal school in Massachusetts which makes much of summer work is that at Hyannis.

The normal school at Danville, Conn., has held a four weeks' session during July, beginning in 1908. Its object is to give to teachers of common schools who consider

themselves unable to take the regular two years' course a brief summary of the common-school subjects, what to teach and how to teach it.

We have in Maryland two normal schools, neither of which holds a summer session.

The State normal school at Los Angeles, Cal., has never held summer sessions. Generally one of the five normal schools in the State holds a summer session, but none will be held this year (1911).

The two State normal schools of Ohio, one at Oxford and one at Athens, hold summer sessions. The former began the summer work in 1903 and has had an attendance in each of the last five years ranging from 550 to 700. The registration in mathematics classes has averaged about 170. For the sessions of 1911 nine courses in mathematics are offered, from arithmetic to trigonometry, and including two courses on the teaching of elementary mathematics.

The State normal school at Kirksville, Mo., has held four sessions of 12 weeks during each of the past 8 years. The attendance during the summer term has varied during the past 5 years from 500 to 610. The estimated registration in mathematics courses each year has been about 60 per cent of the total attendance. Courses of both high-school and college rank are offered from elementary algebra to calculus, including two courses in the teaching of mathematics. The influence of our mathematics courses has been to induce many students to return to the institution summer for summer for mathematics and other subjects. Many of our mathematics students discover, while here, their ability in mathematics and develop a desire to be specialists in the subject. The four other normal schools of Missouri also hold summer sessions of 12 weeks each.

All of the Michigan State normal schools hold summer sessions of six weeks each. The one at Kalamazoo began on this plan at its organization in 1904. The attendance during the past seven years has increased from 117 in 1904 to 834 in 1910. The courses offered in mathematics below calculus are college algebra, trigonometry, elementary algebra, and geometry. A teachers' course in arithmetic and review arithmetic is intended for the training of teachers of mathematics. Regarding the influence of this work upon the preparation of teachers of mathematics, I will say that very great interest has been shown, especially on the part of those preparing for the grades; also many have taken work looking forward to teaching high-school mathematics, and a number of graduates have continued work in the universities.

All of the Wisconsin State normal schools hold summer sessions of six weeks each. The one at Platteville began this two years ago with a session of six weeks' duration and last year (1910) had an attendance of 265, of whom about 160 were registered in elementary mathematics courses. We have little opportunity as yet to judge as to the effect of these courses upon the preparation of teachers of mathematics.

All of the normal schools of Illinois hold summer sessions, and at least one, at Normal, Ill., has a session of 12 weeks. The Chicago Normal College has a summer session of 10 weeks. All these sessions are largely attended.

The State normal school at Euporia, Kans., has had summer sessions in some form since 1891. Mathematics and Latin were the only subjects in which instruction was given at that time. The summer session soon developed into a regular feature of the institution and for a number of years past has been organized upon exactly the same basis with respect to employment of faculty, records, and requirements as at any other portion of our school year. It constitutes one of the five terms of the year. In other words, we do in the summer school the work of one-half a semester, nine full weeks of class work. The courses offered in mathematics have been the regular work of the normal school in arithmetic, algebra, and geometry of secondary grade and in higher algebra, trigonometry, surveying, analytics, and calculus of college grade. The other normal schools of the State, one of them 8 years old, the other 10, have had

summer sessions on the same basis ever since they were organized. The attendance at Emporia in 1910 was 1,200, and the number of persons enrolled in mathematics courses was 305. During the past 5 years the average attendance has been about 1,000, and the registration in mathematics approximately 250. We draw from all classes of teachers in the State, including many who are doing high-school work, and the general influence upon the teaching work of the State has been quite extensive. It is difficult to give any accurate or specific data with regard to this, but in all of the courses offered in mathematics it has been the intention to consider them as specially organized with reference to preparation for teaching.

The State law of Minnesota provides that each State normal school shall hold a summer session of 12 weeks, and many other normal schools, especially in the Middle West, hold summer sessions of six to eight weeks' duration.

For more detailed data on this subject, see a monograph by William C. Ruediger, mentioned above (p. 39).

Enough has been said to indicate the general influence of the normal-school summer sessions, especially in the Middle West. It is clear that for teachers, especially in the common schools and in the elementary schools, these sessions afford opportunities otherwise out of their reach and insure to large numbers of teachers a growth in effectiveness and an enlarging interest in their work which they could obtain in no other way. Of these general advantages, the teachers of mathematics probably enjoy a larger share than any others, since the data seem to indicate that a relatively larger number of teachers are registered for mathematics courses than is the case in other departments.

Finally, one other phase of summer-school work should be mentioned, namely, that which has characterized Chautauqua, N. Y., since 1878. While this began, and was long continued, largely in the form of popular lectures, in more recent years organized class work has been carried on in many departments of the school and college curriculum, including mathematics. The attendance is large and the interest is great. Much attention is given to arithmetic, algebra, and geometry, and no doubt the influence upon the teaching of these subjects is widespread and important.

CONCLUSION.

It has been seen that the summer session is a development of the last 20 years, and more extensively of the last 10 years. Many colleges and most of the universities are now holding summer sessions. Particular interest centers in those institutions where schools of education have been established on a professional scale or where the department of education is recognized as of leading importance. But even in those institutions where this is not the case much of the work of the summer sessions has a pedagogical character, due in

part to the method of presentation and in part to the critical observation of the instructor by the summer students who are themselves teachers. The normal schools, especially of the Middle West and South, are using the summer sessions to the very great advantage of large numbers of teachers who otherwise would be deprived of the opportunity for advancement and growth in the profession of teaching. The department of mathematics has its full share of patronage in the summer sessions and is doing its full quota of work in this form of preparation for teaching.