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ABSTRACT

The Office of Technology Assessment (OTA) of the U.S. Congress was asked to analyze various technological options for distance education, examine current developments, and identify how Federal, State, and local policies could encourage more efficient and effective use of technology in education. Findings of the study, which are summarized in this OTA Report Brief, include: (1) use of distance education in elementary and secondary education has increased dramatically over the past 5 years, but many students and teachers still do not have access to needed but distant experts and information; (2) rapid advances in technology are creating distance learning systems that are powerful, flexible, and increasingly affordable, but no one technology works for every application; (3) in most instances, distance learning appears to be as effective as face-to-face instruction in the classroom; (4) while reaching a small number of teachers today, distance learning will greatly affect the teaching force of tomorrow, requiring further training and institutional support; (5) state education agencies are both gatekeepers and catalysts for distance education; (6) federal and state regulations guiding the development of telecommunications infrastructure and services significantly affect distance education; and (7) federal funding for distance education has been important but modest. Four factors that will most affect the future of distance education are telecommunications policy; research, evaluation, and dissemination; support for teachers; and expansion of the infrastructure. (GL)

OTA Report Brief

November 1989

Linking for Learning: A New Course for Education

Today students can work on a science project with classmates on the other side of the country, practice speaking Japanese with their teacher in another State, or read a formula on the blackboard in a classroom across town. Students in remote rural schools can take the same courses as their counterparts in suburban schools. Learners unable to come to school because of sickness or injury can participate in classes from their homes. These efforts, commonly known as distance learning, use live, two-way interactions to link teachers and students at different locations.

Use of distance learning in elementary and secondary (K-12) education has increased dramatically. Five years ago, few States had either projects or plans for K-12 distance learning; today almost all do. Projects draw upon local districts, regional education service agencies, nearby universities and community colleges, or services offered by public and private educational telecommunications providers. And while distance learning was initially seen as a way to serve isolated rural schools, current uses go far beyond these needs. They link learner communities with one another, and bring a wide array of experts and information to the classroom. **Nevertheless, many students and teachers still do not have access to needed but distant experts and information.**

Rapid advances in technology are creating distance learning systems that are powerful, flexible, and increasingly affordable. Most systems are hybrids, combining technologies such as satellite, Instructional Television Fixed Service (ITFS), microwave, cable, fiber optics, and computers. New developments in computer, telecommunications, and video technologies continue to expand the range of choices, and new strides in interconnecting systems are being made regularly. **No one technology or system works for every application.** Technological capabilities must match educational needs.

In most instances, distance learning appears to be as effective as face-to-face instruction in the classroom. Since distance learning has been used primarily with adult learners—in industry and military training, higher and continuing education—most research has evaluated effectiveness in these settings. It is high. While the evidence is incomplete in K-12 education, preliminary results are encouraging. To be effective on these systems, teachers report that they must change their style and create new opportunities for interaction. Students report that they must work harder in courses offered at a distance, but they welcome the increased course options, responsibility for their own learning, and the opportunity to expand their community. Whether distance learning works well with all students is yet to be determined.

While reaching a small number of teachers today, distance learning will greatly affect the teaching force of tomorrow. Distance learning provides not only a variety of tools for teaching, but also a means to upgrade teachers' skills and encourage their professional development. Teachers can team teach with colleagues across town or across the country, discuss problems and challenges over electronic networks, observe master teachers in action, participate in professional meetings and courses, develop new skills, and earn advanced degrees—all without leaving their home school. **Teachers must have training, preparation, and institutional support to successfully teach with distance learning technologies, as, indeed, they must for all of today's educational technologies.** Also, their concerns about technology and the quality of instruction must be taken into consideration in planning distance learning efforts. Teacher input not only shapes development, it assures long-term commitment.

State education agencies are both gatekeepers and catalysts for distance education. Stringent teacher certification requirements may prevent skilled instructors from teaching electronically in areas experiencing teacher shortages. Similarly, varying State curriculum and textbook requirements can make it difficult to share teaching between schools that might otherwise be logically linked. **State leadership is critical for fostering the efficient use of resources to meet many educational needs.** In the process of developing plans for distance learning, States have the opportunity to forge cooperation between agencies, encourage sharing of costs among users, and build new linkages between schools, higher education, and the private sector.

Federal and State regulations guiding the development of telecommunications infrastructure and services significantly affect distance education. The Nation's schools represent major markets for applications of technology and should be in a powerful position to influence telecommunications policy. However, because of conflicting interests and fragmented telecommunications authority, educational needs may not be fully served. **As distance learning expands, the education community has a growing stake in shaping future telecommunications policies.**

The Office of Technology Assessment (OTA) is an analytical arm of the U.S. Congress. OTA's basic function is to help legislators anticipate and plan for the positive and negative impacts of technological changes.
Address: OTA, U.S. Congress, Washington, DC 20510-8025. Phone 202/224-8996. John H. Gibbons, *Director*.

Federal funding for distance education has been important but modest. The Star Schools Program, begun in 1988 to develop multistate, multi-institutional K-12 distance education, has helped to focus attention on distance learning, and has spurred planning and development beyond the projects now under way. Programs at the National Telecommunications Information Administration and the Rural Electrification Administration support distance education by funding telecommunications technologies. Other programs provide limited support for curriculum development, special programming, technical assistance, and research. Growth of distance learning can be expected to continue for some time without increased Federal involvement. A major commitment to expanding the Nation's distance learning infrastructure, however, will require a change in the Federal role.

The growing interest in distance learning comes as calls for improving education increase. States, localities, the Federal Government, and the private sector all have roles to play in planning, funding and implementing distance education. Four factors will most affect the future:

1. **Telecommunications policy**. This affects costs, capacity, and types of services available to distance education. As Congress confronts telecommunications issues in the 1990s, it must review and shape policies to reflect the Nation's educational needs.
2. **Research, evaluation, and dissemination.** With the dramatic proliferation of distance learning projects, many questions regarding effectiveness, methodology, and design have been raised. Federally funded research can contribute greatly to the understanding and improvement of distance education in this country.
3. **Support for teachers.** Congress is now considering how to help prepare new teachers and encourage others to enter the profession. Funding for teacher preparation could support the use of distance learning technologies. At the same time, Congress could encourage use of technologies to reach teachers in the field who need to upgrade skills in fields such as mathematics and science.
4. **Expansion of the infrastructure.** National leadership could expand distance learning to communities without resources and extend the reach of installed systems. Congress could specify expenditures for distance education in current Federal programs or make funds directly available through a new program. Most importantly, national leadership could focus investments toward the future, ensuring that today's distance learning efforts carry our educational system into the 21st century.

Copies of the OTA report, 'Linking for Learning: A New Course for Education," are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325 (202) 783-3238 The GPO stock number is 052-003-1170-1; the price is $9.00. Copies of the report for congressional use are available by calling 4-9241 Summaries of reports are available at no charge from the Office of Technology Assessment.

Distance Learning in Today's Classrooms

WHAT IS BEING DELIVERED?

Whole courses--especially foreign languages, mathematics, science, and Advanced Placement

Enrichment activities

Current events programs

Training and staff development

WHO ARE THE PROVIDERS?

Local school districts

Regional education service agencies

State education agencies

Colleges, universities, and community colleges

Public television stations

Museums and science centers

Federal agencies

Private sector

Consortia

WHO IS BEING SERVED?

In high schools:
- gifted and talented students needing advanced classes
- underserved students needing an expanded array of courses

In elementary and middle schools:
- students receiving enrichment materials

Teachers and staff

HOW IS DISTANCE EDUCATION DELIVERED?

Video (one-way or two-way)

Audioconferencing

Computer conferencing

Audiographics

Combinations of the above

WHAT TECHNOLOGIES ARE USED?

Transmission technologies:
- broadcast television and radio
- cable television
- fiber optic cable
- ITFS (Instructional Television Fixed Service)
- Microwave
- Public telephone network
- Satellite

Classroom technologies:
- computers with modems
- keypad response systems
- telephones
- videocassette recorders