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AUTHOR Helgeson, Stanley L.; And Others
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ABSTRACT

This is a summary of a final report which was based on a survey of the literature on needs and practices in pre-college social science education for the period 1955 through 1975. The summary contains a brief introduction, a description of procedures followed in the study, and a summary of findings. The findings are presented as summary statements based upon each major section of the final report and are keyed to the original sections in the final report from which they were drawn. (SH)

THE STATUS OF PRE-COLLEGE SCIENCE, MATHEMATICS, AND SOCIAL SCIENCE EDUCATION: 1955-1975

VOLUME I. SCIENCE EDUCATION

EXECUTIVE SUMMARY

Stanley L. Helgeson

Patricia E. Blosser

Robert W. Howe

Center for Science and Mathematics Education

The Ohio State University

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EXECUTIVE SUMMARY: SCIENCE EDUCATION

I. Introduction

The time period from 1955 to 1975 was unparalleled in the degree of activity in science education. Millions of dollars were devoted to the cooperative involvement of scientists, educators, and learning theorists in the development of science curriculum materials. Extensive programs were conducted to upgrade and update the science content background of teachers and to train them in the use of the new curricula.

The Elementary and Secondary Education Act initiated programs to deal with special groups within the educational community. Concern for the educational needs of students, especially the disadvantaged and the deprived, and for program effectiveness was specifically mandated by this Act.

The focus of this project was a status report on the impact of such activity in curriculum development, teacher education, instruction and needs assessment. Specifically, the purpose of this project was to:

1. review, analyze, and summarize the appropriate literature related to pre-college science instruction, to science teacher education, and to needs assessment; and
2. identify trends and patterns in the preparation of science teachers, teaching practices, curriculum materials, and needs assessments in science education

during the period, 1955-1975.

II. Methodology

Because this was an archival study, the procedures focused on identifying, retrieving, and analyzing existing literature rather than on generating new information. Major sources of information included the ERIC data base, Education Index, Reader's Guide to Periodical Literature, Dissertation Abstracts International, published books and journals, federal agencies' files and collections, state department of education archives, and reports from conferences and committees. Selection of documents for review was based upon (1) generalizability of results based upon size of population, sampling techniques, and methods of analysis; (2) summarization of data or research reports (e.g., reviews of research); (3) importance or significance as indicated by publication in a refereed journal or as a committee report; and (4) representativeness of a type or kind of document (e.g., curriculum guides).

The report is organized around four major considerations:

1. Existing Practices and Procedures in Schools--enrollment, school organization, curricular, and instructional patterns; facilities and equipment.
2. Science Teacher Education--preservice education guidelines, certification, programs, and research; inservice education certification, programs and practices, and research; science teaching today, curriculum reform, supply and demand, professionalism and responsibility, pressures and politics, and implications for science teaching.
3. Controlling and Financing Education--control and financing of schools; cost effectiveness of science instruction.
4. Needs Assessment Efforts--general education needs and science education needs.

A section of the report corresponds to each of the major areas. Within each section summary statements are presented for the major subsections followed by the documentation from which each was derived. A final section presents a summary and trends of needs and practices. Because of space limitations and redundancy of information, documentation is selective rather than an exhaustive listing of applicable citations. It should be noted that many of the documents are from the last half of the twenty-year period rather than the first half. This stems partly from the ephemeral nature of much of the literature, but more importantly from two other considerations. First, the emergence of results, trends, and patterns is better reflected in the more recent literature since these are not instantaneous apparitions. Second, the recent literature indicates the existing conditions from which decision makers must determine factors affecting educational policies. If a historical review is to assist science education, the policy implications of past events must be considered for the future.

III. Findings

Selected summary statements are presented for each major section. The column of page numbers indicates the section in the report from which the findings were drawn.

Practices and Procedures

- Enrollments have been increasing but are beginning to decline, with elementary enrollments declining earlier than secondary. (7)
- The effect of enrollment change may be heightened by emigration of students. (7)
- Just as increasing enrollments had an impact on schools, decreasing enrollments will impact on schools, particularly financially. (7)

- Stated objectives for elementary school science have not changed significantly since 1955. (16)

- Objectives for secondary school appear to be in transition; the importance of science in the general education program is receiving less emphasis. (21)

- The percentage of students enrolled in science has increased until 1973-74 and since has remained relatively stable. (21)

- Class sizes have been reduced between 1955 and 1975. (30)

- Perceived barriers to effective science teaching have not changed appreciably over the past 20 years. (30)

- The individual classroom teacher is still the primary mode of instruction in most classrooms. Less than 10% of the schools have used innovative practices such as modular scheduling, television, or computer assisted instruction in any consistent manner. (30)

- Since 1955 there has been an increase in student-centered and hands-on instruction but a substantial percentage of students are not involved with such procedures. (34)

- There are far more alternatives for instructional materials currently than in 1955. Relatively few of these are designed for use in an articulated program. (34)

- The variables for effective teaching are generally agreed upon and the most important, with the current mode of instruction, is the teacher. (34)

- About 50% of the students take no science after grade ten. (34)

Science Teacher Education

- State certification criteria still do not reflect those proposed by professional associations in that the professional organizations call for an increase in science content. (43)

- Over the years the guidelines proposed by professional organizations have broadened their focus from science content to include such things as interpersonal relations and ability to deal with societal problems. Guidelines related to content areas are the most likely to be implemented, however. (43)

- Preservice programs in science education reflect increased field experiences and, in general, increased time in the education component. (50)

- While NSF and OE did offer intensive institutes in the late 1960's and early 1970's, the majority of teachers currently teaching have not participated in these. (70)

- The bulk of the science instruction for the secondary program is in the junior high school (nearly 50% of the students take no science after tenth grade); this level has the teachers with the least adequate content preparation, poorest facilities, and fewest certification programs available. (70)

- Even though more science is being taught at the elementary level, elementary school teachers are most comfortable when science consultants are available. (80)

- Although secondary school science teachers are currently younger and better educated than in the 1950's, there is still a critical need for inservice education, both as perceived by the teachers and as indicated by research. (80)

- The average tenure for teaching was about eight years in the late 1960's and early 1970's; it is currently increasing. This has implications for inservice education since it appears that the more recent graduates are those more likely to go back to school. (89)

- There is a critical need for preservice and inservice science education to be viewed and dealt with as a continuous program rather than as discrete entities handled by two different sets of people. (96)

- Teachers are being impacted upon by the press for accountability, the back to basics movement and textbook controversies, but these are rarely the kinds of issues dealt with in their preparation. (105)

Controlling and Financing Education

- The influence of state governments on science education has increased markedly since 1955. (119)

- There is extreme variation in state control and influence, but regional patterns do exist. (119)

- Some examples of areas in which considerable state control is exerted are school organization, school curriculum, teacher certification and financial support for schools. Science education has been impacted both negatively and positively by state influences. (119)

- The percentage of financial support for the schools from federal and state sources has increased since 1955; the percentage of financial support from local sources has decreased since 1955. (133)

- Federal support for science education has declined since the late 1960's. (133)

- Since state support tends to follow federal trends, state support for science education has also declined and is likely to continue to do so. (133)

Needs Assessment Efforts

- The greatest single need facing education is an improved program of financial support. (148)

- There is increasing emphasis on basic skills; knowledge of science is rarely considered basic. (149)

- An important and complex need is for equal educational opportunity. (151)

- Pressure for accountability has increased markedly within the past ten years. (152)

- Science education is rarely included in state needs statements. When it is included, it increasingly reflects concern for life skills and work skills. (152)

- Nearly all states have some form of accountability or assessment procedure. (152)

- The major objectives in science education have not changed markedly over the past 20 years. The emphasis is beginning to shift, however, at the secondary school level. (170)

- Continuing research in science teaching-learning is vitally needed. However, the results of that research which has already been done needs to be better communicated and applied. (184)