DOCUMENT RESUME

ED 355 931 IR 016 027

| | |
|---|---|
| AUTHOR | Foster, Laura Kliewer |
| TITLE | Utilizing Telecommunications for Education: The Nebraska Model. A Report. |
| INSTITUTION | Council of State Governments, Lombard, IL. Midwestern Legislative Conference. |
| REPORT NO | EI-31 |
| PUB DATE | Sep 91 |
| NOTE | 12p. |
| AVAILABLE FROM | Midwestern Office, Council of State Governments, 641 East Butterfield Road, Suite 401, Lombard, IL 60148-5651 ($7). |
| PUB TYPE | Legal/Legislative/Regulatory Materials (090) -- Reports - Descriptive (141) |
| EDRS PRICE | MF01/PC01 Plus Postage. |
| DESCRIPTORS | Broadcast Television; Communications Satellites; Continuing Education; Cost Effectiveness; Distance Education; *Educational Technology; Educational Television; Elementary Secondary Education; Higher Education; *Information Networks; *Interactive Video; Program Development; *State Programs; Statewide Planning; Technological Advancement; *Telecommunications |
| IDENTIFIERS | Fiber Optics; *Nebraska; *NEBSAT |

ABSTRACT

Most midwestern states have experimented with some type of interactive video for educational purposes, but Nebraska has developed a statewide system to transmit educational programs, mainly via satellite telecommunications. Other states may find Nebraska's experiences helpful in considering their own educational telecommunications plans. Feasibility studies led Nebraska to develop four satellite-transmitted networks--popularly called NEB*SAT--that allow concurrent transmission capability. The four networks of NEB*SAT are: (1) Network 1, a broadcast television channel that can be received by anyone, transmitting the Schools TeleLearning Service and the instructional programs of the Nebraska Educational Television Council for Higher Education; (2) Network 2, a broadcast channel for distance learning and continuing education; (3) Network 3, compressed video for interactive instruction in eight locations so far; and (4) Network 4, the fiber optics portion of NEB*SAT, still in planning stages. Development and implementation costs are reviewed. Appendix A discusses the role of consultants to the system. A glossary is included. (Contains 6 references.) (SLD)

# EMERGING ISSUES

## Utilizing Telecommunications for Education: The Nebraska Model

### A Report of the

MIDWESTERN LEGISLATIVE CONFERENCE

of the Council of State Governments





641 East Butterfield Road, Suite 401, Lombard, Illinois 60148-5651 (708) 810-0210

A Report of the
Midwestern Legislative Conference

# Utilizing Telecommunications for Education: The Nebraska Model

Prepared by:
Laura Kliewer Foster

September 1991

EI-31

*Price: $7.00*

# Utilizing Telecommunications for Education: The Nebraska Model

"Throughout the nation, educators, policy makers, legislators and the general public are increasingly interested in the potential of modern technology to transform education -- in terms of what is taught, how it is taught, and how the educational enterprise is managed. [. . .]

Tomorrow's adults must function effectively in a world that requires technology to develop, process, and manipulate information; to develop innovative products and services, and to increase the productivity of a shrinking workforce." (1990, Hixson and Beauprez)

## Introduction

Telecommunications holds great promise for solutions to several problems facing school systems, particularly those problems endemic to rural communities. Not only can a developed telecommunications system bring specialized teachers to the most remote region of a state, but it can do so in an affordable manner.

An Association for School, College, and University Staffing annual survey on teacher supply found that, in 1990, about one-third (14 of 45) of subject areas suffered "some shortage" of teachers. The highest needs were found in the bilingual, special education and speech pathology areas. The survey also found a shortage of physics, math, computer science, Spanish, chemistry and counseling teachers. (Education Commission of the States.)

According to *The Christian Science Monitor*, at least 33 states currently promote distance learning. Only 10 did so in 1987. Telecourses have been around since the beginning of television, but lower costs of technology (cable television, fiber optics, microwave, satellites, etc.) in the 80s created a proliferation of courses offered through colleges and universities via telecommunications.

Most Midwestern states have experimented with some type of interactive video for educational purposes, usually on the district level. Nebraska has developed a statewide system to transmit educational programs, mainly via satellite telecommunications. Other states still in the process of coordinating statewide telecommunications systems for delivering educational programming may find Nebraska's programming, as well as decision-making and implementation processes, helpful in considering their own systems.

## Background in Nebraska

Nebraska's approach to providing distance education began with a search for a replacement to the microwave the state had leased from telephone companies for its public television network. Most of the equipment for this transmission was 25 years old, and lease rates were rising rapidly. According to Bill Ramsay, director of engineering for the Nebraska Educational Television Commission, telephone companies were providing very little video transmission, and did not seem very interested in doing so. A feasibility study conducted by Lambda Communications recommended satellite-based transmission, since Nebraska is a rather large state geographically with a rather small population. (See **Appendix A: The Role of Consultants**, page 5.)

Further exploration into the use of satellite revealed that the use of a wide bandwidth (72 megahertz) transponder would make additional signals available after the needs of public radio and television were met. (See **Glossary of Terms**, page 6.) A 72-megahertz transponder can be split into two signals of 36 megahertz each, with the needs of public radio and television met with one of the signals. Therefore, the state would have the "fringe benefit" of being able to deliver other types of educational programming via satellite as well.

With the interest and backing of then-Governor Kay A. Orr, the Nebraska Educational Telecommunications Commission (a state agency) planned the phased development of four networks -- popularly called NEB*SAT -- that could provide concurrent transmission of educational programming for kindergarten through continuing education students.

In early 1990, the Commission made the state the first to lease a full-time satellite transponder for educational and public service purposes. On May 30, 1991, the state completed the purchase of a dedicated transponder which should serve the state until the year 2000. NEB*SAT, the educational satellite and fiber optic networking system designed for the state, includes four networks providing concurrent transmission capability. The first network will be used by Nebraska ETV, with the other three providing various learning opportunities. Appropriations approved during the 1989, 1990 and 1991 legislative sessions have allowed development of three of the four phases envisioned for the coordination, scheduling and transmission of the educational video programs. (See Phases section, page 4.)

## The Networks

NEB*SAT is being developed by the Commission through its advisory body, the Nebraska Educational Telecommunications Coordinating Council. The body, which includes representatives of all sectors of Nebraska public and private education, appointed by the governor, schedules the programming on the various networks.

Three networks currently serve a broad spectrum of Nebraskans, and plans include an even larger educational outreach. Purchase of the satellite transponder allowed the state to transfer several existing programs to one of the three networks, as well as provided the added capacity for delivering new distance education opportunities.

### *Network 1*

Network 1, which can be received on a television set without requiring any additional equipment, is a broadcast quality channel interconnecting the nine Nebraska Educational Television Network transmitters and nine Nebraska Public Radio transmitters. Two educational services are provided over this network.

The Schools TeleLearning Service (STS) broadcasts five hours per day during the school year for use as a supplement to elementary and secondary school courses throughout the state. Some of the programs are produced at the Nebraska ETV studios in Lincoln, but most of them are acquired from other agencies nationally. Many of the programs give teachers recording rights, so that instruction can be videotaped for use when needed. STS has offered instructional programming to Nebraska schools for more than 30 years, and a recent study revealed that almost 80 percent of elementary teachers and 35 percent of junior and senior high teachers in the state use the service regularly.

The Nebraska Educational Television Council for Higher Education (NETCHE, Inc.), a consortium of Nebraska colleges and universities, produces and distributes instructional television programs on Network 1 at 3:30 a.m. and 12:30 p.m. Monday through Friday.

### *Network 2*

Network 2 is another broadcast quality channel originating in Lincoln, providing statewide distribution of distance learning and continuing education programming. Most of the programming offered through this network is noncredit, and the channel is received at more than 200 sites throughout the state that have the necessary equipment. (Receiving sites must have special antennas to receive the programming.) Many of the courses are live and utilize an audio bridge to connect viewers to the studio so that they can ask questions of the instructor.

Twenty-one cooperative extension sites (part of the University of Nebraska) use Network 2. (The state funded the updating of these sites' antennas so they could receive NEB*SAT programming.) The university uses the network to train its cooperative extension agents without having to bring them to Lincoln. A "Crop Pest Briefing" teleconference series is currently airing every other week, updating agents and specialists on problems with crop pests throughout the state. The agents then have the latest information to educate farmers.

Also, the university recently experimented with broadcasting two hours of the agricultural, home economic and 4H video programs it has in its library, so that cooperative extension agents could record the programs to keep in their own libraries instead of having to check out the videos from the university. Many slides in the library were also transferred to video and broadcast over NEB*SAT. Most of the receiving sites were able to record the programs without any problems, and the trial was such a success that more videos in the university's library will be aired in the future.

CorpNet, a partnership between the University of Nebraska and business and industry to deliver engineering and business courses, uses Network 2 to broadcast its non-credit courses, primarily in management development. These courses are designed to be received by employees at their work place.

Although several CorpNet college credit classes leading towards degrees were offered on this network until this spring, most have been or will soon be switched to Network 3. While equipment requirements leave Network 2 with smaller receivership than Network 1, the number of receiving sites across the state does provide the capacity for a large audience. Providing materials and grading to such a broad audience proved too cumbersome. Currently only one degree, in mechanical engineering, is offered over Network 2.

***Network 3***

The third network operating via the purchased transponder has the capacity to have 12 one-way or 6 two-way compressed video channels operating concurrently. Compressed video is not broadcast quality, as the transmission requirements are reduced significantly to allow more signals to be carried. The audio and color and picture quality is similar to a home VCR, except the frame rate for compressed video is less than 15 frames per second (versus 30 in a home VCR). Compressed video works well in cases where there is not a lot of movement in the broadcast (as in most instruction). Other than the omission of certain picture detail, instruction via the compressed video network can be fully interactive, allowing for students at different sites to see each other and ask questions as if they were in the originating classroom.

Since locating these sites is costly, the state wanted to make sure that sites would be well used, and not "put out as a political plum," said Bill Ramsay. Ramsay said that it was clear that sites chosen should have the capacity for different users at different times and that using the location for compressed video wouldn't be duplicating other efforts already available. To date, eight locations have been funded through appropriations:

- University of Nebraska Medical Center in Omaha
- University of Nebraska, Lincoln
- Norfolk Community College
- Columbus Community College
- Grand Island Community College
- Chadron State College
- Scottsbluff, Panhandle station (a branch of the University of Nebraska)
- Regional West Medical Center, Scottsbluff

Funding limitations have restricted the amount of transmission over Network 3. Transmission of nursing and engineering instruction has been the priority for NEB*SAT thus far, with other credit courses in the planning stages.

Before NEB*SAT was available, the medical centers in Omaha and Scottsbluff and the University of Nebraska in Lincoln were the primary users of Network 2, broadcasting nursing classes. Legislative mandate required the University of Nebraska Medical Center in Omaha to deliver its nursing program to Scottsbluff, and this spring the classes were switched to Network 3, to allow for interactive instruction, originating from Omaha (in the eastern part of the state) to Lincoln and Scottsbluff (in the western part of the state).

Two masters degrees in engineering previously aired over Network 2 will also be offered from the University of Nebraska to Columbus and Scottsbluff, and an additional masters in mechanical engineering is scheduled to begin airing this fall. The University of Nebraska at Lincoln is the only university in the state that offers these engineering degrees, so NEB*SAT bridges this gap.

Transmission to the other sites awaits funding for other equipment, such as cameras and monitors, needed for the transmission. An MBA program is scheduled to begin in the spring of 1992.

***Network 4***

The fiber optics portion of NEB*SAT -- designated as Network 4 -- is still in the planning stages. Initial funding ($293,000) for equipment and consulting to develop a pilot regional two-way video school system with interconnections via fiber optics was provided by the state. Five schools in central Nebraska will be able to share a variety of classes beginning in the fall of 1992. The schools will bear the cost of leasing the fiber optic telephone lines, NEB*SAT will provide terminal equipment and the state department of education will provide classroom equipment.

Investigating transmission options and classroom configurations is essential before requesting proposals for installation, said Donald Vanderheiden, superintendent of public schools in Broken Bow (one of the five sites for the pilot). "At one time we had made the decision based on the information available at the time. But that was about a year ago, and technology is improving rapidly," he said. Also, although the schools have seen demonstrations of various classroom configurations, sound equipment and transmission options, they will visit sites out of state to determine how each of these options actually works in a live classroom.

Higher level courses in science, mathematics and foreign languages tend to be rare in smaller schools, such as the five chosen for the pilot, so emphasis will be on sharing teaching in these subjects. The fiber optics system allows for full audio and video interaction between the schools, so that a teacher giving instruction at any one of the schools could converse with students in equipped classrooms at any of the other schools.

The long-term goal for Network 4 is to have a statewide system consisting of "pods" of regional schools interconnected via fiber optics, with each pod being connected to the state system, probably by one site in each pod becoming an origination site for Network 3.

## Costs

Overall costs for purchasing the transponder amount to $7.18 million, which includes legal fees, insurance and a 10% escrow fund. The total is less than would have been paid if the state continued to lease microwave for its public television network.

All equipment for Networks 1 and 2 is provided through the state agency. Network 2 receivers each cost $7,000 to $8,000, with half of the cost of each dish provided through agency money and half by the receiving center.

Originally, the antennas for the cooperative extensions were funded by the University of Nebraska or by the county. However, with the transfer to the wide bandwidth transponder, the antennas had to be upgraded at a cost of $1,300 per site. NEB*SAT provided the funding for this upgrade.

Each site equipped for Network 3 entails a substantially larger investment. Total transmitter and licensing costs for each site is close to $91,000. This includes a 4.5 meter antenna, coding and decoding equipment and receiving and transmitting equipment. Network 3 is funded primarily through the Nebraska Educational Telecommunications Coordinating Council, although two sites may be funded through the University of Nebraska Medical Center, which plans to use the sites for rural health care education.

## Phases

NEB*SAT has had three phases of its development approved by both the legislature and the governor. Phase I, approved in 1989 and activated February 1, 1990, entailed $1,614,000 in appropriations ($1,119,000 for equipment and $495,000 for lease of the transponder). The appropriations provided for:

* Continued interconnection of the Nebraska ETV Network's nine broadcast transmitters, via Network 1.

* Interconnection of the new Nebraska Public Radio Network's broadcast transmitters, via Network 1.

* Continuation of UNMC nursing instruction from Omaha to Lincoln and Scottsbluff, via Network 2.

* Continuation of CorpNet instruction to Scottsbluff, via Network 2.

Phase II, approved by Governor Orr and the 1990 Nebraska legislature, appropriated $155,894 for operations and $1,508,005 for equipment, providing for:

* Network 1 and 2 completion.

* Initiation of Network 3.

* Movement of nursing instruction to Network 3.

* Matching funding for elementary and secondary school satellite receivers.

Nebraska faced budget restrictions similar to many of the Midwestern states in 1991, and consequently did not approve much funding for new programs. Still, the 1991 legislature did include funding for two additional Network 3 sites -- at University of Nebraska, Carney and North Platte Community College. These sites will be geared specifically towards rural health education, with instruction for health care workers.

## Drawbacks to NEB*SAT

Nebraska made several decisions in designing NEB*SAT which other states may want to consider doing differently.

Although the choice of satellite transmission was the right choice at the right time for Nebraska, other states with different geography or population may want to consider other forms of telecommunications for transmission. NEB*SAT does not currently utilize much fiber optics for its transmission, but will probably use fiber to enhance the NEB*SAT system in the future, said Bill Ramsay. Unlike fiber optics, satellite transmission does not cost by the mile. A state as large and sparsely populated as Nebraska didn't find fiber optics cost-effective. Also, at the time of the purchase of the transponder, the fiber infrastructure would have taken a few years to construct. "It's quite possible that at the end of the transponder's life (around the year 2000), fiber might be the correct thing to use," said Ramsay.

Secondly, Nebraska chose to purchase a wide bandwidth C Band transponder, which is less expensive and has a wider bandwidth but is not as effective as a Ku Band transponder. Ku Band transponders operate at a higher frequency and are virtually free of interference. C Band transponders share the same frequency as microwave, so states considering this option need to make sure the transmission is not subject to unusual amounts of interference. Although Ku Band transponders cost almost three times as much as C Band, smaller, and therefore less-expensive, antennas can be used.

Also, Nebraska's choice to buy a transponder with wider than normal bandwidth meant buying larger, more costly antennas. For example, according to Ramsay, it is not uncommon for a satellite receiver to cost less than $2,000, but the receivers for NEB*SAT Network 2 cost more than $7,000 each.

Compressed video, as described above, allows for more signals but omits some picture detail. Compressed video's plus is that it reduces transmission requirements significantly, allowing for more "compressed" signals to be carried on the transponder. With more programs available on fewer transmissions, compressed video saves a lot of money. Yet the quality of the broadcast is reduced significantly, and some say the quality is too poor. Compressed video technology is constantly improving, though, and states should be regularly reassessing their consideration of this technology, as the savings are substantial over uncompressed signals.

## Conclusions

Of course, states may decide to build a telecommunications infrastructure for reasons other than education (e.g. economic development potential or state agency use). A lot of places made starts using microwave and satellite telecommunications for educational purposes and didn't grow from there, according to Ray Steele, the director of the Center for Information and Communication Sciences at Ball State University. Now the states are in the process of looking into hardware. Steele cautions that if a state is building an infrastructure and doesn't consider a unified video network, it will severely limit telecommunications' potential.

Telecommunications technology is changing at a rate almost as fast as the speed at which the technology allows information to be transmitted. If a state waits for "the best" technology to arrive, it will never develop a usable system. Yet a state may also be lured into making a huge investment into "cutting edge" technology it really can't afford. Policymakers may want to consider hiring an independent consulting firm which can apprise them of the latest technology and provide a recommendation based on the state's needs and resources.

The quality and level of education is becoming less bound to location. States that develop a comprehensive telecommunications network for educational purposes have less to fear from teacher shortages, and people who live in remote areas have less to fear from shortages of opportunities. Nebraska has made an ambitious effort to equalize educational opportunities for all its citizens in a cost-effective manner, using the latest telecommunications technology available. Although Nebraska will need to regularly re-evaluate its program's technologies, through NEB*SAT the state has made a priceless commitment to preparing its citizens for the future in a manner unheard of a generation ago.

## Appendix A: The role of consultants

Lambda Communications Inc., the company which conducted the needs assessment for Nebraska, has done telecommunications consulting for state governments for about four years. When asked to provide a list of questions legislators should ask about telecommunications networks, LCI's president, George Livergood, stressed the danger of oversimplifying the process to some general rules of thumb. Although he readily admits his obvious bias since his company is in the business, he urges state government officials to hire a consultant that can assess their state's resources and needs, and provide an objective opinion as to the course the state should take in developing its telecommunications network.

Livergood said his company's state government consulting has cost each state approximately $150,000 (the contract should specify a "not-to-exceed" amount). The work takes from six months to a year and entails about 3,000 person hours. What bang should you expect from your buck?

**1) A detailed needs analysis.** LCI speaks with and interviews people from every group of end users -- teachers, students, school administrators, businesses, hospitals, city and state governments -- and helps them determine their present and future telecommunications needs. Livergood says LCI's goal is to obtain "wish lists" from each group by educating them on telecommunications networks' capabilities. Then they interview every present and potential telecommunications source, from satellite to fiber providers. They also determine any potential "end user problems" such as geographic or economic factors that need to be added to the process.

**2) A budget.** "The number 1 issue is always affordability," says Livergood. Consultants help balance the state's budget constraints with the technical resources available.

**3) A business plan.** The five- to seven-year plan provides staffing and governance recommendations.

**4) A final report.** A good telecommunications consultant will be able to distill the technical jargon to paragraphs and short reports understandable to people at every level. So while you can expect the entire final report to be 200 to 300 pages single spaced, an executive summary of about 12 pages will interpret the major findings for the "man on the street."

**5) Assistance with drafting of a "request for proposal" (RFP).**

**6) Assistance with implementation.** "We help assure that what a state is buying is what it gets," says Livergood.

**7) Assistance with funding of project.** Your consultant can help with getting contributions for the state network. In Montana, LCI was able to help convince one private sector business to contribute $300,000 by showing how its employees would have the opportunity to improve their skills through the network.

**8) Re-evaluation annually and at major benchmarks of capital commitment.** Technology is changing rapidly, and what might be the best for the state at the time of the initial evaluation will probably need at least a few adjustments in years to come. A telecommunications consultant will have kept up on changes in technology, so will be able to advise the state on the latest options.

Livergood concedes that if a state is "real careful" it probably could do its own study, although difficulties with objectivity would be inherent from the beginning. Livergood says that if a state is not going to hire an outside source, it should be sure it has a good handle on its needs and resources, then let its telecommunications experts handle the details, because analysis and implementation are not easy processes.

## Glossary of Terms

**Compressed Video:** A digital transmission technique utilized to transmit a video channel in less than the 6 MHz bandwidth used for normal television transmissions. The signal is converted to a digital form at varying data rates and retransmitted with certain compromises in quality (normally) at varying data rates. At the receiving end the signal is reassembled to its viewable analog form.

**C Band:** A category of satellite transmissions which transmit from earth at approximately 6.0 GHz (gigahertz - a unit of frequency of 1,000,000,000 Hertz), and receive from the satellite at approximately 4.0 GHz. This band of transmissions has less path loss than the other standard used for satellites (Ku Band), but must have a large antenna for the same receiver input power level due to its use of longer wavelength frequencies. Other problems relating to the use of C Band include the shared use of these frequencies with terrestrial microwave transmissions, which cause interference with the weaker satellite signals in certain areas.

**Downlink:** The circuit between a satellite and a receiving earth station, including the satellite transmitter and antenna, the satellite-earth propagation path, and the earth station antenna and receiver.

**End User:** The ultimate last user of a telecommunications system, whether it is a student within a school, a business or a subscriber on a cable television system.

**Frame:** One complete television picture consisting of two fields of interlaced scanning lines.

**Hertz:** An electronics term referring to one cycle per second of alternating voltage or current, such as normal house current of 60 Hertz (60 cycles per second).

**Ku Band:** A category of satellite transmissions higher in frequency than those used as "C Band" which are being transmitted from a recent generation of satellites placed in the geostationary orbit. The higher frequencies (12 GHz versus 4 GHz) have created the possibility of smaller receive antennas and the realization of direct broadcast satellite signals to the end user without the necessity of going through a cable television system or other shared use receive sites.

**MHz - Megahertz:** A unit of measure of frequency of 1,000,000 Hertz or cycles per second.

**Microwave:** That portion of the electromagnetic spectrum from approximately 1,000 Megahertz to 100,000 Megahertz. The microwave energy is capable of being focused in concentrated beams in specific directions (due to its short wavelength characteristics) and sent over long distances. Extreme examples of long-distance focused microwave transmissions are the signals sent from a satellite uplink earth station to a satellite 22,300 miles away and from that satellite back to earth. It is also capable of being transmitted over wide areas from a central point or shaped into specific coverage areas with special antennas.

**Satellite:** An electronics retransmission device serving as repeater, normally placed in orbit around the earth in the geostationary orbit for the purpose of receiving and retransmitting electromagnetic signals. It normally receives signals from a single source and retransmits them over a wide geographic area.

**Transponder:** A channel of a satellite used for receiving and retransmitting signals. Normally satellites have 24 transponders, with 12 polarized for vertical and 12 for horizontal transmissions in order to optimize the bandwidth of the satellite and the respective transponders.

**Uplink:** The circuit between a transmitting earth station and a satellite, including the earth transmitter and antenna, the earth-satellite propagation path, and the satellite antenna and receiver.

*Glossary source: Lambda Communications Inc.*

## Sources

Judson Hixson and Debra Beauprez. 1990. "Technology: Its Use in Education." *Policy Briefs*. The North Central Regional Educational Laboratory. Number 5.

Daniel B. Wood. March 21, 1990. "TV Tech Plugs in Where Schools Leave Off." *The Christian Science Monitor.*

Bill Ramsay, director of engineering, Nebraska Educational Television Commission. June 26, 1991. Interview.

Gwen Nugent, educational telecommunications services coordinator, Nebraska Educational Television Commission. July 11, 1991. Interview.

Roger Bartlett, chief engineer, Network Operations, Nebraska Educational Television Commission. July 12, 1991. Interview.

George Livergood, president, Lambda Communications Inc. August 1, 1991. Interview.

# Publications

*(Single copies are available on a complimentary basis to government officials.)*

## Emerging Issues -- *$7.00 each*

____ *Utilizing Telecommunications for Education: The Nebraska Model*, **September, 1991** -- EI-31

____ *Monitoring State Economic Development Programs: A Guide for Legislators*, **August, 1991** -- EI-30

____ *Midwestern State-Tribal Relations: The Search for Common Ground*, **January, 1991** -- EI-29

____ *Drugs, Alcohol and Pregnancy: Parents and Children at Risk*, **November, 1990** -- EI-28

____ *Free Trade: Canada and the States*, **October, 1990** -- EI-27

____ *Back to School: How States Can Encourage Parent Involvement in Education*, **July, 1990** -- EI-26

____ *Health Care for the Uninsured and the Underinsured*, **April, 1990** -- EI-25

____ *Crackdown in the Heartland: Midwestern State Anti-Drug Efforts*, **January, 1990** -- EI-24

____ *The Impact of the 1990 Census on the Midwest: Congressional Reapportionment and the Distribution of Federal Funds*, **December, 1989** -- EI-23

____ *Strengthening Higher Education in the Midwest: The Course of Interstate Cooperation*, **November, 1989** -- EI-22

____ *Recent State Actions on Biotechnology*, **August, 1989** -- EI-21

____ *Promising State Economic Development Strategies*, **August, 1989** -- EI-20

____ *Gunning for Answers: A Review of Recent Gun Laws*, **June, 1989** -- EI-19

____ *More Than A Passing Involvement: The States' Increasing Role in Housing Assistance*, **May, 1989** -- EI-18

____ *Round Two of the Insurance Revolution*, **February, 1989** -- EI-17

____ *Why Prisons Are Packed and What States Can Do*, **December, 1988** -- EI-16

____ *Prodigal Crops: A Review of Proposals for Sustaining Agriculture*, **November, 1988** -- EI-15

____ *Child Care: Investment in the Future*, **August, 1988** -- EI-14

____ *Fiscal Update: An Overview of Midwestern Tax Actions in 1988*, **August, 1988** -- EI-13

____ *Update: Midwestern States' Response to the Drought*, **August, 1988** -- EI-12

____ *Plant Closings: Options for States*, **July, 1988** -- EI-11

____ *Pay Equity: Bridging the Gap*, **March, 1988** -- EI-10

____ *Protecting Our Resources: Survey of Midwestern Ground Water Regulation*, **February, 1988** -- EI-9

____ *Debate Over Premarital HIV Antibody (AIDS) Testing*, **January, 1988** -- EI-8

____ *Deregulating the Electric Industry: What Lies Ahead?*, **January, 1988** -- EI-7

____ *Economic Development Incentives: Guidelines for Decision Making*, **January, 1988** -- EI-6

____ *Update: Interstate Compact on Grain Marketing*, **January, 1988** -- EI-5

____ *AIDS in the Heartland: The Legislative Response*, **August, 1987** -- EI-4

____ *Economic Development: States Battle to Attract Jobs*, **August, 1987** -- EI-3

____ *Sales Tax Update*, **August, 1987** -- EI-2

____ *AIDS: Diagnosis of a Dawning Crisis*, **May, 1987** -- EI-1

## Also Available --

____ *Education Reform Survey* (conducted by The Roper Organization for CSG), **August, 1989** ($7.00)

____ *Long-Term Care for the Elderly: The Search for Solutions*, **November, 1988** ($7.00)

____ *Midwesterner* (monthly newsletter) (Subscription: $30.00 per year)

____ *Emerging Issues* (quarterly reports) ($7.00 per issue or $25.00 for yearly subscription)

**If you would like any of the publications shown, please contact the Midwestern Office of the Council of State Governments at the address below.**

Midwestern Office
Council of State Governments
641 East Butterfield Road, Suite 401
Lombard, Illinois 60148-5651