war, and in promoting the vital concerns of a peaceful society. In legislation, in administration, in the making of new provision for the betterment of life, there are larger responsibilities falling every year upon those agencies of human culture which this section and this association represent. It will devolve upon us here to consider changes such as these, and devise and recommend ways in which the larger duties and opportunities may be met.

There is not time to enlarge upon these considerations. But they are laid before you in the briefest possible compass, with the conviction that here is real work to be done, which will count for positive gains to our national life.

ELMER ELLSWORTH BROWN
BUREAU OF EDUCATION,
WASHINGTON, D. C.

SECTION L, EDUCATION[1]

THE first meeting of the new section for education of the American Association for the Advancement of Science was held on Tuesday, December 31, at 10 A.M. The meeting was called to order by the vice-president, Commissioner E. E. Brown, who, in a brief address, welcomed the members present and urged that the section always maintain the high ideals of education as a science for whose advancement the section had been formed. Three independent sessions of the section, and two joint sessions with other organizations were held. One of these joint sessions was with the American Psychological Association, and the other with the American Society of Naturalists. An open address was delivered before a large audience composed of members from all sections by Vice-president Brown on the topic "The Outlook of the Section for Education." This address is printed in full in the current number of SCIENCE. The officers chosen for the coming year are:

Vice-president—Professor John Dewey, Columbia University.

Secretary—Professor C. R. Mann, the University of Chicago.

Member of the Council—President C. S. Howe, Case School of Applied Science.

Member of the General Committee—Professor D. P. MacMillan, Chicago.

Members of the Sectional Committee—C. H. Judd, C. S. Howe, T. M. Balliet, E. L. Thorndike, C. M. Woodward.

At the sessions of the section the following papers were presented:

The Ethical Judgments of School Children: Professor H. A. AIKENS, Western Reserve University, Cleveland, Ohio.

The Practise Curve as an Educational Method: Professor J. MCKEEN CATTELL, Columbia University.

Practise curves were exhibited showing the improvement which occurred in learning to use the typewriter and in memorizing German words. The practise was continued as long as 365 consecutive days by two observers. Curves were also shown measuring the extent to which practise in one direction causes improvement in other directions. In such experiments the learner works as hard as possible for a short time each day and knows exactly what he accomplishes, and the plan seems to have some advantages as an educational method. The greatest possible concentration and exertion for a short time is probably the best way to learn, and the child is led to this by his efforts to improve his record. The experiment can be so arranged that all the elementary subjects—reading, writing, spelling and arithmetic—are required in the experiment and are in definite relation to a task in which the child becomes interested. There is a fair competition with other students which may be emphasized as far as is desirable, but the main com-

[1] Chicago, December 31, 1907–January 2, 1908.

petition of the child is with himself; he knows exactly what progress he makes and does the best he can to improve.

Practise Curves in Learning: W. F. Dearborn, University of Wisconsin.

The report concerned, first, the daily improvement made by twelve subjects in the ability to memorize rapidly the meanings of from thirty to fifty French or German words and passages of English poetry and prose. The subjects were college juniors and seniors and the practise was made daily for twenty days. The various subjects were then tested after intervals of from two weeks to ninety-five days to determine the relative permanence of that memorized before the marked gains of the practise compared with that memorized towards the end of the practise.

After practise, and in most cases after the first five or six days, it took less than one half the original time to do the same amount of work. There was a gain of time ranging from 53 per cent. to 62 per cent. in the learning of vocabulary, and 55 per cent. to 82 per cent. in the learning of poetry and prose.

The permanence of the practise gain was tested by determining the time necessary to relearn the first two and the last two lists of vocabulary and passages of poetry and prose. Two weeks after the end of practise three subjects relearned the last tests or passages in somewhat less time than the first (three subjects), after four weeks it took from one third to one half as long again to relearn the last passages as to learn the first (three subjects), after three months' time it took one half as long again to relearn the last passages. The permanence of the more rapid acquisitions was, therefore, less than that learned at a greater expenditure of time. However, the total time spent in learning and relearning in the last part of the practise is much less than that required in the earlier part—from 30 to 50 per cent. less.

This practise method is evidently well suited to some sorts of learning, especially where permanence of results is not a prime consideration, *e. g.*, in learning a declamation, and also where there is frequent opportunity for renewing acquaintance with the subject-matter. It is probably well suited to the learning of the vocabulary of a foreign language.

The Effect of Practise on the Range of Visual Attention: Professor Guy Montrose Whipple, University of Missouri.

The object of the investigation, which was prosecuted in the Educational Laboratory of Cornell University, was to determine the feasibility of producing measurable augmentation of the range of visual attention in adults by continued daily practise, and to determine by introspection the manner in which such augmentation, if present, was brought about.

Preliminary tests with 0.1 sec. exposure of simple geometrical drawings, digits and letters indicated that observers very quickly reached a physiological limit beyond which further progress was impossible.

Extended tests with 3 sec. exposure by means of a pendulum tachistoscope of varied forms of test-material—groups of dots, pictures, nonsense syllables, drawings, stanzas of poetry, etc., and with a 6 sec. exposure of groups of miscellaneous objects placed upon a table, indicated little or no improvement in the range of visual attention with practise, but revealed marked individual differences between different observers for different kinds of material. The factors which condition the range were determined with some exactness by an analysis of the results in the light of introspective evidence. The net result, pedagogically, is that it is not worth while, as has often been erroneously as-

serted, to conduct specific school exercises for training the range of attention. A detailed account will be published later.

A Method of Concentration in Teaching Medicine: Professor W. T. PORTER, Harvard University.

The Grading of Students: Professor MAX MEYER, University of Missouri.

Scales of Measurements in Education: Professor E. L. THORNDIKE, Teachers College, New York.

Professor Thorndike showed a scale of merit in handwriting, established empirically by gradings of several thousand samples of handwriting. Such a scale makes it possible for any specimen of handwriting to be graded rapidly and with any necessary precision. It also permits students of education who use it to give grades that shall have the same significance, no matter by whom given, and to present a measurement of the quality of handwriting attained by a given school in a brief and unambiguous set of figures.

The Place and Content of a Course in Biology in the High School: G. W. HUNTER, DeWitt Clinton High School, New York.

Statistics show that over 50 per cent. of the pupils in high schools in New York City leave before the end of the second year. Science work has won its right for existence in the curricula of the high school; a science having utilitarian value should be the one placed in the first year of a high school course of study.

The biological sciences are best fitted for the above purpose. Biology gives training in scientific method. It provides the child material which will be useful in preparation for future citizenship. It allows, in its various phases, of application to human affairs. Its informational content is of immense and farreaching practical utility.

A recommended course treats of the general principles of physiology of plants and animals, with special application of these data to the human race. Types are utilized to illustrate certain general biologic principles rather than to show classification. Emphasis is placed on the humanitarian and utilitarian aspect of biology as seen in its economic phases. More stress is laid on the informational and cultural content and less on the teaching of scientific method as such. Nature-study methods are used to some extent in observational work.

Such a course should not be offered as college entrance requirement, but should be supplemented by a year of either botany or zoology in the latter years of the high school.

The Scientific Basis of High School Studies: Professor C. DEGARMO, Cornell University.

This paper will appear in full in a future number of the *School Review.*

The Pedagogy of the Danish People's High Schools: Professor J. A. BERGSTRÖM, Indiana University.

The Teaching of Spelling as a Scientific Problem: Professor HENRY SUZZALLO, Teachers College, New York.

An Experiment in the Teaching of Homonyms: Principal H. C. PEARSON, Horace Mann School, New York.

This experiment was recently carried on in the Horace Mann Elementary School, in order to determine the relative efficiency of two common methods of teaching homonyms, one that of teaching a pair of homonyms together such as *pair* and *pear,* and the other of teaching two such words separately. The plan of the experiment was to have one section of a given grade teach homonyms by one method, and the other section of the same grade by another

method, care being taken to have all the factors in the teaching alike except the point of difference that we were trying to reach. The results of the investigation were submitted to careful statistical analysis and showed that the method of teaching homonyms together was more efficient in the third, fourth, fifth, sixth and seventh grades.

It is hoped that experiments of a similar nature will be conducted in other schools, so that the validity of the conclusions of this experiment may be more accurately determined.

Psychological Experts in Public School Systems: The Experience of Chicago: Dr. D. P. MacMillan, Director of the Department of Child Study, City School System, Chicago.

Dr. MacMillan traced the idea of establishing psychological experts in public school systems, showing that the demand for this came from persons who were not psychological experts, although their cause was ably championed by Professor Royce in 1898 before the National Educational Association.

In Chicago this matter was under discussion by the Board of Education during the years 1896–8. Several plans were discussed, but it was finally decided to organize a special department of the board whose officers should devote their entire time to this work. This was done in 1899, and the functions of the new department were defined as follows:

1. Research work. (*a*) Collecting anthropometric and psycho-physical data for the purpose of establishing norms and for determining such relationship as may be of service in pedagogy. (*b*) Applying accurate scientific methods to specific pedagogic problems, particularly methods of teaching and determination of the pedagogic value of various studies.

2. Examination of individual pupils with the object of advising parents and teachers as to their pedagogic management.

3. Instruction of teachers in child study and psychology.

The work of the department during the ten years of its activity was then described in some detail, and it was clearly shown that it is altogether feasible for consulting psychologists to carry on within school systems the line of activity which educational zealots and far-sighted scientists entertained and projected for them. The general recognition of the value of establishing such departments is in line with the most modern and progressive tendencies in education, and if the plan were adopted by a number of the larger school systems, untold benefits to the public school system would result.

Objective Measurements of the Efficiency of School Systems: Dr. J. D. Burks, Albany Training School for Teachers.

Reasons for the Existence of Schools of Education in American Universities: Professor C. W. A. Luckey, University of Nebraska.

The average attendance at the meetings was forty. Much interest was shown in the papers, and many of them were discussed at length. It was the consensus of opinion that this opening meeting of the new section was a great success and that it augured well for the future of the organization.

C. R. Mann,
Secretary

THE AMERICAN FEDERATION OF TEACHERS OF THE MATHEMATICAL AND THE NATURAL SCIENCES

A meeting of delegates of associations interested in the formation of an American Federation of Teachers of the Mathematical and the Natural Sciences was held in