

NSTA Position Statement:

The Use of Computers in Science Education

Rationale

Just as computers play a central role in developing and applying scientific knowledge, they can also facilitate learning of science. It is therefore the position of the National Science Teachers Association that computers should have a major role in the teaching and learning of science. Computers have become an essential classroom tool for the acquisition, analysis, presentation, and communication of data in ways which allow students to become more active participants in research and learning. In the classroom, the computer offers the teacher more flexibility in presentation, better management of instructional techniques, and easier record keeping. It offers students a very important resource for learning the concepts and processes of science through simulations, graphics, sound, data manipulation, and model building. In the field, the portability of the laptop computer allows students to actively gather and analyze data and take it back to the classroom for in-depth study and the sharing of information. These capabilities can improve scientific learning and facilitate communication of ideas and concepts. Lest the following emphasis on computers be misunderstood, we assert at the outset that computers should enhance, but not replace essential "hands on" laboratory activities. NSTA proposes the following guidelines for the implementation of computers in the teaching and learning of science:

Declarations

- Tutorial and multimedia software should engage students in meaningful interactive dialogue and creatively employ graphics, sound, and simulations to promote acquisition of facts and skills, promote concept learning, and enhance understanding.
- Simulation software should provide opportunities to explore concepts and models which are not readily accessible in the laboratory, e.g., those that require:
 - a. expensive or unavailable materials or equipment
 - b. hazardous materials or procedures
 - c. levels of skills not yet achieved by the students

d. more time than is possible or appropriate in a realtime classroom, e.g., population growth simulations.

Microcomputer Based Laboratory Devices (MBL's) should be used to permit students to collect and analyze data as scientists do, and perform observations over long periods of time enabling experiments that otherwise would be impractical.

Databases and spreadsheets should be used to facilitate the analysis of data via their organizational and visual representation capabilities.

Networking among students and teachers should be encouraged to permit students to emulate the way scientists work and, for teachers, reduce teacher isolation.

Use of the Internet should be encouraged as a means of networking with scientists, teachers, and students in other areas, gathering information and data, posting data and findings, and providing students with the most up-to-date information.

In order to effectively implement computers in science education, teachers should:

- Know how to use effectively and efficiently the software and techniques described above.
- Know how to incorporate microcomputers into instructional strategies.
- Become familiar with the use of computer applications as management tools for grading, reports, inventories, budgets, etc.
- Exemplify the ethical use of computers and software.
- Seek to provide equitable computer access for all students.

Recommendations for Hardware and Software

- Every science classroom must have a minimum of one dedicated microcomputer or laptop computer, modem and dedicated phone line, one large screen display (or LCD for overhead projector), and one printer. In addition, each classroom must have appropriate computer based laboratory sensing devices and a science software library. In addition, a well equipped science classroom should have sufficient computers available for simultaneous use by groups of three or four students and the

school should have a facility where students can individually use computers for producing reports, analyzing data, practicing skills, etc.

—Adopted by the Board of Directors

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