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Science Teaching and the Iowa Academy of Science

ROBERT E. YAGER¹ and DELMA E. HARDING²

The Science Teaching Section of the Academy can boast of the largest membership of any section at this point in time—the hundredth year for the Iowa Academy of Science. In terms of the normal lifetime of man, a hundred years is a major span of time. Centennials should afford an opportunity for reviewing accomplishments and history, as well as an opportunity for celebration, reflection, and focus upon the future. This is such an attempt with respect to science teaching and the Iowa Academy of Science.

The teaching of science has been central to the Academy, since its members have been teachers of science at the collegiate level as well as researchers. It is fair to observe that more members have been primarily teachers than have been researchers. Throughout the early history of the Academy, members were concerned, with the general citizenry of the state, about the importance of science and fostering scientific curiosity in the young, including talented secondary school students.

One of the earliest attempts to formalize the concern of members of the Academy about science teaching occurred in 1923. Academy Secretary James H. Lees, of the Geological Survey in Des Moines, in his report to the Board and to the membership, recommended that the Academy “hold occasional symposia on general topics such as the teaching of various subjects; what should be presented to students and what should be required of them.” The Academy committee which considered the secretary’s report in 1923 took the position that “opinions concerning teaching problems could better be presented at the group luncheons which have become a permanent part of the program of the Academy.” The committee did favor the idea of symposia concerning general topics. Interest in and concern for science teaching was not central to the Academy for several years because of the prevailing attitude that such interest and concern did not exemplify topics of a scientific nature.

A “Committee on Conservation in Connection with the Public Schools” issued a report for the first time in 1924, and continued its work for several years. Such individual efforts, including work with high school youth, continued. Concern for science teaching *per se* increased during the next decade. In 1936 Academy Secretary-Treasurer Joseph Gilman identified three significant phases of Academy activity and concern. These were: science teaching, state planning, and conservation. He wrote of two levels of science teaching—high school and college. He further urged closer association between the Academy and the Iowa Science Teachers Association.

The High School Relations Committee under the chairmanship of C. W. Lantz became active in 1937. Improvements in science teaching and science programs in secondary schools were urged. This was also the year that a new section was formed and formally approved for 1938. This ac-

tion was based on recommendations of a three-man committee appointed in 1936 to consider the “creation of a teaching section.” L. P. Sherman was president of the Academy in 1937 and was instrumental in activating the study committee.

Two meetings of this committee were held during the course of the 1937 Academy meetings. Questions were suggested as likely to arise in the operation of such a section. Included were: Would there be enough interest in teaching problems among the various sciences to ensure a sustained group interest in such a section of the Academy? Would these problems be better treated in a distinct section rather than in the various subject-matter field sections? Might such a section result in an irreconcilable split in the interests of many members of the Academy? In considering a separate section, one of the strong points in favor of such a section was that a science teaching section would give an opportunity for increased interest of teachers in secondary schools in the senior Academy. Such a section was intended to encourage greater coordination and communication among those teaching the various sciences at the secondary and college levels. S. M. Dietz of Ames was appointed as the first section chairman.

During the years 1938 to 1953, the Science Teaching Section existed as one of the active sections, with papers presented at the annual meeting and with manuscripts published in the *Proceedings*. In 1938 there were nine manuscripts published in the *Proceedings* in the Science Teaching Section. These papers were concerned with teaching aids and course structure and were primarily concerned with science teaching at the collegiate level. The decade that followed produced a number of discussions, presentations, and publications in the *Proceedings* that can be characterized as surveys, assessments of current developments, appraisals, and forecasts. The leaders in the Science Teaching Section were college science teachers. The following five years (1948-53) resulted in a change of active participants and topics of interest in the section. More science educators were active and such topics as secondary school curricula, high school teacher preparation in the sciences, and college programs for preparing teachers were common. Appendix I indicates the section chairmen who were involved from 1937 to 1954.

Dr. Paul E. Kambly, who was at the University High School in Iowa City, identified certain general curriculum trends in high school science during these years.

1. A trend toward arranging subject matter into broader units of work, resulting in the reduction of the number of topics or units included in one school year.
2. A trend toward courses that disregarded the traditional subdivisions of subject matter. This made biology a somewhat standardized school subject.
3. A trend toward the establishment of separate health-education courses. The impetus given health education provided by World War II was reflected in demands for more adequate health education.
4. A less definite but more important trend was toward greater emphasis on conservation education in the areas

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of physical and biological resources in general as well as the area of human resources. The very least to be expected from the greater amount of time to be placed on conservation in the physical and biological courses would be to help pupils understand the need for wise use of natural resources.

5. A trend toward more consumer education of the type necessary for wise choice and use of consumer goods was evident before World War II, and was increasingly evident following the war.
6. Preinduction courses taught primarily by science teachers represented another possible curriculum trend. An example of this was aeronautics taught as a part of a physical science course.

Kambly also reported that college teachers were aware of the demands being placed on the high school science teachers and were willing to help prepare better trained teachers. A total of 60 semester hours of science work, with a 24-hour major in one subject and 18 hours in two others, was suggested.

Four trends concerning methods of science teaching were also evident by the late 1940's.

1. Greater use of the unit methods of teaching and less use of the textbook-recitation method. The emphasis in unit teaching is on the development of understanding of major questions through the use of science concepts.
2. Increased use of audio-visual aids.
3. Greater use of teacher demonstrations—used much more than individual pupil laboratories.
4. Providing class time for supervised study resulting in more teacher supervision of the work of pupils. This led teachers to help students read and understand new scientific materials.

Interest in the Science Teaching Section of the Academy began to wane during the 1950's. In 1952 there were no papers presented, although the lead article in the *Proceedings* was F. E. Brown's consideration of talent searches. In 1953 James Kercheval's article "Survey of Science Instruction in the High Schools of Iowa" was the only contribution. The minutes of the business meeting of the Academy report that no new section chairman was elected for 1954. So ended 16 years of section status for science teaching in the Academy.

H. E. Wise addressed the Academy in 1956 concerning the Science Teacher Improvement Program of AAAS. His address is included in the *Proceedings* of that year. The Board of Directors met on the day following Wise's address and discussed science teaching. Some consideration was given to reactivating the section. However, it was decided that a Science Teaching Committee would be created instead. This committee was "to investigate the question of what the Academy should do to aid the improvement of science teaching." Walter F. Loehwing of The University of Iowa, the new president of the Academy and a person who had been active in the earlier Science Teaching Section, was to act as chairman of the committee. During the year the committee considered the problem of teaching science and teacher training; it considered the desirability of cooperation with the State Department of Public Instruction; it considered the need for cooperation between the high school and college levels. In 1957 the Bylaws were changed to make the Science Teaching Committee one of the eight standing committees of the Academy. The chairmen of all standing committees were automatically members of the Board of Directors. Hence, from 1957 until 1970, when the Constitution and Bylaws of

the Academy underwent major revision, science teaching, through the chairman of the Science Teaching Committee, was represented as a central area on the governing board of the Academy. Appendix 2 indicates the chairmen of the Science Teaching Committee, all of whom served during the period as full members of the Board of Directors.

During the years 1958-1962, Dorothy Matala of Cedar Falls chaired the Science Teaching Committee. During these five years the focus of the committee was upon exploring funding possibilities for state academies with the National Science Foundation. Contact was made with the State Department of Public Instruction concerning problems of teacher certification; contact was also made with the National Science Foundation and AAAS concerning their improvement programs. During 1958 and 1959 the committee sought expressions of interest and ideas from members of the Academy and from selected high school teachers. In 1960 there was no report of activity of the Science Teaching Committee. However, in cooperation with the High School Relations Committee, a grant from the National Science Foundation was awarded to the Academy of Science and The University of Iowa for operating the Iowa Visiting Scientist Program. This program, under the direction of T. R. Porter of The University of Iowa during the years 1960-1967, was a tangible expression of the interest of members of the Academy in secondary school science. It was a popular program among teachers, schools, students, and Academy "scientists."

In 1961 the Science Teaching Committee, in cooperation with the Committee on Preparation and Certification of Teachers for Junior Colleges and High Schools, presented a major report concerning desired requirements for teacher preparation. The second committee was chaired by Wendel Bragonier of Iowa State University. No activity of the Science Teaching Committee occurred during 1962. However, a request to reactivate the Science Teaching Section from a group including members of the Academy who were secondary science teachers was not approved by the Board.

In 1963 Robert E. Yager of The University of Iowa was appointed chairman of the Science Teaching Committee. The new committee requested reactivation of the Science Teaching Section and a closer alliance of such a section with the Iowa Science Teachers Association, the creation and support of a new *Iowa Science Teachers Journal*, and endorsement of a plan for seeking a specific proposal for support of a high school research participation program. The Board endorsed all three proposals on a trial basis.

The Science Teaching Committee worked with the officers of the Iowa Science Teachers Association in accomplishing a merger. In the year that followed the "Association" ceased to exist and the entire membership became the "Science Teaching Section" of the Academy. The first year (1964) there were 42 papers presented in the new Science Teaching Section, making it the largest in terms of membership and contributed papers. The members of the Executive Committee of the Iowa Science Teachers Association included Betty Goettsch (Story City), Lyle Anderson (Waterloo), David Fagle (Marshalltown), Lindy Solon (Ames), and Roger Volker (Webster City). The membership of the Academy's Science Teaching Committee included Robert E. Yager (Iowa City), Donald Biggs (Ames), John Bolte (Iowa City), Delma Harding (Ames), Leland Wilson (Cedar Falls), and Ray Haan (Des Moines).

The Science Teaching Section continued to function with officers as it did previously as the Iowa Science Teachers As-

sociation. It did have many more members who were college teachers than it did previously. The section chairman was identified as the past president of the section. The section also held regular fall meetings each October as a part of the annual meetings of the Iowa State Education Association. It continues to do so today. The officers of the Science Teaching Section since the discussions and action in 1963 and the formal merger with the Academy in 1964 are included as Appendix 3.

The Science Teaching Committee of the Academy was involved with a variety of ideas and activities during the years 1963 to 1970 until the Constitution was revised and the committee terminated. Most significant of these were the teacher award programs, the articulation conferences between two-year and four-year colleges, the research program for secondary students, coordination with the Junior Academy and other youth programs, leadership in national science curriculum projects, and leadership in and assistance with the Science Teaching Section and the *Iowa Science Teachers Journal*.

The Iowa Section of the American Chemical Society had for many years named a Science Teacher of the Year and honored such a teacher at Academy meetings. The National Association of Biology Teachers established a national program in 1962 to select an Outstanding Biology Teacher in each state. The Academy was contacted as a possible focus for this award as well. The Science Teaching Committee helped establish guidelines, a program, and a format for science teacher awards in the state and within the Academy. These efforts have now been incorporated as a major function of a new standing committee of the Academy—the Recognition and Awards Committee.

Many members from two-year colleges had long expressed the need for conferences concerning problems of articulation and communication in the state. The Science Teaching Committee, with authorization from the Board of Directors, organized the first of a series of such conferences in 1966. Additional conferences were held in the two succeeding years. Eventually a committee was appointed to head this effort for what was planned to be a regular fall meeting of the Academy during which problems of collegiate education in the sciences could be considered. Unfortunately, the efforts were broadened to include more disciplines and registrar personnel. Discussions and issues were more administrative and less related to curriculum and teaching. The last activity of such conferences and/or committee action was reported in 1971.

The Science Teaching Committee was asked to help organize the Junior Academy of Science in a manner that would more closely exemplify the Academy itself. One activity was the decision of the committee to sponsor a research participation program for high ability secondary students. Scientist-advisers for the Junior Academy members were identified. The support of the National Science Foundation was received for a period of seven years following the first grant in 1964. Upon establishing a central office for the Academy, administration of the program, which was proposed and operated as a function of the Science Teaching Committee, was transferred to Cedar Falls, since the offices of the executive secretary of the Academy, the director of the Iowa Junior Academy of Science, and the chairman of the High School Relations Committee were all located there. The chairman of the High School Relations Committee assumed the directorship of

the NSF supported symposium. The program no longer enjoys support from the National Science Foundation but it does continue and is regarded as central to the operation of the Iowa Junior Academy of Science. Over three thousand students in Iowa are currently involved in activities as a part of the Iowa Junior Academy of Science. Many of these activities result from the efforts of the Science Teaching Committee during 1964-68.

The Science Teaching Committee functioned for many years as a coordinating group among the Academy, the Board, the schools of Iowa, and science teachers. Such coordination had been deemed desirable by Academy officials 50 years ago. The committee continued the association with certification personnel and the science consultants of the State Department of Public Instruction. The committee assisted with school evaluation, revisions in certification standards, curriculum field testing, and consultation in schools. The committee was active as well in continuing certain facets of the Visiting Scientists Program.

Until the committee was disbanded in 1970, it was active as an advisory group with the Science Teaching Section. Members often met with the executive board of the section. The committee also continued to function as the editorial committee for the *Iowa Science Teachers Journal*.

At the end of one hundred years of Academy history, science teaching is the largest of the 16 sections now comprising the Academy; many of the members belong to one or two other sections as well. Members of the section have been officers, board members, and committee members throughout the leadership of the Academy. The section represents the activities that now comprise science teaching and the Iowa Academy of Science. Major activities of the section deserve some elaboration as a focus upon the beginning of the second hundred years.

The spring meeting remains the major activity each year. At these meetings section members participate actively in other section meetings, general symposia, and cooperatively sponsor special sessions, and present research reports concerned with science teaching. The number of papers presented in the Science Teaching Section during the years 1964-75 has varied from 45 to 10.

The *Iowa Science Teachers Journal* remains a visible means of communication and a means for publication of contributed papers. The format for volumes 9 and 10 was changed considerably as financial support diminished. However, renewed support from the State Legislature for Iowa Academy publications has made it possible to return to the *Journal* style and format for volumes 11 and 12. The current year, 1975, represents the 12th year (and therefore 12 volumes) consisting of four issues each year.

The fall meeting in cooperation with the Iowa State Education Association remains a major meeting in terms of the number of members in attendance and the quality of the program. Speakers with national reputations, intriguing symposia, and discussion topics often characterize the one-day meetings held in Des Moines.

The section cooperates with Iowa State University in hosting an annual Science Teaching Short Course on the Iowa State University campus. This two-day symposium is held each March and involves several hundred teachers each year. Attendance has become a tradition for science teachers—many of whom encounter the Academy and its Science Teaching Section for the first time.

The section has also sponsored the Science Teacher Cadre, a program designed to involve teachers in in-service growth and greater communication from school to school across the state. The section has also cooperated in organizing and sponsoring several conferences and special programs headed by the Iowa State Education Association and its central staff.

The section has continued to work with the personnel at the State Department of Public Instruction, the State Council of Science Supervisors, the Junior Academy of Science organization, and the science fair organizations active in the state.

One of the major activities during 1975 has been sponsorship and involvement with a statewide improvement project in science education which is known as Project ASSIST (Alternatives for Schools of the Seventies for Improving Science Teaching). Project ASSIST is a program for assisting teachers and schools in implementing specific new curriculum materials—most of which have been prepared nationally with funds from the National Science Foundation. Project ASSIST operates in 18 regional centers across the state with headquarters at the Science Education Center at The University of Iowa. Members of the executive committee for Project ASSIST are also members of the Science Teaching Section, as are most of the regional coordinators and members of leadership and instructional teams. Many are involved in a series of awareness conferences across Iowa.

The Science Teaching Section in the year 1975 is not only the largest section of the Iowa Academy of Science. It is also one of the most active, with meetings, projects, programs, and activities occurring at all times during the year. Although the membership is under 500, most of the 450 public schools, 15 area schools, and 30 colleges in Iowa are involved in and affected by the people and programs that are the Science Teaching Section. The future is bright, while it is full of challenges.

APPENDIX 1

SECTION CHAIRMEN OF FIRT SCIENCE TEACHING SECTION,
1937-1953

- 1937-38 S. M. Dietz, Ames
- 1938-39 J. B. Culbertson, Mount Vernon
- 1939-40 H. S. Conard, Grinnell
- 1940-41 C. J. Lapp, Iowa City
- 1941-42 R. M. Getchell, Cedar Falls
- 1942-43 S. M. Dietz, Ames
- 1943-44 K. A. Stiles, Cedar Rapids
- 1944-45 C. W. Lantz, Cedar Falls
- 1945-46 C. W. Lantz, Cedar Falls
- 1946-47 C. W. Lantz, Cedar Falls
- 1947-48 W. H. Bragonier, Ames
- 1948-49 C. W. Lantz, Cedar Falls
- 1949-50 Grant O. Gale, Grinnell
- 1950-51 O. C. Kreider, Ames
- 1951-52 J. V. Farrell, Cedar Falls
- 1952-53 Willard Unsicker, Iowa City
- 1953-54 Clifford L. McCollum, Cedar Falls

APPENDIX 2

CHAIRMEN OF THE SCIENCE TEACHING COMMITTEE, 1957-1970

(The committee existed as a standing committee of the Iowa Academy of Science. Its Chairman was a member of the Iowa Academy of Science Board of Directors.)

- 1957-58 W. F. Loehwing, Iowa City
- 1958-59 Dorothy M. Matala, Cedar Falls
- 1959-60 Dorothy M. Matala, Cedar Falls
- 1960-61 Dorothy M. Matala, Cedar Falls
- 1961-62 Dorothy M. Matala, Cedar Falls
- 1962-63 Dorothy M. Matala, Cedar Falls

- 1963-64 Robert E. Yager, Iowa City
- 1964-65 Robert E. Yager, Iowa City
- 1965-66 Robert E. Yager, Iowa City
- 1966-67 Robert E. Yager, Iowa City
- 1967-68 Robert E. Yager, Iowa City
- 1968-69 Robert E. Yager, Iowa City
- 1969-70 Robert E. Yager, Iowa City

APPENDIX 3

OFFICERS OF THE SCIENCE TEACHING SECTION, 1964-1975

- 1963-64
President—Betty Goettsch, Story City
Vice President—Lyle Anderson, Waterloo
Secretary—Lindy Solon, Ames
Treasurer—Lindy Solon, Ames
- 1964-65
President—Lyle Anderson, Waterloo
Vice President—David Fagle, Marshalltown
Secretary—Lindy Solon, Ames
Treasurer—Roger Volker, Webster City
- 1965-66
President—David Fagle, Marshalltown
Vice President—Thomas Scott, Des Moines
Secretary—Richard Sweeney, Des Moines
Treasurer—Kenneth Frazier, Ames
- 1966-67
President—Warren Classon, Davenport
Vice President—Richard Sweeney, Des Moines
Secretary—Gerald Krockover, Iowa City
Treasurer—Lena Keithahn, Mason City
- 1967-68
President—Richard Sweeney, Des Moines
Vice President—Gerald Krockover, Iowa City
Secretary—Gerald Cunningham, Marshalltown
Treasurer—James Mairs, Marshalltown
- 1968-69
President—George Chapman, Dubuque
Vice President—Eloise Soy, Cedar Falls
Secretary—Henry Dickinson, Maquoketa
Treasurer—William Peterson, Sioux City
- 1969-70
President—Lena Keithahn, Mason City
Vice President—Verlin Fleagle, De Witt
Secretary—William Peterson, Sioux City
Treasurer—Henry Biere, Anamosa
- 1970-71
President—Verlin Fleagle, De Witt
Vice President—Milbert Krohn, Spirit Lake
Secretary—Donald Murphy, Des Moines
Treasurer—Donald Lange, Davenport
- 1971-72
President—Milbert Krohn, Spirit Lake
Vice President—Donald Murphy, Des Moines
Secretary—Sr. Claire Marie Fatik, Davenport
Treasurer—Tom Sheppard, Fort Dodge
- 1972-73
President—Donald Murphy, Des Moines
Vice President—Jack Daniels, Emmetsburg
Secretary—Ray Mitchem, Union
Treasurer—John Bosveld, Dubuque
- 1973-74
President—Kenneth Frazier, Ames
Vice President—Elwood Garlock, Cedar Rapids
Secretary—Joseph Beach, Cedar Rapids
Treasurer—Robert Wilson, Belmond
- 1974-75
President—Elwood Garlock, Cedar Rapids
President-Elect—Roy Unruh, Cedar Falls
Secretary—Dennis Mason, Marshalltown
Treasurer—Henry Veldhuis, Sheldon