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AN ASSOCIATION POSITION STATEMENT ON PROGRAMS AND BUDGETS OF THE NATIONAL SCIENCE FOUNDATION DIVISION OF THE PRE-COLLEGE EDUCATION IN SCIENCE

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This Document in Brief

This document is a position statement, together with recommendations, from the National Science Teachers Association relative to educational programs and budgets of the National Science Foundation, particularly at pre-college levels. It is the result of noting with great concern what seems to us to be a serious, threatening decrease in financial support for such educational programs over the past three years, coupled with our firm belief that more and better science education—not less, either in quantity or quality—is an imperative for all children and youth in these days of growing concern about societal problems and national needs. Higher levels of scientific literacy among the total population must become a priority goal for the scientific/technological society of our time and for the future.

We recognize that large support for education generally is provided through the Office of Education and at state and local levels, but these kinds of support are very broad and are not focused on the fundamental fields of science, mathematics, and social science. It is our contention that the educational programs of NSF in these specific areas must be maintained and strengthened and that new ones must be designed in order to help schools, school systems, and teachers provide meaningful, functional education in these vital areas for all students.

The National Science Teachers Association, organized in 1944, is the largest science education society in the USA with a current enrollment of over 40,000 members and subscribers from all levels of education—elementary, secondary, and collegiate. The work of the Association is carried on by its officers, many committees, and a full-time staff of 24 persons. Communication and dissemination of information are by means of three periodicals—Science and Children, The Science Teacher, and the Journal of College Science Teaching—and through several regional meetings each year plus the annual national convention.

A Review of NSF Pre-College Educational Efforts

In the mid nineteen-fifties, when the nation was experiencing severe shortages of scientifically trained manpower, studies of school science offerings revealed serious deficiencies in the science education of our youth. By direction of, and with support of the Congress, the National Science Foundation embarked on a massive program to remedy this condition. This effort resulted in the developments of new curricula, new instructional material, new audio-visual material, new approaches to teaching science, and a much-needed updating of science course content. The National Defense Education Act of 1957 contributed greatly to providing more and improved science teaching equipment for the schools. NDEA also stimulated and helped make possible a very substantial increase in the numbers and competencies of science supervisors, consultants and other specialized personnel at local and state levels.

One of the most important aspects of the National Science Foundation endeavor has been the series of programs designed to bring this new course content and the new instructional materials to the attention of the science teachers, to update and upgrade the teaching competencies of science teachers, and to prepare the teachers to utilize the new curricula in the schools.

The excellence of the new instructional schemes can be attested to by their prompt and wide acceptance in the schools and by the better preparation of those students entering college for careers in science and engineering. Another indication of success was the prompt response of private enterprise—authors and publishers—to adopt, adapt, and include much of the new materials and approaches in their commercially produced textbooks.

Although much of the original NSF effort was directed toward the senior high schools, the success achieved generated further science programs for the junior high and elementary schools and, of course, the colleges. But excellence in the classrooms could not have been achieved without the teacher-training programs funded and oriented by the Pre-College Education in Science Division of NSF. It was through these efforts that the science curricular programs came to their present high level of fruition. These teacher-training programs included summer institutes, academic year institutes, and in-service institutes, among others. Dr. James B. Conant, in his 1963 book The Education of American Teachers, stated that "the use of NSF summer institutes
for bringing teachers up to date in a subject matter field has been perhaps the single most important improvement in recent years in the training of secondary school teachers."

The budget for pre-college education in 1970 was $53.5 million and in 1972, $35.0 million. For fiscal year 1973 this budget dropped to $23.6 million. It is extremely disturbing to members of the National Science Teachers Association to note this marked decrease in the NSF education budget. In the secondary school area alone the number of participants involved in summer institutes in 1972 decreased by about 48% compared with 1971 and in 1973 the number of participants to be involved will decrease by an additional 16%. In the category of in-service institutes the number of participants to be involved in 1973 is about one-tenth (1/10) that of the previous year. Even more startling is the reduction in the support of education when compared with the total NSF new obligations, and in the reduction of teacher-training programs.

Although we were successful in meeting the needs of the sixties, by 1970 the problems had changed. There is still the need to develop successful practices in the elementary schools, an area where the target students are the entire student population. In addition, there is still the need to produce further reform in the pre-service education of teachers of science. These needs alone mandate a level of expenditure at least at the 1970 level; but there are now additional needs which have arisen from our burgeoning technology.

Changing Needs of Society, New Demands for Education

Societies are not stagnant systems; they are complex, dynamic structures with constantly changing elements and needs. The very advance of science which NSF helped foster has resulted in a post industrial society, a society now rooted in technology, a world where nature, in many instances, is sub-servient to man. We now live in a world where technology and society interpenetrate, where the organizational systems of society affect and are affected by technology. This is a new world, and our educational system is struggling to face the challenges that this world presents--to understand the problems and to take advantage of the opportunities of advanced technology.

In this modern world our technology almost always has broad societal implications. Examples of areas of current concern include transportation, communication, health care, solid waste management, the quality of air and water, population, and many others. NSF has already started its own program of Research Applied to National Needs (RANN). This program supports an increasing number of projects with defined social goals--such as super-systems, high energy physics related to cancer therapy, and excavation technology for subways, water, and sewage lines. In addition, there are the much-talked about environmental problems, population growth, and food and hunger. As these projects move ahead, they undoubtedly will pose new problems, demands, and opportunities for science teachers as well as for teachers in such areas as social studies and industrial arts.

The problems mentioned above are the kinds which our citizens and our science teachers must understand and about which they will have to make judgments and decisions. In many instances our citizens will be the workers in these new areas, the designers as well as the support people. We must prepare them for this new role. In all instances our citizens will be affected. We must educate them in a manner sufficient to make valid choices with due regard to societal consequences, to support or reject endeavors and issues on the basis of reason and information.

To meet these changing needs of society, science education should be consistently supported at a substantial level. Although the course content development and improvement which took place during the sixties has been a good beginning, the education of tomorrow's scientists and engineers must be directed to produce broadly trained scientists who are highly motivated and capable of pursuing careers associated with the public interest. In addition to developing programs to improve the quality of science education for those professionally committed to the sciences, we must improve science education for a broader range of students so that a larger segment of our society can more effectively work and live with technological advances.

Critical social problems pose challenges and new needs for science in the education of children and youth. We must increase the opportunities for strengthening science instruction for all pupils--in elementary grades, middle schools, junior high schools, and for the 60%-70% of high school students who take no science courses beyond the tenth grade. We must produce a high level of scientific literacy throughout the populace. Ignorance of science in our scientific-technological society is costly and must be
overcome. Experimentation must go on at all levels--the schools, the colleges and the universities, to find new designs and new approaches for incorporating science in the educational endeavor.

No one questions our ability to produce highly specialized professional scientists; we now need to produce non-scientists who understand a great deal more about science. We must now give our attention to the Science/Technology/Society interface. Interdisciplinary endeavors are now the great need, and we must support interdisciplinary exploration and development at all levels of education.

NSTA Views of Needs, Priorities, and Budgets for NSF Pre-College Science Education

The National Science Teachers Association has from its inception been concerned with producing the best match between the science education of our youth and the world in which they will live upon graduation, be it from high school or college. Because of our broad distribution of membership and activities we are able to keep in constant touch with students and programs as well as to maintain an awareness of the needs of society. The NSTA position statement on "School Science Education for the 70's" is a guideline for producing citizens who understand the power and limitations of science and technology and who understand the obligations of a society whose major concern is man and the quality of his life.

To achieve this goal requires a major educational effort on many fronts. We believe that much support should be provided for schools, school systems, supervisors, and teachers to work collaboratively on their problems, problems identified from within and among schools. We believe the Congress also recognized this need when it authorized $77.3 million for the fiscal year 1973 education budget.

Unfortunately the impoundment of $30.8 million by OMB required NSF to make major program adjustments resulting in the elimination of many programs.

NSF has developed approaches to meet the new educational needs. The programs they have developed are all necessary, but because of the constraints imposed by reduced funding they are far from sufficient. There is the recognition that new secondary school interdisciplinary curricula and materials must be developed for our future scientists and technicians but there is little provision for training the secondary school science teachers in the use of this material. There is the recognition of the need to develop programs at the science-technology-society interface but there is little provision to develop the competencies of secondary school teachers in this area. NSF itself makes the case for such programs by recognizing in its program of "Continuing Education for Scientists and Engineers," that the professional education of scientists and engineers must be continued. Must not the professional education of science teachers be continued? If the eventual results of knowledge obsolescence on the part of engineers is of serious importance to the nation, certainly the knowledge obsolescence of science teachers is equally serious and perhaps of greater consequence considering the number of students affected.

NSF recognizes the need for careers in science for members of minority groups and has plans for programs involving colleges and universities. But the motivation to pursue such a career usually stems from a high school experience and we have few programs designed to meet this need. Should not the secondary school science teachers be given opportunities to develop such programs and expertise?

In essence our task is with the science teacher. Our present teachers must develop the capabilities of handling these new approaches. We must retrain and reeducate them. We must have more teacher-training programs of the various kinds. I refer again to Dr. Conant's statement that "the use of NSF summer institutes...has been perhaps the single most important improvement in recent years in the training of secondary school teachers."

In all new endeavors we must pay more attention to what schools and teachers want, and we must involve more teachers in the development and implementation of programs, for this approach comes closest to providing prompt "pay-off" in the education of students.

Professional organizations do not have the resources to carry out such efforts on the scale necessary. The NSF, however, is ideally suited to this purpose. The organizational structure of the educational division of NSF can meet this purpose. The years of experience in developing curriculum projects, institutes of various kinds, and school facilities can be immediately put to use. At this time, when there is such urgent need to develop new
approaches in science education to meet the needs of society, we cannot afford any reduction in the educational budget of the National Science Foundation. On the contrary, the National Science Teachers Association strongly recommends that the budget component for the pre-college education in science be substantially increased.

Considering the needs to develop new curricula and to strengthen programs for the pre-service and in-service preparation of teachers, we strongly believe that the education budget for fiscal year 1974 should be higher than it was for fiscal year 1970. We believe that there should be a 30% increase in support for course-content improvement projects, a 20% increase in the cooperative college-school science programs and a 50% increase in support for in-service institutes.

IOWA TEACHERS CONSERVATION CAMP

Sherman Lundy
Des Moines County ECEC (Chairman)
Burlington, Iowa

A little over a year ago in the spring of 1972, the Des Moines County Environmental Conservation Education Committee (ECEC) conducted a conservation education needs assessment of teachers in Des Moines County. From several discussions, it was decided a workshop in conservation education would be of great benefit to the area teachers. Two one-week workshop proposals were written and sent to the University of Northern Iowa (UNI). Professor Ben Clausen of UNI's Iowa Teacher's Conservation Camp assisted in the preparation of the proposal to the UNI officials; the extension officials at UNI, offered a counter proposal which the Des Moines County ECEC, felt did not meet the apparent needs of teachers. Another approach was taken in the Fall of 1972, by the Des Moines County ECEC and Professor Clausen; the suggestion was made that the ITCC course be offered on a regional basis throughout the various regions in Iowa alternating from year to year the area in which the course would be given. The logic behind this was the feeling that while the old ITCC program at Springbrook was good, teachers could derive more benefit from familiarization and utilization of local resource sites and personnel, in addition to developing environmental education materials.

University of Northern Iowa officials approved the idea of offering the ITCC course on a regional basis and two locations, Cedar Falls and Burlington, were selected for the summer session of 1973.

In Burlington, the Des Moines County ECEC began the task of liaison, securing a place for the class, scholarship monies for partial payment of tuition costs, and local resource personnel to assist in the teaching of the course. The Burlington Community School District officials provided the ITCC with room space and lab facilities in the new high school building. Ralph Dewey, of the Des Moines County Soil Conservation Service (SCS) Office, contacted all the soil districts (counties) in southeastern Iowa and sent letters to all Des Moines County school districts informing them of the proposed course and encouraging their participation. Sherman Lundy of the ECEC followed with a visit to several of the school districts in the area; information about the course for posting on bulletin boards and application blanks were provided for each school. In addition, the State Department of Public Instruction also contacted the school districts in this area in regards to the ITCC course. Other members of the council including Ruth Martens, Cale Carlson, and Byron Baumgartner encouraged teachers of their school districts to participate. Ralph Dewey and Sherman Lundy then conducted a fund raising and outdoor education campaign by visiting civic and conservation organizations.

Through the gracious efforts of the Soil District Commissioners in four counties, especially Des Moines County, Long Creek Conservation Club, Burlington Kiwannis Club, Burlington Pollution Control Council, and the Burlington High School Ecology Club, over $1400 for partial scholarships was raised and divided among the teachers who took the course. The few teachers who were from other states or regions of Iowa had either partial or full scholarships from their districts.

The Department of Public Instruction became involved in the program through the offices of Duane Toomsen, Environmental Educational Consultant. UNI provided professors Ben Clausen and David McCalley who with Duane Toomsen, were the instructors for the 32 teachers who completed the course. The area participants of the ITCC in Burlington, were particularly fortunate to have Ralph Dewey of the Des Moines County SCS Office, who is an enthusiastic supporter of