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Many school staff and their client communities are concerned about pupil achievement, skills, and attitudes related to science. To respond to these concerns, staff need to determine how they can improve their science programs by modifying the content and skills emphasized in the curriculum, changing or supplementing instructional materials, changing instructional approaches, and changing the use of technology.

WHAT SHOULD BE INCLUDED IN A SECONDARY SCHOOL SCIENCE

PROGRAM?There are several publications available to use to determine what a science program should include. Several states including California, Michigan, and New York have produced state guides or frameworks suggesting what should be included in a good secondary school science program.

The American Association for the Advancement of Science (AAAS) has launched Project 2061, an ambitious project outlining content to be included in K-12 school programs. The National Science Teachers Association (NSTA) is developing a project to modify the scope and sequence of K-12 science.

WHAT MATERIALS ARE AVAILABLE THAT HAVE BEEN EVALUATED FOR

THEIR IMPACT ON STUDENT PERFORMANCE?

THE NATIONAL DIFFUSION NETWORK (NDN)The NDN provides funds to

disseminate exemplary programs and materials. Before a program can be included in the NDN program, it must be approved by a review group, the Program Effectiveness Panel. A program requesting a review must provide evaluation data that indicate the program was effective in the school in which it was developed or field tested and that it could be used successfully in other schools.

Programs or materials that are judged effective are summarized in the Department of Education publication "Education Programs That Work" (Education Programs..., 1988); updated editions are produced periodically. Secondary science programs in the most recent edition "Science Education Programs That Work," (1989) include "Environment and Technology Project, "Geology Is," "Informal Science Study (IFSS)," Marine Science Project: For SEA," "The Mechanical Universe," "Physics--Teach to Learn," "PRISMS: Physics Resources and Instructional Materials," "Science-Technology-Society: Preparing for Tomorrow's World," "Sci-Math," "Stones and Bones," and "WIZE: Wildlife Inquiry Through Zoo Education."

THE NATIONAL SCIENCE FOUNDATION (NSF)

The National Science Foundation continues to provide support for secondary school science programs and materials. Projects supported include physics, chemistry, biology, health sciences, and earth sciences. THE DIRECTORY OF AWARDS (1989) lists many of the current activities. Additional projects are also being supported.

WHAT ARE OTHER SOURCES OF PROGRAMS AND MATERIALS WITH

EVALUATION DATA?The Educational Products Information Exchange (EPIE) is a nonprofit organization that reviews and evaluates educational materials. EPIE produces a newsletter and special publications that include evaluation information on a variety of curriculum materials including science. A listing of EPIE materials can be obtained by writing to EPIE.

Some of the Regional Educational Laboratories sponsored by the U.S. Department of Education produce and/or review science materials. The Northwest Regional Educational Laboratory, for example, reviews and evaluates computer software, including those related to science. They publish the results of their reviews on a regular basis.

States such as New York produce science materials that have had extensive evaluation. Some states such as California and Texas publish reviews of textbooks.

The ERIC database contains materials, descriptions of programs, and evaluation data related to many programs.

WHAT ARE OTHER SOURCES OF INFORMATION ABOUT PROMISING

PROGRAMS AND MATERIALS?In addition to exemplary programs and materials for which there is evaluation data, there are many programs and materials that have been used and evaluated. Based on their use and the reported results, they are considered promising programs and materials for consideration by others.

The COSMOS Corporation (White, 1986) worked with the National Science Teachers Association and other groups to identify programs and materials that were considered effective. The catalog published in 1986 contains more than 40 descriptions of programs, materials, and practices for secondary science.

The Title II program of the Education for Economic Security Act has supported the development of many promising programs and materials. A recent document published by the United States Department of Education contains over 80 project summaries from projects funded in 39 states and the District of Columbia (Exemplary Projects. Mathematics-Science..., 1988). The subject areas covered in these projects include several secondary school science projects.

Secondary school science programs and materials are also being developed with funds from the U.S. Department of Education Eisenhower Act. "The Abstracts of the 1989 and 1988 Awards: Dwight D. Eisenhower Mathematics and Science National Programs" (Levinson, 1989) include 14 secondary programs with science components.

The National Science Teachers Association (NSTA) inaugurated the Search for Excellence in Science Education in 1982 to carry out the National Science Foundation's 1981 initiative, Project Syntheses. A committee established criteria for excellence and applied them to actual science programs. In each area hallmarks of excellence were identified in terms of goals, curriculum, instruction, evaluation, and teacher qualifications.

Eight issues in the Focus on Excellence series describe promising secondary school programs: Biology (Penick and Bonstetter, 1984); Science/Technology/Society (Penick and Meinhard-Pellens, 1984); Physics (Penick, 1985); Middle School/Junior High Science (Penick and Krajcik, 1985); Chemistry (Penick, 1985); Earth Science (Penick, 1986); Energy Education (Glass, 1985); and Exemplary Programs in Physics, Biology and Earth Science (Yager, 1984).

There are a variety of programs and materials available that make use of new technology. Software has been and is being developed for secondary school programs. Integrated learning systems have been developed for secondary school science. Distance learning programs (including the STAR School Project) also include materials

for secondary school science education. "Linking for Learning" (1989) and "Online: Computers in Education" (1988) describe several examples.

The ERIC Clearinghouse for Science, Mathematics, and Environmental Education (ERIC/SMEAC) has contacted (1) state, county, and local coordinators and curriculum specialists for science and (2) federal program staff for nominations of programs and materials they consider promising and exemplary. In addition, association programs, newsletters, journals, and materials received at ERIC/SMEAC have been reviewed for programs and materials. From these sources, possible programs and materials are being identified and schools and projects involved with these activities are being contacted to obtain information about the programs and materials and actual materials when available. A description of a selection of the programs and materials related to secondary school science will be published in 1990.

ERIC/SMEAC plans to produce supplements to the 1990 publication when additional programs and materials are identified. Nominations for programs and materials should be sent to ERIC/SMEAC.

WHAT ARE SOME GOOD WAYS TO BEGIN?

Some sources of information and publications that include programs and materials described in this digest are listed. In addition, you should contact your state coordinator or specialist in science education; many states have started reform activities and you should determine what your state and schools in your state are doing and resources that are available.

SELECTED INFORMATION SOURCES

National Science Foundation
Division of Materials Development,

Research and Informal Science Education

1800 G Street, NW

Washington, DC 20550

Northwest Regional Laboratory

101 Southwest Main Street

Portland, OR 97204

National Diffusion Network

555 New Jersey Avenue, NW

Washington, DC 20208-1525

EPIE Institute

P.O. Box 839

Water Mill, NY 11976

SELECTED REFERENCES

NSTA items can be obtained directly from the National Science Teachers Association (NSTA), for the price indicated, at the following address: National Science Teachers Association, 1742 Connecticut Avenue, NW, Washington, DC 20009, Telephone: 202-328-5800

Criteria for Excellence. An NSTA Science Compact. National Science Teachers Association, Washington, DC, 1987. ED 280 739. NSTA price $4.00.

Directory of Awards. Fiscal Year 1987 and 1988. National Science Foundation, Washington, DC, 1989. ED 309 026.

Education Programs That Work: A Collection of Proven Exemplary Educational Programs and Practices. Edition 14. Sopris West Incorporated, Longmont, CO, 1988. ED 296 984.

Exemplary Projects. Mathematics-Science, Computer Learning and Foreign Languages. A Collection of Projects Funded through Title II of the Education for Economic Security Act. Department of Education, Washington, DC, 1988. ED 302 390.

Glass, Lynn W., ed. Focus on Excellence: Energy Education. National Science Teachers Association, Washington, DC, 1985. NSTA price $7.00.

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Linking for Learning. Office of Technology Assessment, Washington, DC, 1989.

National School Boards Association. Online: Computer in Education. What's Happening? What's Possible? Jostens Learning Corporation, San Diego, CA, 1989.

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Penick, John E., ed. Focus on Excellence: Physics. National Science Teachers Association, Washington, DC, 1985. NSTA price $7.00.

Penick, John E. and Ronald J. Bonstetter, eds. Focus on Excellence. Biology. Volume 1, Number 3. National Science Teachers Association, Washington, DC, 1984. ED 243 691. NSTA price $7.00.

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Yager, Robert W., ed. Focus on Excellence: Exemplary Programs in Physics, Chemistry, Biology and Earth Science. National Science Teachers Association, Washington, DC, 1984. ED 243 692. NSTA price $7.00.

White, J, Lynne, ed. Catalog of Practices in Science and Mathematics Education. COSMOS Corp, Washington, DC, 1986.

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