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ABSTRACT

The external politics of technology utilization in schools involving local, state, and federal levels of government is the central focus of this paper. Interest group politics are also examined, especially as practiced at the state level by professional associations representing teachers, administrators, and school board members. The first chapter examines the failure of the microcomputer to transform the traditional role of the teacher in the schools and then assesses the promise of interactive distance learning to do so. The primary conclusion reached is that only technologies like interactive distance learning, with its capacity to offer an educationally viable and cost-effective alternative to the classroom teacher, will have a real impact on schools. The second chapter describes the technology of interactive distance learning and state-level providers of distance learning services as well as the federal role in distance learning. The third chapter analyzes, at each of the three educational governance levels, political and legal issues that have been raised by distance learning. In the years ahead teacher unions may find themselves in some difficult political battles either to prevent school districts from obtaining and expanding interactive distance learning instruction or to compensate teachers for mastering its use. (24 references) (MLF)

TRENDS & ISSUES

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The Politics of Technology Utilization: From Microcomputers to Distance Learning

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The Educational Resources Information Center (ERIC) is a national information system operated by the Office of Educational Research and Improvement. ERIC serves educators by disseminating research results and other resource information that can be used in developing more effective educational programs.

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Prior to publication, this manuscript was submitted for critical review and determination of professional competence. The publication has met such standards.

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Foreword

This third issue of the Trends and Issues Series is an adaptation of a chapter the author contributed to the Twentieth Anniversary Yearbook of the Politics of Education Association, an affiliate of the American Educational Research Association. *The Yearbook of the Politics of Education Association for 1989* will be published in 1990 by Falmer Press.

In the following pages, Phillip K. Piele assesses the relative intensity of political issues surrounding the use of microcomputers in schools as opposed to those surrounding the spread of distance learning technology. He shows that the ability of these two technologies to generate attention in the political arena has depended on whether they provide a viable, cost-effective alternative to classroom teachers and therefore threaten to reduce the number of teaching positions. Whereas microcomputers have failed in this regard, distance learning—the provision of one-way video and two-way audio instruction via satellite—is increasingly being used as a substitute for hard-to-find teachers in geographically remote schools. Piele draws attention to the disparate responses of local, state, and national teacher organizations to these two dissimilar kinds of technology.

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Stuart C. Smith
Director of Publications

Contents

Introduction

Surely some revelation is at hand;
Surely the Second Coming is at hand.

W. B. Yeats, "The Second Coming,"
Collected Poems. Macmillan, 1924.

The purpose of this paper is to explore the politics of technology utilization in schools, especially as it pertains to current activities and future trends. The scope of the paper's discussion is confined to K-12 public schools in the United States, thus excluding postsecondary institutions such as community colleges and universities, as well as technology utilization issues in other countries.

The paper's political analysis is focused primarily on external, rather than internal, issues surrounding the utilization of technology in the schools. That is to say, while some attention to organizational (typically bureaucratic) politics of schools is unavoidable, especially when discussing political issues related to the use of the microcomputer in schools, the external politics of technology utilization involving local, state, and federal levels of government is the central focus of this paper. Interest-group politics are also examined, especially as practiced at the state level by professional associations representing teachers, administrators, and school board members.

The first chapter examines the failure of the microcomputer to transform the traditional role of the teacher in the schools and then assesses the promise of interactive distance learning to do so. To anticipate, the primary conclusion reached is that only technologies like interactive distance learning, with its capacity to offer an educationally viable and cost-effective alternative to the classroom teacher, will have a real impact on schools. One test of the significance of that impact is, I argue, the amount of political pressure exerted by interest groups to block such alternatives from being adopted.

Why Microcomputers Failed to Transform the Schools

Early proponents of the use of computers in the schools tended to hold to a belief in technological determinism: computers would irresistibly sweep aside or circumvent established education practices in this country. Certainly the most visible and influential of the early prophets of a microchip-induced transformation of the public schools was Seymour Papert, a professor of mathematics and education at MIT, whose book *Mindstorms*, published in 1980, became holy writ for computers in education among academics and practitioners worldwide. In summarizing his vision of student learning radically transformed by the microcomputer, Papert said:

> I believe that the computer presence will enable us to so modify the learning environment outside the classrooms that much if not all the knowledge schools presently try to teach with such pain and expense and such limited success will be learned, as the child learns to talk, painlessly, successfully, and without organized instruction. This obviously implies that schools as we know them today will have no place in the future. (Papert 1980: 9)

Now, more than a decade after computers began to invade the schools, the evidence from respected researchers and nationally prominent advocates of school reform finds the reality of computer use in most public schools in this country to be more form than substance. Most computer applications are relegated to fairly mundane skill-building instruction like teaching keyboarding to elementary school students, the fundamentals of the computer to middle school students, and introductory programming courses in BASIC and Pascal to high school students, with a wide variety of drill and practice programs for various subjects and nearly all grade levels thrown in along the way.

"Use of computers will remain at the periphery of the institution [school] not affecting its core activities," says Deer Walker, "just as other forms of technology—films, video, tape records, and so forth—do today" (Walker 1986: 32). Thus, concludes Walker, "I cannot agree with those who foresee the death of organized schooling, certainly not in this century" (Ibid.: 37).

In his influential study of the American high school, Ernest Boyer presaged Walker's findings when he found use of computers in schools to be not only "spotty and uneven," but used "largely by male students in mathematics classes" (Boyer 1983: 189). Unless more teachers are trained to use microcomputers in their classes, suggests Boyer, the microcomputer, like other technologies promising to revolutionize schools in the past, will bypass the schools "because teachers have been bypassed in the process" (Ibid.: 191). One explanation for the peripheral status accorded technology in most schools is suggested by L. J. Perelman:

> The common practice of trying to simply add-on technology to education while actively prohibiting transformation of the rest of the system's social infrastructure is just what has made much of the technological experimentation in education fruitless. (Perelman 1987: 33)

And Albert Shanker, president of the American Federation of Teachers, supports Perelman's explanation. Shanker stated, "I know of no other fields save education whose structure, technology, and basic ways of operating (and problems) have remained unchanged for over 150 years" (Shanker 1988: 29).

The politics of the early years of providing access to microcomputers in the schools centered, at the state and federal levels at least, on passing legislation making funds available to schools to buy microcomputers and related hardware. Local efforts in this arena centered on school districts scrambling to establish, equip, and staff microcomputer labs initially in the high schools and spreading down from there to as many middle schools and elementary schools as state and

federal funds and local taxpayer forbearance could be stretched.

The politics of the early microcomputer hardware acquisition period—roughly a five-to-six-year period beginning in the early 80s—saw federal, state, and local educational agencies eagerly responding to the promise of a microcomputer-induced educational utopia where every child would have access to his or her own electronic tutor in a traditional learning environment more or less transformed from a bureaucratic, mass-processing, control-oriented place to an open, creative, stimulating place where teachers and computers collaborated to inspire and enrich the lives of students.

An Alternative to the Human Teacher?

Many teachers may have been initially threatened by the new electronic teaching machine on the block. Would teachers have to change their curricula and instructional styles to accommodate the demands of this new electronic "colleague"? And would computers, in some subjects and at some educational levels, even replace teachers? They soon found that far from having to learn to integrate the microcomputer into their more traditional teaching methods, they could virtually ignore the microcomputer altogether, sending their students off to microcomputer labs to be supervised by the staff's local microcomputer "expert." Teachers continued to teach in much the same way they had since entering the teaching profession.

Certainly the vastly oversold promise that these new electronic teaching machines would revolutionize public education by rendering obsolete much of the more mundane tasks of teaching, leaving teachers to engage in more conceptual, problem-solving, and creative learning activities with their students, in all but a few rare and short-lived cases never materialized. No need here for state teacher associations—fearing a loss of teaching positions—to lobby their legislators to apply state textbook selection criteria, for example, to microcomputer software or to insist that teams of programmers creating instructional software be certified to teach in any state, let alone certified to teach in the state the software would be used.

Vast amounts of microcomputer-based software are currently being used to teach basic and advanced courses in mathematics, foreign language, English grammar, and biological and physical science courses. Do we hear or read about any efforts by states to enforce current statutes on textbooks and other curriculum materials and teacher certification to prevent this microcomputer-based instructional software from being used in the schools? No. And why not? Because its use is not seen as a realistic threat to present and future teaching positions. The current generation of microcomputer hardware and software used by the vast majority of public schools in this country is still too technologically primitive and educationally limited to provide a viable electronic alternative to the human teacher.

After all the glitz and glitter of the early frenzied years of school-based microcomputer acquisition and adoption had passed, many schools began to realize they were stuck with a lot of worn-out or obsolete hardware that was costing many times more than the original price to maintain. In the meantime, the people staffing this technology—those who had the interest and foresight to take a few computer literacy courses at the local university—settled down to the bureaucratically inspired (some would say endemically human) activity of enhancing and protecting their newly acquired turf.

Can the Promises Be Kept?

The introduction of microcomputers in the schools, while failing to transform them educationally, has added one more curricular component to an already overburdened curricular load carried by many teachers, especially those in the elementary schools, diverted physical space and resources to maintain the facade of computer-based instructional viability, and added to the district's administrative burden by creating the positions of microcomputer coordinator, director of instructional computing, and the like. All of this has cost additional money or diverted money from other areas of the educational enterprise.

But while much money has been spent on buying microcomputer hardware and software and adding staff and administrators, not much in the way of transformation has occurred. Even so, some current proponents of the use of microcomputer-based instruction in the schools argue for the expenditure of more money, not less; a stronger, more interventionist state and federal effort, not a weaker, lassie faire one; and a concerted effort to mobilize public support, government legislation, and corporate expertise to restructure the schools into temples of technological tutelage (see, e.g., Gillman 1989).

While the microcomputer has found a niche as a tool for use in remedial and enrichment programs in many schools, the time to rally public support, legislative action, and corporate expertise to transform the schools with the microcomputer has probably passed. Those who successfully made the early educational arguments for bringing microcomputers into the schools have not continued to make those arguments in the face of their underwhelming impact on the traditional organization, administration, and curriculum of elementary and secondary schools. So while many of the early highly visible proponents of educational benefits of the microcomputer have had their fifteen minutes of fame (as predicted by the late pop artist Andy Warhol) and faded from the scene, many of the true believers and recently converted who remain in our schools and universities still gather at state and national meetings, write articles in state and national magazines, and try to convince state and federal educational agencies, foundations, and computer companies that the promises of the microcomputer can be kept—all that's need is better hardware, better software, and more money to buy the same. And the second coming will come.

Indeed it will, but not in the form expected. The real technologically induced transformation of the schools has already begun, not by the microcomputer, but by a technology structurally more powerful and, therefore, able to touch far more students' and teachers' lives than the microcomputer. The technical details and operation of this technology are virtually unknown to all but a small percentage of the population, but its applications are known, used, and relied upon by nearly everyone: telecommunications.

The Technology of Interactive Distance Learning

For instructional purposes, the foremost example of the use of telecommunications technology is what is now generically referred to as *distance learning*. Distance learning uses two-way audio (radio) instruction—for years the principal means of delivering instruction to children living in remote parts of Australia—or one-way video (television), the dominant mode of transmitting instruction and educationally relevant information to schools for over thirty years. While not free of political controversy,* instructional television (ITV as it is commonly referred to in education jargon) has, like other technological innovations before and since, been relegated to a narrow and educationally circumscribed place in the public schools' curriculum.

Most recently, interactive distance learning systems have started to combine one-way video with two-way audio instruction. Instruction is provided by an instructor at some remote site, frequently in another state, and transmitted, generally via satellite, to a receiving station with a satellite antenna and then by cable (sometimes by microwave ground station or telephone lines) to a television set in a classroom. Students watch the instruction, ask questions, or make comments to the instructor by means of the two-way audio link (generally a cordless telephone). The instructor's response is seen on the screen and heard over the audio portion of the video monitor.

*For example, the local and national print and electronic news media, including articles in professional journals, have focused on the present debate over satellite-transmitted broadcasts of daily news and information with commercial messages to schools in exchange for free satellite receiving antennas, television monitors, and other related equipment. At its annual convention in July 1989, the National Education Association joined other educational organizations in adopting a resolution condemning Channel One, the Whittle Communication television program providing commercially supported news to schools.

Equipment Requirements

The equipment needed to receive satellite-transmitted voice and video signals includes a receiving antenna, a concave "dish" approximately six feet in diameter, but larger or smaller depending on the geographic proximity to the center of the signal path (called the footprint); the closer the receiving station is to the center of the signal path the smaller the size (within certain technical limits) of the dish required. The costs of these satellite receiving antennas depend on their size and the sophistication of their onboard electronic equipment, such as automatic tracking systems, which not only allow the receiving station to stay tuned into the strongest signal, but also allow it to switch between different transmitting stations, alternate geostationary satellites, or different transmitting frequencies on a single satellite. Whereas an FCC license is required to transmit audio, video, or digital signals via satellite, none is required to receive them.

Additional equipment needed by educational users of satellite-based distance learning systems includes a video monitor, a VCR to tape and store the lessons for later replay, and a microcomputer with a printer to receive, store, and print text material such as written instructions for class assignments and examinations. With the increased availability and declining cost of facsimile machines, several distance learning providers have begun to send text material via this electronic option.*

In addition to its ability to reach more students cheaply and quickly, interactive distance learning technologies are more effective than

*For a more detailed and up-to-date overview of the technology, applications, and research on interactive distance learning, see Kitchen, K., and Kitchen, W. (1987) *Two-way interactive television for distance learning: A primer* (Alexandria, Virginia: ITTE Technology Leadership Network, National School Boards Association.)

microcomputers and other recent instructional advances because they provide an unprecedented level of information density. Television quality video, while less information rich than photographs and certainly less adequate than direct experience, has proven fully capable of generating "true to life" experiences for children and adults. When interactive audio is combined with professional graphics and uniquely talented teaching pedagogy, the result is a reasonable substitute for the classroom performances of typical public school teachers. Research on the consequences of such substitutions is urgently needed, since ordinary citizens and education policy makers are apt to give increasing support to rapid expansion of its use in a wide variety of school settings.

State-Level Providers of Distance Learning Services

Several distance learning providers employing the above telecommunications technology are currently operating in this country. The largest of these providers, TI-IN, a for-profit company operating from San Antonio, Texas, "currently serves subscribers in 28 states and broadcasts over 140 hours per week of live, interactive high school credit courses, student enrichment viewing, staff development programs, and college credit courses" (De Freitas 1989). A sampling of TI-IN's high school credit courses planned for the 1989-90 school year includes beginning and advanced foreign language instruction in Spanish, German, French, and Japanese; mathematics instruction in elementary analysis, trigonometry, and calculus; science courses in anatomy and physiology, astronomy, marine science, computer science, physical science; and social science courses in psychology and sociology. Courses in elementary fine arts, art history, and reading improvement are also provided. These 50-minute courses are transmitted five days a week over four channels to subscribers in all four time zones.

Distance learning services are also provided by state and local educational agencies in Washington, Virginia, Missouri, and Kentucky. Several other states are planning to offer such services this year. In Oregon, for example, the 1989 session of the Legislature is considering a bill to establish Oregon Ed-Net, "an integrated statewide telecommunications network for purposes of providing educational programs, worker training and retraining and telecommunications system throughout the state" (Oregon Legislative Assembly 1989: 1). The legislation defines *integrated* as "an electronic system capable of transmitting video, voice and data communications to support delivery of educational services, courses, staff development, data sharing, conferencing and meetings" (Ibid.). The bill calls for the establishment of a governing board, whose nine members are appointed by the governor to serve three-year terms without compensation. The board, in turn, is authorized to appoint a person to serve a four-year term as director and to establish *ad hoc* and standing committees to aid and advise the board on technical and other matters as it considers necessary. Initial funding of Oregon Ed-Net, requested in the amount of 8 million dollars, would come from the Oregon Lottery Fund.

The governance structures and funding provisions of other state education agencies providing distance learning services vary from state to state. In Missouri, for example, the school boards association established an Education Satellite Network (ESN) in 1987 to provide instructional programs to elementary and secondary school students in small, rural districts in the state. By the end of 1989, Missouri hopes to have satellite transmission receiving equipment installed in every public school in the state. Funds for the necessary equipment were raised by a legislatively imposed tax on video tape rentals. The *reason d'etre* for establishment of the ESN, according to Carter Ward, executive director of the Missouri School Boards Association (MSBA), was to address "the discrepancy in curricular offerings" between the larger urban and suburban school districts and the smaller, rural ones throughout the state (Ward 1989: 1).

While advanced placement and remedial instruction were initially provided to schools, expanded services of the educational satellite network currently include enrichment programs, inservice education, and teleconferencing for noneducational organizations and groups. MSBA plans to offer its instructional programs to

schools throughou. the country by encouraging other state school boards associations to become affiliated with ESN. "To date," states Ward, "the Idaho School Boards Association has voted to become an affiliate of ESN" (Ibid.).

In several other states, the state departments of education offer distance learning services. This is the case in Virginia, where plans call for installation of satellite downlink equipment in every public school in the state by the fall of 1989. If school districts do not have the necessary local funds to purchase the equipment, they can borrow the money from a special fund established for the purchase of satellite receiving equipment. In Kentucky, the state department of education arranged for the delivery of interactive distance learning courses with Kentucky Education Television (KET), a separate unit of state government. Although representatives of the state department of education sit on its governing board, KET apparently has considerable authority in deciding what courses will be included or excluded from its program schedule. In Washington, the service is provided by Education Service District (ESD) 101 in Spokane, which offers high school and staff development courses to schools in Washington and neighboring states.

Several multistate consortiums of interactive distance learning providers, involving state and local (both for-profit and not-for-profit) education agencies, have been formed in the last two years. For example, the Satellite Educational Resources Consortium (SERC), headquartered in Columbia, South Carolina, is composed of state departments of education in fourteen states and two big-city school districts (Cleveland and Detroit). The consortium provides live, interactive distance learning courses in foreign languages, mathematics, and science three days a week via satellite to schools in the states and cities that are partners in the consortium.

The Federal Role in Distance Learning

Federal funds from Star Schools—a new U.S. Department of Education administered program in the Office of Educational Research and Improvement (OERI)—supports SERC and three other regional distance learning programs. One of these programs is the Midlands Consortium, a five-state partnership based at Oklahoma State University in Stillwater. Composed of five universities in four states (Oklahoma, Kansas, Mississippi, and Alabama) and one school boards association in Missouri, the consortium serves schools in the five states.

Another regional consortium supported by the Star Schools Program is composed of four universities in four states (Alabama, California, Illinois, and Mississippi) and a state department of education and a regional education services district in North Carolina and Texas, respectively. The consortium, coordinated by Texas-based TI-IN, will provide live, interactive instruction to schools in sixteen states.

Finally, the fourth program receiving Star Schools Program support is a multistate effort coordinated by the Technical Education Research Center (TERC), a for-profit company located in Cambridge, Massachusetts. The consortium is composed of state departments of education and state broadcasting systems in fourteen states in the north central, north eastern, and mid-Atlantic regions of the United States.

The legislative authorization for the Star Schools Program was sponsored by Senator Ted Kennedy of Massachusetts allegedly at the urging of Boston University President John Silber, who wanted B.U. to be the major, if not sole, recipient of the 80 million dollars initially proposed to fund the program for five years. Ironically not only was B.U. not a major recipient of Star Schools funding, it received no funds at all. Proposals for funding of the initial programs were numerous, of high quality, and very competitive. Nineteen million dollars were authorized to fund the four initial multistate proposals for the use of telecommmunications to deliver instruction to schools using interactive video, video tape, and computers in FY 88. Funding was reduced to $14.4 million in FY 89.

Despite this promising initial support of distance learning, the federal role in education technology is ambiguous at best. On the side of a stronger federal role is the following recommendation from a 1988 report prepared for the Select Subcommittee on Education of the Committee on Education and Labor, House of Representatives: "OERI must make a significant new investment in researching and evaluating new technology ca-

pable of improving the quality of education at all levels" (emphasis added) (Subcommittee 1988: 14).* The report concludes by saying that "[t]here is a clear federal responsibility both to invest in the research and development of new technology (perhaps with the benefit of private cooperation), and to assist schools to move into a new technology era—an era which thus far we have stumbled into rather than carefully planned for" (Ibid.: 15).

Nevertheless, the future of the Star Schools Program is somewhat in doubt. OERI's proposed budget for FY 90 provides zero funding for the program. Whether money to maintain Star Schools will be provided in the Secretary's Fund for Innovation in Education is unclear. While OERI's proposed use of the Secretary's Fund includes plans to fund programs to support the use of telecommunications technology for student instruction and teacher training, no specific mention is made of the Star Schools program itself.

The future of the program may not be decided entirely within the confines of the federal bureaucracy, however. Several powerful United States senators from states with universities or state departments of education affiliated with the Star Schools regional consortiums, notably in the South, have voiced strong support for continued identification and funding of Star Schools. There is also strong support in the House of Representatives, especially now that Tom Foley from the state of Washington has been elected Speaker. Speaker Foley's congressional district includes Spokane, the location of ESD 101, one of the pioneers of live, interactive distance learning instruction, described earlier. Clearly, with so many states involved as partners in the currently funded Star Schools program, and with thirty-nine states having schools that are the beneficiaries of satellite antennas and other related equipment to receive distance learning programs, many of them live and interactive, the likelihood of Congressional intervention in the OERI decision to eliminate or restructure the Star Schools program is high.

Just how effective will be the joint efforts at self-interest lobbying by the members of the consortiums to prevent OERI from killing the program still remains to be seen. But if the history of such efforts by federally funded, multistate education programs such as the Regional Labs, the ERIC Clearinghouses, and the National Diffusion Network is any guide, that effort will likely be successful, at least in retaining the identity of the program, if not restoring the previous year's funding level.

The specific reasons for efforts to eliminate the program are unclear, but one reason may be linked to criticism that the money for the program has been used primarily to fund the purchase of equipment, with very little of the promised instructional services. Still, even if the program is no longer funded, many schools have acquired the necessary equipment to receive live, interactive distance learning programs that would not otherwise have done so. Furthermore, many of those schools will have had at least some exposure to the use of distance learning instruction. Based on this experience, they will be better able to decide whether to expand their services by subscribing to instructional programs provided by one of the many active distance learning providers.

Finally, many of those involved for the first time in the service-providing end of the distance learning movement will have gained valuable experience in developing and marketing programs. Thus local school district demand for more and more conveniently scheduled live, interactive programs will increase. As this happens, the number of commercial companies and individual and multistate public and nonprofit education agencies that provide these programs will also increase.

*For further discussion of the recommendations, see pp. 14-15 of Subcommittee report. See also the Office of Technology Assistance Report (May 1988) entitled *Technology and the American transition: Choices for the future* (Washington, D.C.: United States Government Printing Office.)

Political and Legal Issues Concerning Distance Learning

A number of political and legal issues have been raised by the recent development of systems for the delivery of interactive distance learning services previously discussed. These issues can be analyzed at each of the three education governance levels: federal, state, and local.

Federal Issues

At the federal level the critical issues are leadership and financing. Federal involvement and leadership in education were sharply curtailed during the Reagan administration. In the near future, it is unlikely that a coalition supporting federal leadership in the development of distance learning will be successful. While both national teacher organizations have expressed surprisingly strong support for the concept, neither has the political muscle to ensure success. Additionally, legislative advocates like Massachusetts Senator Ted Kennedy are predominantly liberal democrats who face an uphill battle on nearly every policy question.

If federal leadership is problematic, federal financing prospects are truly bleak. Federal deficits continue to encounter Graham/Rudman limitations. Combined with the need to bail out the nation's savings and loan institutions and a continued demand for strong military spending, the deficits virtually ensure that expensive new domestic programs will go unsupported. In short, federal politics are not likely to play a major role in determining the future of distance learning technologies.

State-Level Politics

At the state level, two political issues are likely to shape the future of distance learning. First, adoption of a distance learning approach to program content and curriculum design directly challenges many of the traditional structures and processes of state educational governance. At stake are both state sovereignty over school programs and state policies aimed at ensuring an adequate supply of certified teachers.

Curriculum Control

In the area of curriculum control, for example, Kentucky Educational Television provides distance learning instruction to schools in that state. What happens if KET decides to cancel a program that the state department of education says it will provide to schools? Who decides what subjects are going to be provided: the state department of education (the constitutionally authorized education administrative agency of the state) or a publicly funded educational television company?

State administrative agencies, traditionally responsible for developing and monitoring legislatively mandated curricula, are being circumvented by state school boards associations, state educational television agencies, and education service districts—to say nothing of the configurations involving multistate education agencies. Distance learning has fueled a propensity to leap traditional state boundaries and form collaborative relationships with other state educational organizations for the delivery of instructional services. As a result, all kinds of creative partnerships are being devised that seem to ignore issues of state sovereignty in the establishment and control of education.

State political experience with two other education policy issues—student testing and textbook selection—suggest possible models for how the curriculum control issue will be handled. With a few notable exceptions, states have adopted the view that private firms responsible for development of student testing programs have

a right to exercise technical control over the preparation, scoring, and interpretation of test results. State agencies typically confine themselves to choosing the test program that best fits their needs from among the offerings of private vendors. Political battles over the test results rarely include assertions that the states have abandoned their sovereignty or abandoned their responsibilities when selecting testing programs. Exceptions to this general pattern have been experienced in New York, where Educational Testing Service was sued for release of test content, and in California, where state leaders insisted that the State Department of Education develop test items explicitly to meet state curricular goals. If distance learning follows the testing model, states will adopt particular vendors' programs but leave the determination of content and form to the producers.

Textbook politics involve stronger commitments to state or local control over program content. While most states leave the issue to local education agencies, the major textbook adoption states (California, Florida, and Texas) have fought for substantial control in recent years. If distance learning follows the textbook model, a few states will display high profile demands for control while most will abandon the field entirely, assuming that marketplace choices by local districts will provide adequate quality control.

Teacher Labor Market Politics

Another set of state-level issues concerns the impact of distance learning on teacher supply and demand. Notice the arguments being advanced in support of interactive distance learning: a more equitable distribution of advanced placement, enrichment, and remedial instruction to small, rural schools. While not stated, the inference is that it is too expensive or too inefficient to hire teachers—even if available—to teach these courses to students in small geographically remote schools. But the net effect of this development—a *de facto* substitution of technology for the teacher in the classroom—goes largely unnoticed. This observation brings us to the heart of the political controversy surrounding interactive distance learning and it gives rise to the question: How are local, state, and national teacher organizations responding politically to the issue of present and future loss of teaching positions in certain fields? For the time being, the problem is masked by the short supply of qualified teachers in the most widely affected subject areas, and the fact that the available specialists are disproportionately concentrated in the wealthier medium-to-large suburban schools.

State-level politics involving early efforts at intra- and inter-state delivery of live, interactive distance learning instruction can already be observed in several states. In Oregon, for example, a bill enacted during the 1989 legislative session provides a distance learning exception to the state statute and administrative rules that required any teacher hired by a district school board to hold an Oregon teaching certificate (ORS 342.505).* Essentially the bill modified the Oregon statute that penalizes districts hiring noncertified teachers. According to the statutory language, any person delivering instruction via distance learning will not need to hold an Oregon certificate but will have to hold a valid teaching certificate from the state where the instruction originated.

An examination of the testimony presented on this bill before Oregon house and senate education committees provides insights into the political interests and arguments used to influence support for distance learning technologies. On the pro side were the Oregon School Boards Association and the Confederation of Oregon School Administrators, a federation of associations representing superintendents, principals, and curriculum coordinators in Oregon. The school board and administrator associations, joined in support of the bill by the Oregon State Department of Education, advanced three major arguments in support of the bill.

The first argument centered on the inability of many school districts, especially those in rural areas, to afford high quality, comprehensive educational programs. Because of the limited number of interested and academically qualified

*Oregon Administrative Rule 584-36-010, developed by the Teachers Standards and Practices Commission, states: "Educators who are employed by public schools and who are compensated from public funds must hold certificates."

students, school boards in many small and rural districts cannot afford to hire teachers specifically qualified to teach certain courses. Distance learning increases the ability of these districts to provide comprehensive instructional programs, especially in the areas of foreign language, mathematics, and science. Second, even where districts can afford to hire teachers for such courses they are in very short supply—especially teachers qualified to teach high school level courses in mathematics and science. Third, the bill's supporters argued, Oregon school districts should not be restrained from access to this technologically innovative method of delivering instruction because of burdensome legal restrictions.

In addition to these three major claims, the supporters also argued that the distance learning innovation should have an opportunity to succeed or fail in Oregon schools on the basis of cost, variety, and the quality of the services provided, unencumbered by a state-imposed restriction limiting course offerings to those provided by teachers certified in Oregon.

Testifying against any exceptions to the teacher certification law were the Oregon Teachers Standards and Practices Commission (TSPC) and the Oregon Education Association (OEA). TSPC and OEA argued that teacher certification rules are designed to protect the students and the public interest; any exception to these rules would not be in the best interests of students, teachers, or the public.

The underlying arguments on both sides of this issue embody concepts delineated in Anthony Downs's (1957) classic formulation of an economic self-interest theory of democracy. While Downs's theory was developed primarily as a vehicle to explain application of cost-benefit concepts to voting behavior in partisan political elections, it also provides useful insights into understanding the behavior of the interest groups providing opposing testimony on the distance learning bill. The position taken by school boards and administrators groups supporting the bill can best be explained by their interest in securing more educational "bang for the buck" by providing many more students with access to limited, high-cost courses. While not covered within the explanatory scope of Downs's theory, support by the state department of education for a bill loosening teacher certification is probably best explained by its constitutional and statutory duty to ensure fair and equitable access to education by all Oregon students.

Opposition to the bill by the Teachers Standards and Practices Commission, an independent regulatory agency whose membership includes several representatives from the teaching profession, is easily understood. Economic self-interest is not direct, but the commission has become a strong advocate for teacher preparation and certification legislation initiated or supported by the state teachers union—a propensity among state and federal regulatory bodies.*

Economic self-interest can easily account for the state teacher union's opposition to the bill. Fearing the actual or potential loss of teaching positions, the Oregon Education Association, notwithstanding its publicly stated reasons for opposing the bill, clearly wanted to protect the interests of its members.

Interesting, and quite surprising from an economic perspective, is the position taken by the American Federation of Teachers and the National Education Association on distance learning. The heads of both national teacher unions have expressed support for the concept. It remains to be seen if the fears of state teacher unions like the OEA will lead the national association to alter its position.

Local Politics

At the local level, the politics of distance learning are closely connected to issues of collective bargaining and teacher status. The advent of formal collective bargaining for teachers has institutionalized the politics of self-interest for the overwhelming majority of public school teachers. As local teacher unions focus their attention on the issue of distance learning, two scenarios

*For supportive as well as contrary explanations of this phenomenon, generally referred to in political science literature as the "capture theory," see Lowi, T. J. (1969) *The end of liberalism* (New York: Norton) and Wilson, J. Q. (1980) *The politics of regulation* (New York: Basic Books).

appear likely. The first springs from the economic model of collective bargaining typically endorsed by statewide teacher organizations and frequently used by local bargaining units. Where this happens, teacher unions can be expected to see distance learning technologies as a threat to job security and to resist their use across the board. Optionally, local teachers might equate access to and control over the distance learning technologies as a much needed source of workload reduction and status enhancement. Where teachers view distance learning technologies as nonthreatening, they will recognize that using the resources of highly talented pedagogues and professionally prepared video graphics can substantially reduce the workload for individual classroom teachers.

Additionally, local teacher leaders could view the incorporation of distance learning technologies into daily classroom practice as an opportunity to gain recognition as a specialized and technologically advanced profession. As training in the acquisition, use, and assessment of outcomes related to distance learning becomes more prominent, teachers could make the case that their social and economic status in the community should be raised.

Legal Barriers to Interactive Distance Learning

Teacher certification statutes, previously discussed, pose important barriers to interactive distance learning in states other than Oregon. A recent study of state education statutes and administrative rules in four western states found several potential legal barriers to using technology-based substitutions for the human teacher in the classroom (Pheasant 1989). Special certification standards for mathematics and science teachers were also found to threaten distance learning programs. Other statutory or administrative rules raise potential barriers to technological substitution of the teacher in some states, but not others. The most important of these ancillary regulations include pupil-teacher ratio requirements, mandates fixing the proportion of district budgets to be used for teacher salaries, state-mandated textbooks, and state aid formulas based on teachers or teaching units.*

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*For earlier studies finding similar legal barriers to the use of technology in schools, see: Scanlong, R. and J. Weinberger, eds. (1973) *Improving productivity of school systems through educational technology: Final report of symposium*, Research for Better Schools, Philadelphia; Heinich, R. and K. Ebert (1976) *Legal barriers to educational technology and instructional productivity*, National Institute of Education, Finance and Productivity Group, Washington, D.C.; Wilkinson, G. L. (1980) *Educational media, technology and instructional productivity*, ERIC Clearinghouse on Information Resources, Syracuse University; Duttweiller, P. C. (1983, November) "Barriers to optimum use of educational technology," *Educational Technology*, pp. 37-39; and Goldstein, M. B. (1984) *Issues of law and policy affecting telecommunications-based distance learning*, Southwest Educational Development Lab, Austin, Texas.

Future Trends and Issues

Certainly, in the near-term future (the next three to five years), the impact of distance learning on teacher jobs will be small. Providers have been careful to provide programs in subject areas where teacher shortages currently exist. Furthermore, with a few notable exceptions, rural schools are the main targets of the marketing efforts by distance learning providers. Nevertheless, if school district budgets become tighter; if teacher shortages grow worse in such subjects as foreign languages, mathematics, computer science, and the physical and biological sciences; or if state legislatures add more years of foreign language, mathematics, and science to high school graduation standards, the political and economic environment will come into direct conflict with state teacher union protectionist efforts in many states.

In the years ahead, teacher unions may find themselves in some difficult political battles either to prevent school districts from obtaining and expanding interactive distance learning instruction or to compensate teachers for mastering its use. Not only must teacher unions contend with the changing landscape of state and local financial support for education, but they also face challenges in the ever-shifting arena of public opinion, where the clamor of parental demands for education of higher quality with greater choice have already reached the ears of state and local policy makers and moved issues related to excellence and choice to the top of the educational agenda. Parents and other citizens who see interactive distance learning as an equitable and cost-effective solution to demands for more and better courses will not stand idly by while teacher unions seek to restrain the use of this technology by imposing legislative, judicial, or collectively bargained barriers.

In recent years, legislation in several states has made it easy for parents to offer instruction in the home. According to Lines, "[t]wenty-nine state statutes now explicitly allow instruction at home by a parent or tutor" (Lines 1987: 514). In addition, several of these states, do not require the parent to be certified. Unless state laws preventing interactive distance learning in the public schools are changed, parents in many states will subscribe to interactive distance learning services at home. In the May 1989 issue of *Oregon Focus*, an Oregon Public Broadcasting monthly publication, Maynard Orme, OPB's executive director, states that because of improved antenna technology, the size of a satellite dish can be reduced from 6 feet to 2 feet; thus it will become less expensive and more feasible to mount them on the roof of private homes. Furthermore, "targeted audience services such as direct two-way video and audio instruction" will become feasible through the development of a technology commonly referred to as "compressed video," which reduces the bandwidth (and the cost) required to transmit video signals (Orme 1989: 19).

These and other technological developments will continue intensifying the pressure on teacher unions to maintain the status quo for their members. But state and national unions appear to have one of two choices in the face of technology that now and in the future can and will continue to replace the classroom teacher—at least in secondary schools: (1) erect legislative or collectively bargained barriers, as the railroad unions did when the diesel engine began to replace the steam engine, resisting the elimination of the fireman whose job was made obsolete by diesel technology, or (2) try to work with these new technologies, as American automobile unions did, when they agreed to allow more robots on the assembly lines to meet industry-killing competition from the Japanese.

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