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ABSTRACT

The Annual Self-Inventory for Science Teachers (ASIST) is intended to help junior and senior high school science teachers to systematically judge the extent to which they meet reasonable professional standards and to suggest what they might do to improve areas of identified weakness. The standards have been determined by the Commission on Professional Standards and Practices of the National Science Teachers Association. The Commission believes that the professional science teacher: is well educated in science and the liberal arts, possesses a functional philosophy of education and the technical skills of teaching, continues to grow in knowledge and skill throughout his career, insists on a sound educational environment in which to work, maintains his professional status, contributes to the improvement of science teaching, and takes a vital interest in the quality of future science teachers. (PR)

# ANNUAL

# FOR SCIENCE TEACHERS IN SECONDARY SCHOOLS

**First Edition**

**Prepared by the NATIONAL SCIENCE TEACHERS ASSOCIATION**

**Commission on Professional Standards and Practices**

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teachers to use in determining areas of possible professional development. However, in order to provide you with a bench mark as a rough guide for norm comparison, we will prepare a compilation of scores as soon as we have a sizeable number of replies for a sample. The results will enable you to compare your own self-inventory with that of other science teachers. To obtain this information, use the rating card following page 4 of the Self-Inventory. The results of the sample are available to you free of charge, along with a 9 x 12-inch professional development portfolio designed as a permanent repository for materials relating to your professional activities. To receive these two bonus items, fill out and mail both of the attached cards. Note that your profile score card is unsigned because we desire that these replies remain anonymous.

We believe that you will also be interested in finding out how teachers rate themselves on a *nationwide* basis. So are we. To help both of us—*all* of us—we request that you transfer your scores to the attached card and mail it as soon as possible. Be sure to fill in all items and be sure to mail promptly. Greater response assures greater accuracy. Note that your name is not to be filled in on this card; we are only interested in a statistical analysis and not in assessing you personally—that is your job. We will publish the results and analysis of this profile in *The Science Teacher*. Thank you.

P.S. Don't expect to have perfect scores on all items—nobody will—including the authors.

Note: To find your average for each section, add the total of point scores for each item and divide by the number of items. Do not include items preceded by an asterisk in averaging; these items will apply only in special (or atypical) situations. All items have a maximum of four points although several have these divided among several subitems. A total test score can be determined by applying the familiar formula,

$$\text{average (mean)} = \frac{\text{sum of scores}}{\text{number of scores}}$$

As science teachers we like to believe that we belong to a profession having high standards. We know that science teaching is a demanding occupation; but we also know that as practiced by the professionally competent teacher it is a socially significant and personally satisfying vocation. The key is professional competence.

But what are the *standards* by which our professional competency as science teachers can be judged by ourselves or by our colleagues? We do not become professional merely by assertion, or even by virtue of teaching science, but only by meeting the preparation and performance standards recognized by the profession. Since a clear statement of standards for science teaching did not yet exist, the NSTA established, in 1968, the Commission on Professional Standards and Practices. The charge of the Commission was to delineate—after careful study and wide consultation—a forward-looking set of standards that could stand as the profession's own statement of what it means to be a professional science teacher.

The Commission gave considerable thought to the form as well as to the content of its final report, since it wanted its recommendations to reach and be functionally useful to science teachers for years to come. The result was not a formal "Commission Report" at all, but two documents. One, entitled *Conditions for Good Science Teaching*,[1] is a pamphlet containing NSTA recommendations on such matters as professional growth policy, facilities, and working conditions. It is expected that these recommendations will be revised at frequent intervals to reflect the latest knowledge and thinking in the field and thus always be up-to-date and immediately useful to science teachers wishing to improve science learning in their schools. The other document is the one before you, the *Annual Self-Inventory for Science Teachers* (ASIST). Its primary purpose is to help each junior and senior high school teacher of science systematically judge for himself the extent to which he meets reasonable professional standards and to suggest what steps he might take in order to overcome any identified shortcomings. While ASIST is mainly for use by science teachers themselves, the Commission believes that it can also serve as a statement to others of what we teachers of science take to be the characteristics of a truly professional science teacher.

In any field, professionalism involves certain knowledge, skills, attitudes, and behavior. It is not the possession of a degree, or of a state certificate, or even of this or that particular skill or bit of knowledge that distinguishes the professional science teacher from sub-standard teachers of science. The professional science teacher is distinguished rather by overall pattern of preparation, thought, and action: by what he knows about students and science and education; by what he can do to encourage and enhance learning; by what he believes about the relationships between himself, his students, the school, the local and world communities, and the scientific enterprise; and, above all, by what he does and does not do. In brief, the Commission on Professional Standards and Practices of the National Science Teachers Association believes that:

**Is well educated in science and the liberal arts**

**Possesses a functional philosophy of education and the technical skills of teaching**

**Continues to grow in knowledge and skill throughout his career**

**Insists on a sound educational environment in which to work**

**Maintains his professional status**

**Contributes to the improvement of science teaching**

**Takes a vital interest in the quality of future science teachers**

In ASIST, a series of statements is given to provide operational meaning for each of the above general characteristics. Space is provided for you to use in recording (1) which standards you have met, and in what way, and (2) which standards you have not yet reached, and what you intend to do about it during the next year. The Commission hopes that each science teacher will conscientiously make a self-inventory each year. ASIST can be snapped free from *The Science Teacher* without damage. This makes it convenient for you to keep your *Annual Inventories* together to survey your progress over the years, and in particular to measure your actual performance during any one year against your stated plans of the previous year.

Finally, while it believes that for the time being, ASIST does sufficiently describe the professional science teacher, particularly at the secondary school level, and does present demanding yet attainable standards, the NSTA Commission on Professional Standards and Practices offers it to you as a set of guidelines, not as an immutable final declaration.

[1] Available from the National Science Teachers Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036. Single copy price, $1.50.

**A science teacher needs a thorough understanding of science; therefore, his education in science includes**

Penetrating deeply into the content, conceptual framework, and methodology of one science or area of science

Studying science on a broad front by having taken, regardless of his teaching major, laboratory courses involving concepts and processes from

a. Biology

b. Chemistry

c. Physics

d. Earth sciences

Becoming acquainted with the interrelatedness of the sciences by taking at least one integrated, interdisciplinary course, such as earth science, biochemistry, or astrophysics

Studying mathematics to the level and in a way that leads both to

a. An understanding of the conceptual ties between science and mathematics

b. The operational facility necessary to study modern science effectively

Delving into the origins, growth, meanings, significance, and impact of science by

a. Taking courses in the history and philosophy of science

b. And through systematic reading and study

**Teachers, above all, should be liberally educated human beings, and the science teacher especially so, since he should reflect in his teaching the fact, not widely understood, that science itself is philosophically and practically associated with, and in no way antagonistic toward, man's other intellectual, creative, technical, and social activities; therefore, his academic preparation should include substantial study in**

The social and behavioral sciences

The graphic, performing, or industrial arts

Literature and philosophy, for the insights they give into values and the human condition

The numbers to the left of statements represent the degrees of achievement. Mark the number which best matches the degree to which you believe you fulfill the goal, have acquired the stated expertise, or participated in the suggested activities, etc. Complete fulfillment or maximum performance would rate a 4 while a lack of activity during the past year would rate a 0, with varying degrees in between. Note that some items might not be applicable. These are marked with an asterisk and should not be included in your overall average.

The Professional Science Teacher

**Based on information and insights gained from formal study, personal reading, and discussion with scholars and practitioners, he has formulated a working philosophy of education—continuously modified by experience—that includes explicit assumptions about**

Students: What they are like. How they learn. What their goals are. How they can benefit by studying science

Teachers:

a. What their responsibilities are for setting goals, motivating students, keeping order, judging performance, and giving rewards and punishments

b. How they stand in the educational enterprise in relation to students, school administrators, parents, college science teachers, and each other

c. What balance they should strike between the interests of the individual and the desires of the community, and between serving the local community and the larger ones

d. What balance they should seek between transmitting the existing values of the culture and fostering change

Schools:

a. Their responsibilities to the students, individually and collectively

b. Their responsibilities to local, state, national, and world communities

c. Their relationship to other levels and kinds of schools

Science: What it is; how it functions. Its relevance for nonscientists. Its relation to the humanities and social sciences. Its relation to technology. Its impact on society; the moral and social responsibilities of its practitioners.

**By the time he has completed his training (university courses on methodology, supervised practice or intern teaching, and two or three years of apprenticeship on the job) the science teacher should have acquired the basic knowledge and technical skills of his job, having**

Familiarized himself thoroughly with the materials of instruction in science, how to evaluate them, where they can be obtained, and when and how they can best be used

Mastered varied techniques, styles, and strategies of instruction, such as how to manage multi-media instruction, individualize learning, organize meaningful laboratory investigations, and evaluate learning and motivate reluctant students.

Demonstrated to competent observers an ability to conduct learning effectively and wisely

**He examines his teaching critically at least every two or three years by such methods as**

Inviting a professionally competent person (the science department chairman, a science teacher from another school, a science educator from a nearby university) to observe his teaching and to help find ways for improving it

Making audiotapes or videotapes of real teaching episodes and analyzing them with the aid of a competent colleague

Soliciting thoughtful student feedback

**He makes up deficiencies in his academic preparation and keeps up-to-date in science teaching, education, science, and the interaction of science and society, by**

Utilizing appropriate journals

Reading several books each year on education, science, and the history, philosophy, and sociology of science

Attending professional conferences periodically

Taking advantage of professional days to observe science teaching in other schools and to visit university and industrial centers of research and applied science

Enrolling in summer, inservice, or correspondence courses

Keeping informed on, and applying for admission to, appropriate programs of study for science teachers, such as those supported by the National Science Foundation

Utilizing a sabbatical leave period to carry through a study plan especially tailored to his own needs

**He tries to improve his opportunities for professional self-improvement by**

Informing his department chairman and principal in writing of specific ways in which the school's professional growth policies and practices must be changed to bring them up to the NSTA *Conditions for Good Science Teaching*

Requesting, if necessary, his local teachers organization to take up the issue of school support for teacher professional improvement with the superintendent and school board

Seeking, if there has been no real progress toward an acceptable policy after several years of effort, a teaching position where there are better opportunities for professional growth

The Professional Science Teacher

**He presses for the provision by the school of those services, facilities, and learning materials necessary for effective teaching by**

Participating in any planning for new or renovated facilities that may be under way

Annually informing the science department chairman and principal in writing of the particular ways in which the school services and facilities fall below NSTA *Conditions for Good Science Teaching* and recommending specific changes

Urging his local teachers organization to fight for better teaching conditions and offering help in that effort

**He safeguards the lives and health of his students by**

Familiarizing himself with school emergency procedures, state safety regulations, and NSTA and National Safety Council recommendations

Informing his students of emergency procedures and of any special laboratory hazards

Forbidding students to indulge in activities or experiments that will endanger themselves or their fellow students

Making a thorough safety check each year to see that the rooms in which he teaches and the equipment he expects his students to use meet modern safety standards and that emergency equipment is on hand and in working order

Notifying the science department chairman and principal in writing of unsafe conditions and requesting the necessary repairs, replacements, and changes

Refusing (with a full written explanation of his action to the department chairman and principal, and a copy to his local teachers organization) to teach in any facilities or to use any materials or follow any procedures that present an immediate and grave danger to his students

**He believes that there must be no school policies or teacher or administrator practices that are unfair, inhumane, or degrading to any students, whatever their individual abilities, goals, family background, appearance, race, or religion; and that he must work toward the elimination of any such policies or practices by such means as**

Periodically making a penetrating appraisal of his own attitudes and behavior toward his students

Bringing to the attention of the faculty, school administrators, and local teachers organization any continuing violations he perceives of the educational interests and human rights of any group or category of students

Trying to persuade his local teachers organization to form a high-level committee of sensitive and respected teachers to oversee continuously this dimension of the total school environment and to take valid issues to the superintendent and school board, to the community and state teachers organization

**If the educational environment seriously mitigates against good learning and teaching and shows no signs of improvement in spite of his conscientious efforts over several years, he demonstrates his own professional integrity by**

Seeking employment in a school where the educational environment is healthier and where he can serve students better

Apprising university and teacher organization placement agencies of the situation so that prospective job applicants can be informed

The **Professional Science** Teacher

**He is an active member, sometimes serving on committees or holding an office, in appropriate professional organizations, such as**

Local, state, and national organizations for teachers of all subjects and all levels

Organizations of special relevance for all science teachers, such as

a. National Science Teachers Association

b. American Association for the Advancement of Science

c. State and local science teacher organizations

d. State academies of science, or others

Organizations devoted to the interests of teachers of particular sciences, such as the American Association of Physics Teachers, American Chemical Society, National Association of Biology Teachers, and National Association of Geology Teachers

**He takes other positive steps to increase his knowledge and influence**

Reading several science teaching, science, and education journals

Seeking a significant role in one or more educational matters that go beyond his own classroom teaching (such as curriculum, budget, policy, professional standards, and inservice programs), becoming informed on those matters and requesting meaningful responsibilities related to them

a. Within the science department itself

b. Within the school or school district

**In order to protect the educational interests of students**

He refuses to accept teaching assignments outside of his area of preparation

He protests to his department chairman and principal (and to his local teachers organization if the practice persists) the assignment of nonscience teachers to the teaching of science

The **Professional Science** Teacher

**Because the general improvement of science teaching depends upon the accumulation from many sources of new and improved learning materials, techniques, and approaches, and because his own classroom teaching will profit from it, he**

Uses some of his time and energy to develop projection visuals, audiotapes, test questions, reading lists, demonstrations, student experiments and project ideas, science club activities, etc.

Participates from time to time in the critical classroom testing of new materials and approaches developed by other teachers, national curriculum groups, Regional Laboratories, and educational publishers

Occasionally accepts invitations (with administrative approval, and after careful consideration of the welfare and rights of his students) to serve as an experimental or control teacher in thoughtful educational experiments

**In order to share his ideas, developments, and concerns with colleagues, he may**

Submit articles, book reviews, apparatus notes, and letters-to-the-editor to appropriate professional journals

Give papers or demonstrate new materials and techniques at regional or national NSTA meetings, or other appropriate professional conferences

Willingly permit science teachers from other schools to visit his classes

The **Professional Science** Teacher

**He encourages his outstanding students to consider careers as science teachers by**

Himself teaching science in a way that emphasizes the creative, challenging, socially significant, and personally rewarding aspects of the profession

Permitting likely candidates (his own or other high school students, or nearby college students) to tutor, serve as assistants, or otherwise learn by direct experience some of the difficulties and pleasures of teaching

*continued*

Accepting opportunities to speak with science majors from nearby colleges and universities (and with their faculty advisers) about the realities and trends in science teaching

**He contributes to the improvement of science teacher preparation by**

Informing the institution where he received his own training of the strengths and weaknesses of his preparation in the light of experience

Serving periodically as a supervising teacher of science teacher interns

Recognizing that the first year or two on the job is a crucial period in the training of a teacher and, therefore, helping the local teachers organization to secure special working conditions for beginning science teachers (including adequate professional supervision, a reduced teaching load, and a limited number of preparations and out-of-classroom assignments)

Supporting efforts of state and national teacher organizations to gain a stronger voice for teachers in the setting of standards for entry into the profession of teaching

The space below (and the back of this page) is provided for your use in outlining plans for proposed growth activities during the coming year. If the space is inadequate, you are encouraged to write expanded plans on separate sheet(s) which may then be inserted in the Professional Development Portfolio offered on the inside front cover. Use the attached card for requesting your portfolio.

**A.**

**B.**

| ITEM | SCORE |
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| C | |
| D | |
| E | |
| F | |
| G | |

| ITEMS | SCORE |
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| C-11 | |
| C-12 | |
| C-13 | |
| D-1 | |
| D-3 | |
| D-8 | |
| D-9 | |
| D-11 | |
| D-12 | |
| D-13 | |
| D-14 | |
| E-6 | |
| E-7 | |

*Atypical items not to be used in test means.

described on the inside front cover of this Self-Inventory. I also want to receive a copy of scores achieved on the Self-Inventory by the sample of science teachers. I have completed the inventory and have submitted my score on the return card.

NAME

ADDRESS

CITY

STATE ZIP CODE

C.

D.

PLEASE
AFFIX
STAMP

E.

NATIONAL SCIENCE TEACHERS ASSOCIATION
1201 Sixteenth Street, N.W.
Washington, D.C. 20036

F.

G.

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