

1989

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Recommended Citation

Fisher, Robert L. (1989) "Improving Science Teacher Preparation: Perspective on Standards," *Iowa Science Teachers Journal*: Vol. 26: No. 1, Article 3.

Available at: <https://scholarworks.uni.edu/istj/vol26/iss1/3>

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IMPROVING SCIENCE TEACHER PREPARATION: PERSPECTIVE ON STANDARDS

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They are all telling you how to educate your future teachers of science: Legislators are passing mandates; professional committees publish report after report; state bureaucrats are holding the line on regulations that have been around for years; the National Council for the Accreditation of Teacher Education (NCATE) is adopting new standards; and the guys down the hall have suddenly become experts on what you are doing to educate teachers. Too much!

But, if you are a college science instructor involved with the preparation of science teachers for the K-12 schools, there are developments from the National Science Teachers Association (NSTA) and NCATE that will be important to you. This may be the most important part of the reform movement.

The odds are that your program of science teacher preparation is now accredited by NCATE. Sometime during the past ten years, faculty and administrators of your institution conducted a review of the institution's ability to support teacher education programs and each program's compliance with several standards for curriculum, faculty and resources. One of those standards asked you to indicate that you had studied "the recommendations of national professional associations and learned societies and [adopted] a rationale for the selection and implementation of pertinent sets of recommendations" (NCATE, 1982). That meant you looked to standards advocated by organizations such as NSTA, ACS, AAPT and NABT for recommendations on science teacher preparation and decided to adopt or adapt standards as you saw appropriate. Basically, programs could do just about anything.

That was then; now there is a new system (Kunkel, 1984-85 and NCATE, 1986) which requires that, as a part of seeking NCATE accreditation, you actually use the NSTA standards for science teacher preparation. Failure to use those standards would be grounds for a decision to deny accreditation to the program and the institution.

A recent article in *The Science Teacher* (Fisher, 1986) provides a full description of the new process. The article details that the standards adopted by NSTA were developed through committees of NSTA and adopted by the NSTA Board of Directors, the curriculum portion of the standards was adopted by NCATE, the NSTA standards must be specifically addressed as part of the NCATE accreditation process, and NSTA members will review that report to determine compliance with

the NSTA curriculum standards.

The NSTA Standards

The standards are written for elementary programs, middle/junior high school programs, and secondary programs in biology, chemistry, earth science, general science, physical science and physics. Note that there are no standards for programs which prepare teachers to teach two or more different courses for the secondary schools. Although NSTA remains opposed to programs which purport to prepare teachers to teach all sciences, such as is typically done in the small schools, NSTA is now preparing standards for second fields in the sciences. Bill Aldridge, executive secretary, has noted that schools need secondary teachers who have preparation in more than one field of science (Rothman, 1986).

In spite of the emphasis on preparing teachers to teach a single discipline, the standards call for secondary teachers to have 50 semester hours of science including work in all areas of science. Each specialization requires 32 or more hours in that field, with supporting coursework of at least 16 hours. In this way, NSTA recognizes both the need to have a broad understanding of the entire field of science, while being limited by the number of hours in an undergraduate degree, and the probability that teachers will take additional courses in the other areas throughout their careers.

The standards indicate some criteria for the coursework to be included with the program. These examples illustrate components of the standards. The interrelationships among the sciences should be emphasized. The coursework should relate to current technology and the impact on man. The program should require experiences in designing, developing and evaluating field, demonstration and laboratory instructional activities. The student should be competent in using processes of science common to all fields, and have an understanding of the relationship between science/technology and society and human values. Computer applications should emphasize computers as tools for computation, interfacing with lab experiences and equipment, processing information, testing and creating models, and describing processes, procedures and algorithms.

The professional education component of the program should include a science methods course, field experiences prior to student teaching which place the student in situations with K-12 students in increasingly responsible positions, and a full semester of student teaching at more than one grade level or in more than one science area. These comments do not provide a complete outline of the standards. Copies of the complete standards are available without charge from NSTA.

The Review and the Report

Approximately two years prior to the time an institution is scheduled for the next NCATE review, the institution will compile documentation for what NCATE calls the "Preconditions" to accreditation. Precondition #8 requires each science teacher preparation program to prepare a report which documents compliance with the standards of NCATE and the specific guidelines developed by NSTA and adopted by NCATE. This report will include the program's objectives; an overview of the program including how it relates to the rest of the teacher education unit, the requirements of the program, descriptions of field experiences, student teaching and internships, and an explanation of how the program may deviate from the guidelines; a "matrix" which relates the program components to the guidelines of NSTA; and course descriptions.

If the results of the review indicate that a program is not in compliance with the NSTA guidelines, that appropriate curricular changes will need to be made prior to the time the report is written. In most colleges and universities, this may be a process lasting longer than 12 months. Some changes, however, may be within courses and can be changed without formal curricular action.

The reports of the program reviews are submitted to NCATE and are then sent to NSTA. A committee of NSTA members reviews the program, writes a critique and sends that critique to NCATE. The critique will be given to the team scheduled to visit the campus as well as to the campus. During the visit the team, which may not include a science educator, will have the benefit of the NSTA critique in conducting the review of the program.

The Value of It All

It is possible that you are feeling as if **THEY** are doing it to you again! To that sentiment may I offer these considerations.

The "they" in this action is a combination of NSTA and NCATE, and it probably includes you. If you are a member of NSTA, then it is your organization that established the guidelines for science teacher preparation (e.g. 50 hours of science, student teaching of one semester). You have an avenue to change those standards through your representatives to NSTA, by being elected to an office, or by appointment to the teacher education committee. You may also be represented on the NSTA Board by your membership in one of the division affiliates: AETS, CESI, CSSS, NARST, NSSA, or SCST.

You also have a voice on development of the NCATE standards and the processes used to implement the standards. The NCATE boards are made up of individuals nominated by associations. Your representative to NCATE can take the desired message to the table for deliberation.

It is appropriate to view the standards of NCATE and NSTA as the standards WE have developed. The "we" in that statement is the profession of which we are a part.

For some of us, the NSTA standards represent standards that we believe in, but have not been able to accomplish on our own campus. Now that the standards of NSTA are a part of the NCATE process, you can use the accreditation process to encourage those standards which are appropriate for your students. Most institutions do not want to lose accreditation, so the influence of NCATE may assist in the adoption of the changes.

The implications for your campus cannot be outlined in an article like this. You and others responsible for the science teacher preparation programs should obtain a copy of the standards from NSTA and begin your own review of the program. It may be appropriate to bring someone from another campus to help you conduct the review. You should be looking at the standards and your program from two points of view. You can regard the standards as the current view of the profession for the education of science teachers which may be used to upgrade your program. Where you believe the standards are in error you should direct those comments to NSTA. In this way your program grows and the professional standards improve. The THEY is now indeed a WE.

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