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ABSTRACT
        This report focuses on the first of three phases in a
project at the Institute of Agriculture, Forestry, and Home Economics
(IAFHE) at the University of Minnesota. This project has been charged
with developing a plan for delivering credit and on-credit
educational offerings at multiple locations in the state. Background
information on the project environment is followed by a description
of the information-gathering approach, which consisted of interviews
with faculty designed to elicit data related to target audiences,
problems in instruction 1 delivery, interaction among IAFHE units and
between IAFHE and other university units, and their specific
interests in distance education. A discussion of the findings covers:
(1) needs of practicing professionals, nontraditional students,
upper-division undergraduates, and institute faculty; (2)
opportunities for the implementation of educational technology and
benefits to faculty and students; and (3) barrier to the use of
telecommunications technology, including time concerns, financial
issues, lack of access to technical support, and fear of technology.
Several technology options are suggested for short-term, mid-term,
and long-term use. Included in the report are a brief overview of the
second phase which covers policy issues, implementation strategies,
and support development, and a copy of the interview schedule. (4
references) (MES)

TDC Research Report No. 3

March 1989

Organization and Technology Issues Related to Distance Education

Patricia Kovel-Jarboe

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Organization and Technology Issues
Related to Distance Education

Patricia Kovel-Jarboe[1]

ABSTRACT

Changing student demographics and rising demand for graduate and professional courses, combined with the increasing availability of relatively low-cost instructional technologies, have led many post-secondary institutions to examine the potential for electronic delivery of education.

This report describes the approac', findings, and recommendations concerning implementation of distance learning technologies in the Institute of Agriculture, Forestry, and Home Economics at the University of Minnesota. Phase One of the project (assessment and planning) has been completed; Phase Two (strategies and support development) is nearing completion; and Phase Three (implementation) is expected to begin in mid-1989. The focus of this report is on Phase One, but tentative information on Phase Two is also provided.

INTRODUCTION

In late 1987, the Institute of Agriculture, Forestry, and Home Economics (IAFHE) at the University of Minnesota began developing a plan for delivering credit and non-credit educational offerings at multiple locations in Minnesota.[1] The decision to develop this plan followed a series of discussions by the institute's executive council, composed of its deans and chancellors, and headed by a university vice president. The Telecommunications Development Center (TDC) was asked initially to assist in defining the scope and objectives of the project and, later, to take full responsibility for carrying it out. The center is administratively part of the IAFHE. With a five-year grant from the W.K. Kellogg Foundation, TDC has been charged with conducting and evaluating applied research using new and emerging electronic technologies for education. During 1986 and 1987, TDC focused on assessing faculty needs related to effective use of new technologies, designing and delivering seminars and workshops for University of Minnesota faculty and other Minnesota educators, and providing technical assistance and financial support to a series of demonstration projects.

Beginning in 1988, increased emphasis has been given to designing and conducting research that will allow the Minnesota Extension Service, also administered by IAFHE, as well as its national counterpart, the Cooperative Extension System, to identify and appropriately use those educational technologies with the greatest potential to address extension delivery issues.

As conceived, the project was expected to have two components. The first was to be an assessment of needs and options, while the second would be development of an implementation strategy. As it has evolved, three phases can be described; they are: Phase One - assessment and planning (September 1987 through January 1988); Phase Two - strategies and support development (February 1988 through April/May 1989); and Phase Three - implementation (subsequent to July 1989).

TDC's previous interactions with institute faculties strongly suggested that faculty members must be involved in planning for, as well as implementing, educational technologies. Based on that key assumption, a primary goal of the project would be to involve the faculties as fully as possible in developing a plan that would be both technologically appropriate and acceptable within the context and culture of the specific organization.

THE ENVIRONMENT

The Institute of Agriculture, Forestry and Home Economics includes three colleges in St. Paul, the Crookston and Waseca campuses, the Minnesota Extension Service (including 91 county offices), the Agricultural Experiment Station (including six branch stations), and several other facilities located through-

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out Minnesota. The three colleges offer undergraduate, graduate, and professional education; the Crookston and Waseca campuses provide two-year terminal programs or two years of academic coursework fully transferable to the state's various four-year institutions. The Minnesota Extension Service, part of the Cooperative Extension System, offers informal educational programs for adults and youth through a staff of on-campus faculty and county agents. The experiment stations and other research facilities carry out applied research which complements the traditional research programs of the colleges.

As the activities covered by the report commenced, several situations existed which were significant to the project. First, the College of Agriculture was involved in a major curriculum revision effort (called Project Sunrise) which involved its faculty in a variety of planning committees. Second, the entire university, including the institute, was engaged in a multi-year, planned-change strategy designed to strengthen its programs of greatest repute and build or eliminate those of lower quality and/ or lesser importance. The planning process and the resulting recommendations are known as Commitment to Focus.

The University of Minnesota has not used distance delivery technologies extensively, nor has it supported a large number of distance delivered programs; however, there have been some uses of distance delivery technologies. Undergraduate, independent study courses, via video- or audio-cassette have been offered for some time, and a small number of undergraduate and graduate courses have been delivered via broadcast television or radio. Continuing Education and Extension (a collegiate unit headed by a dean) has had responsibility for these programs as well as traditional off-campus courses, conferences, and other special learning opportunities such as summer institutes and study abroad programs.

The Institute of Technology has for some years used ITFS (Instructional Television Fixed Service) to deliver graduate-level engineering courses to employees of approximately 40 corporations in Minneapolis-St. Paul and greater Minnesota. This

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Box 1. Interview Schedule.

- I don't want to focus on technology per se, but before we start do you have any questions or issues you'd like to discuss related to the materials I sent to you a week or so ago?

- What faculty interest exists in your department regarding distance or non-classroom delivery of courses?

    - Has anyone been especially interested?
    - Has the faculty tried anything specific?

        - If yes, please describe.
        - If no, why hasn't this happened?

- How would you describe the interaction relating to instruction between your unit and others in IAFHE?

    - With other departments in IAFHE - teaching or research or extension?
    - With other University of Minnesota departments?
    - With other institutions/facilities?
    - Any international components?
    - Indu ry/university projects

- Can you tell me about specific problems your department faces in instructional delivery?

    - What would department members describe as their biggest hassles?
    - Are there specific courses or topics that pose (difficult) problems for instructors? Why?
    - How do you currently deal with these problems/hassles?

- Is there now or potentially demand for your courses by off-campus and/or non-traditional students?

    - Who would you like to reach that you don't?
    - Are there audiences for your courses that you've lost? Why? Who?
    - Undergraduate: upper or lower division; graduates; practicing professionals
    - What makes a student non-traditional?

- Do you have any concerns regarding technology-based instructional delivery or IAFHE plans in examining these issues?

    - Fears?
    - Barriers?
    - Opportunities?
    - What incentives would make you (and/or other faculty) willing to take advantage of technology?

one-way video, two-way audio system has occasionally (and irregularly) been used for other programs. No technology links existed between or among the university's six campuses with the exception of coaxial cable between Minneapolis and St. Paul, and non-dedicated telephone lines used for computer-to-computer data and file transfer.

APPROACH

In the last 15 years, the study of educational technologies and their impacts on students has yielded a large body of literature. The bulk of it focuses on descriptive studies oriented toward achieving control of the interactions of specific media, contents, and learner characteristics. Relatively little of the published material deals with institutional issues or related policy matters. A 1987 publication by the Western Interstate Commission for Higher Education (WICHE) identifies fewer than 30 publications which significantly address these concerns, and several of the identified publications are descriptive rather than evaluative or analytical.[2]

To prepare this report, information was gathered from key institute faculty (department heads and others) through in-depth interviews. These interviews were designed to elicit data related to several broad areas:

- target audiences currently unreached or poorly reached
- emerging audiences
- problems faced in instructional delivery
- amount and nature of interaction among institute units and between institute units and other university units
- concerns related to instructional technologies
- specific opportunities or applications of interest

If not obvious from initial responses, additional information was sought relative to five specific types of educational situations: upper-division undergraduate, lower-division undergraduate, graduate, extension/outreach, and research. More than 40 persons participated in the in-depth interviews. Approximately 40 other faculty were involved in less formal exchanges which contributed to this report. The goal was to elicit as many relevant responses as possible to the broad issues listed above. (A copy of the interview schedule is included in Box 1.)

If the investigators had been concerned only, or even primarily, with new or existing markets, the research methodology might have been quite different. Traditional approaches to market research -- focus groups, for example -- with much greater involvement of consumers, in this case present or potential students, would have been appropriate. Likewise, in-depth analysis of the needs and desires of current or potential employers of IAFHE graduates might have been warranted.

Instead, an intra-institutional approach was justified for several reasons. First, Commitment to Focus, the planning effort noted earlier, had resulted in much previous analysis of new and existing student pools. For example, declining enrollments in the College of Agriculture had already resulted in considerable attention being paid to potential sources of new students and in the initiation of the curriculum revision project. Second, a major project goal was to create awareness among faculty of the range

of technologies appropriate to use in post-secondary education. Another concern was to identify those attitudes or practices which might inhibit faculty use of distance delivery options, so the implementation plan could begin to address them.

General support for this approach has been provided by Hezel in a study commissioned by the Annenberg/CPB Project:

While many faculty members remain suspicious of educational technologies, faculty members must be included in any telecommunications planning process. Faculty usually learn about technologies and only later develop applications of technologies. Assuming that the most effective uses of technology will be made by faculty members who understand its potential, a comprehensive needs assessment should be preceded by educational technology information seminars for faculty and education administrators.[3]

These information sessions had taken place under the auspice of TDC throughout 1986 and 1987.

Data on existing technology systems, obtained from the Minnesota Technology Resource Notebook[4] and TDC files, influenced the set of technology recommendations included in this report. (See Box 2.)

As institute colleges and departments respond to Commitment to Focus, and with the rapid construction of technology systems, descriptive data such as those contained in this report are best regarded as unstable; however, the broad phenomena and the opportunities which they represent are unlikely to change significantly in the next 2-3 years.

FINDINGS AND OUTCOMES
(Phase One)

This section presents findings in three areas: needs, opportunities, and barriers. Needs are those items and situations which informants deemed to have greatest urgency. Opportunities are activities and situations which could facilitate the adoption of electronic delivery or benefit because of it. Barriers are those practices, situations, and attitudes which may hinder the adoption of appropriate technologies in the institute, if they cannot be addressed effectively.

Since the goal in gathering data for this project was to raise as many relevant issues as possible and to gain a sense of their richness and texture, statistical analyses are not presented and would not be appropriate. In general, the findings which are presented apply across collegiate and unit boundaries. More isolated but still significant findings are noted as such.

Needs

Three audiences were consistently identified as of great importance: practicing professionals, nontraditional students and upper-division undergraduates, and the institute faculty itself. There was agreement that while these groups are currently reached, oftentimes they are underserved; and, the need to reach them will continue.

Addressing the needs of the practicing professional will require a combination of credit coursework at graduate levels as

Box 2. Discussion of Technology Options.

INTRODUCTION

During the course of the project, the feasibility of using several telecommunications systems has changed. In some cases, technology-related developments are the cause; in others, the educational and political climates have changed. The technologies discussed here reflect these changes and anticipate others. Possible technologies are grouped in three categories: short-term (less than one year), mid-term (one to five years), and long-term (1993 and beyond).

Within each category, the options are listed in order of their potential to serve the high-need audiences previously identified. In reality, a combination of technologies and options will be required. Facilities and activities in specific parts of the state may make certain options more or less attractive.

SHORT-TERM

In the short-term, courses which lend themselves most readily to electronic delivery are those without lab or extensive field work requirements. Ideally, these will be courses (or programs) which have simple visual supports that do not require much motion.

Option Group One (Audio)

That systems for audio delivery be implemented. Options might include:

Audio cassette. Cassettes would be supplemented with print and/or a limited number of face-to-face meetings with the instructor. This could be accomplished by bringing students to the St. Paul campus or sending instructors to other institute sites where the course/program is offered.

Radio. This might include all class sessions being broadcast or might include a combination of broadcast lessons (for example, those that would also have wide public interest) and cassettes. Supporting materials would also be needed.

Audioconferencing. Through a conferencing bridge, up to 40 students could meet with each other and the instructor for discussions to supplement either of the preceding options or to stand alone. This option will work best when students have had prior face-to-face inter-action and when high-quality supporting materials have been sent to students in advance.

FM radio/TV subcarrier. Broadcasters who are not interested in carrying informal or for-credit University courses on a regular basis, might be more interested in leasing their subcarrier for this purpose. A special signal can be sent out in coded form as part of the audible broadcast signal. Students would need an inexpensive decoder to capture and make the special signal audible on their sets. (This is the technology used for "talking book" services.) Additional supports, as noted above, would supplement the audio component of the course/program. Because of the additional cost for the decoder, students will have to be highly motivated to accept a course in this mode, and will have to believe that multiple institute offerings will be of interest to them.

Audiographic teleconferencing. This technology which requires a personal computer and phone line at each site allows for "illustrated lectures" by sending simultaneously a computer signal and human voice over a single phone line. "Illustrations" are computer graphic files (EGA) prepared in advance and distributed on floppy disk. The system allows any site to "takeover" instruction encouraging learner participation.

Option Group Two (Video)

Three options for delivery of a course/program with video appear feasible.

Use of UNITE. The Institute of Technology has been using an instructional TV system for some time. Licensing of an additional four channels (four channels were already operating) results in excess capacity that can be made available to others in the university community. This system reaches several major employers in the Twin Cities metropolitan area as well as the Rochester Continuing Education Center with one-way video and two-way audio capabilities.

Use of existing two-way TV systems. There are a number of operational two-way TV systems in the state available for instructional uses. Most of these are located in secondary schools and are used for K-12 purposes during the class day. Late afternoon or evening classes could probably use these systems without incurring significant charges for building, operation, etc. Again, it would be necessary for the instructor to travel to an origination site tied into one of the systems.

Use of satellite video teleconferencing. This could be a stand-alone option or it could be a supplement to one of the audio options. Origination could take place on campus (a studio) or there is possibility of origination from another on-campus site – for example, a laboratory. Production expenses would range from $100 to $1000 per minute depending on the level of pre-production required. Uplink costs would be $400 to $700 per hour; there would be direct costs at many potential downlink sites as well but probably only in the range of $100 to $200/

Box 2. Discussion of Technology Options (continued).

site regardless of length. Selected institute sites would need to be equipped with receive dishes at a cost of approximately $3000/site (C-band) or $6000/site (Ku-band).

Option Group Three

Nontraditional delivery pattern. Vocational education and other university units have had some success in delivering courses outside of the typical 45-minute time block. Alone or in combination with one of the previously identified options, it would be possible to teach a course in such a way that students are required to come together (face-to-face) only two or three times. Combined with one or more of the other options this would allow delivery of a laboratory course or some other content that requires a hands-on experience.

Option Group Four (Computer)

Computer conferencing. A course/program fully deliverable by computer would require extensive redesign and significant levels of support from instructional designers and computer programmers. However, computer conferencing would be a useful adjunct to one of the other identified options. Ideally, a computer conference would allow student-student interaction as well as student-instructor interaction. If conducted asynchronously (that is, not in real time), a computer conference does not disadvantage participants whose keyboard skills are weak. There is some research evidence that suggests that his type of conferencing limits situations in which one individual monopolizes either classroom discussion or discussion conducted through the usual audioconferencing techniques.[1] It is also effective in situations where status differences among participants would serve to inhibit certain individuals. This is especially t ue when participants can see the comments of all other participants without learning their identities.

Electronic mail. In a manner similar to computer conferencing but better suited to focused instructor-student interaction, electronic mail would allow for on-going, personal, confidential communications between two individuals. It could supplement many other technologies and serve in lieu of on-campus office hours.

MID-TERM

Fiber optic networks will be the technology of choice for delivery of distance education. Within four years the backbone of such a statewide network may be in place. Useful segments will be available in the next two years.

Option Group Five (Integration)

Integrated campus system. Integrated voice, data, and video systems will be required for the university and the IAFHE to remain competitive with other education providers. Tne institute should pursue the possibility of assignment of excess fiber optic capacity, installed as part of the "new" campus phone system, for instructional use. This capacity could be used to offer courses/programs on St. Paul and Minneapolis campuses simultaneously.

Development of off-campus linkages. Fiber and microwave technologies will make it possible for institute instructors to teach via other metro-area, two-way TV systems without leaving campus. This capability would also be improved if the St. Paul campus was linked interactively with either of the cable providers who have "drops" adjacent to this campus.

Origination facilities in St. Paul. As new construction and/or major remodelling occurs on the St. Paul campus, consideration should be give i to creation of classroom(s)/facilities equipped for the origination of interactive instruction. (This should also be considered for selected non-St. Paul IAFHE sites.) In addition to proper lighting and acoustics, purchase of cameras, mixers, and basic editing and production equipment suitable for instructional quality video presentations will be required.

In the mid-term, options one through four will continue to be useful avenue for the delivery of courses/programs to high-need audiences.

LONG-TERM

The long-term picture for distance delivery is similar to the mid-term with more detail and increased options. Most secondary and post-secondary education institutions will be able to originate and deliver electronic programming. Some experts are predicting that many individuals will be able to participate in interactive programs from their homes or places of employment.

However, audio and videotapes, computer-assisted instruction, and technology-enhanced correspondence courses will still have a place in the distance delivery technology mix. With continued strong competition for "leisure" time, individuals will want to choose not just the place but also the timing of their continuing education.

Notes: [1] Hiltz, S.R., Johnson, K, and Turoff, M. (1986) "Experiments in Group Decision Making," Human Communication Research, 13(2), pp. 225-252.

well as extension programs which provide skill or knowledge updating. The majority of groups associated with this audience are located in institutional settings (e.g., secondary and post-secondary education institutions, cooperatives, social service centers, etc.). Many are located in Minnesota and are significant to Minnesota's economy and well-being. Others are located in adjacent states, nationally, or internationally.

For some departments/programs the potential professional audience is large, numbering in the thousands; for others, it is small but important. The individual members of this audience are presumed to be highly motivated, and a main barrier they face in accessing the institute's education offerings is distance. Some IAFHE units fear that if programs for these groups are not implemented immediately and successfully, education providers from outside Minnesota may step in to fill the perceived gap.

Because they are working in (primarily) institutional settings, this audience can be reached through technologies and systems that are more likely to be found in organizations. This should not, however, preclude those technologies which are more individualized and home- or office-based.

The nontraditional undergraduate audience was often identified. Among the subgroups mentioned were: graduates of two-year institutions; urban students, including minorities, who may not be aware of institute opportunities without some intervention; and working adults who may or may not overlap with the first subgroup. While parts of this audience may be accessible through institutional sites (schools, colleges, employers), there is probably need for some delivery through individually directed media. Distance delivery will not by itself meet the needs of these groups, since distance is not the only significant barrier preventing access to current university programs.

Although Continuing Education and Extension (CEE) has not focused energies in greater Minnesota or on this audience, it is similar to some groups CEE does target. A plan for greater coordination between CEE and the institute is under development and may provide significant opportunity for better serving this audience. (CEE recently established a committee to look at its options in moving forward with more technology use in delivery of its programs.) Resources such as television production facilities and staff (managed by CEE's Media Resources) may be used by the institute in exchange for CEE access to delivery sites or technologies located in greater Minnesota.

The institute faculty is an audience for graduate-level, degree-related coursework (especially extension agents); for professional updating through, for example, pro-seminars conducted by University of Minnesota faculty or others (potentially all); for enrichment of the traditional classroom experience through greater participation by individuals at non-St. Paul locations; and for specialized, non-degree training (specialized agents and coordinate campus faculty).

A need for administrative and programmatic communication among institute units was apparent, as was the need for academic interaction. The vitality and strength of IAFHE educational offerings arise, at least in part, from the scholarly collaborations of faculty in research, teaching, and service (extension) regardless of their geographic location.

Certainly there is overlap between the first and third high-need audiences and possibly among all three. Aside from strong need to reach particular audiences, no other need identified by the present research were found to relate to distance delivery.

Opportunities

Opportunities identified in the study fall into two categories: probable facilitators of technology adoption and probable benefits to other populations of such adoption.

Many of the strategies and planned outcomes described in the collegiate planning documents, and now named as priorities by the university, will facilitate the move toward identification and adoption of appropriate educational technologies. Project Sunrise and other less articulated plans for curriculum review and revision will provide incentives to departments and individual faculty members to redesign courses and whole knowledge bases for delivery in nontraditional, non-classroom settings. Downsizing due to decreased enrollments should allow some faculty to be reassigned to distance delivery efforts. As resources are reallocated, redesign and efficient delivery of certain types of courses appear less to be "mere" opportunities and more as necessities. Undergraduate "service" courses, and those which may be used to meet graduation requirements -- for example, in the College of Liberal Arts -- should be among those considered for mediated delivery, especially as they overlap with the needs of nontraditional undergraduates.[5]

Another TDC project (to improve identification, access, and successful use of satellite-delivered programming) -- although it focuses on educational programming produced elsewhere -- also presents opportunities to collaborate on origination of IAFHE education efforts, especially those contributing to professional updating.

Barriers

Perceived barriers to greater use of telecommunications technologies ranged from the nearly ridiculous to the possibly insurmountable. The three issues which came up across colleges and units were time, money, and fear. Also, common wisdom has told us that younger faculty members, provided they have achieved tenure, will be most likely to welcome new technologies, or at least accept them, and that older faculty members will be likely to avoid new technologies at any cost. Department heads and other informants raised this as an issue, but in many cases believed it would not be true of their colleagues.

Concerns about time surfaced in several forms. One, that curriculum revision will be an add-on activity and that greater time requirements to allow for redesign for technology-mediated delivery will not be acknowledged. A second concern was that, at least initially, greater amounts of time (especially for course set-up) would be required to deliver a course or program using technology. A third issue related to time was the possibility that courses would have to be offered at "less convenient" times, for example, early morning, evenings, or weekends.

In viewing money as a barrier, informants voiced concerns about absorbing the real -- even if indirect -- costs of course

redesign. They also identified the high cost of hiring media developers and computer programmers. Few had any ideas about options for funding these particular types of activities. There was a general perception that most technologies would be too expensive to consider, especially in light of their short "shelf life." Since few of the faculty have had experience with educational technologies, except as an adjunct to traditional classroom delivery of a course or program, they had difficulty in identifying how technology for distance delivery could be anything other than an addition to what they were already doing. Thus, they tended to believe that all existing costs would remain and be increased greatly by the additional technology-related costs.

Even when it was not raised as a financial issue, lack of access to technical support was a clear barrier. Faculty members without extension appointments expressed envy at the computer support available to their extension colleagues, not just support for equipment purchases but on-going user/technical support.[6] Several informants commented that computing services and media resources (e.g., television production) personnel were both physically and academically "remote" from the St. Paul campus. As the larger of the Twin Cities campuses, Minneapolis is home to the university's video production unit, micro-computer assistance center, and various other specialized resource centers. Despite the less than three-mile distance and the existence of a free, intercampus bus service, St. Paul campus faculty members do not often travel to or otherwise interact with Minneapolis campus centers, nor do those based in Minneapolis make frequent use of St. Paul resources.

Fear of technology is potentially a barrier for some portion of IAFHE faculty and staff. Unwanted adjustments in teaching practices, concerns about negative impact on the tenure and promotion process, and legitimate questions about educational quality all arose with the discussion of a technology or system in the institute. Technical support, a sequenced phase-in, training, and exposure were recommended to remove many of the fears.

Obstacles identified by this study are consistent with those found by Raymond Lewis in a 1985 Annenberg/CPB Project.[7] Faculty in that study participated in focus group sessions held at 15 colleges and universities throughout the United States. Among the obstacles Lewis identified were: lack of funds, lack of access to hardware, insufficient incentives and rewards, lack of training, and lack of descriptive/evaluative information on available courseware.

Options

Based on the data collected from informants, previous research findings, and TDC staff knowledge of technologies and systems available or planned for Minnesota, a lengthy set of options was prepared. These options are summarized in Box 2. The options represented a range of technologies and potential, but all showed promise as a means of reaching the high-needs audiences which the study had identified.

One of the strategies used in presenting options was to indicate others at the University of Minnesota (or other educational systems) who would be likely collaborators in using the

same or similar delivery system. Though this component was often known only through anecdotal means (e.g., inquiries from other units referred to TDC), it served to reinforce feasibility and lessen perceptions that certain technologies were still many years from being usable or useful. Use of educational technologies, especially interactive television, in Minnesota's K-12 school districts have been extensive and have also served to reinforce notions of feasibility for some faculty.

Another strategy used in the report was to examine a number of statewide activities in the area of distance/electronic delivery and to use these as a context for raising significant policy issues. These issues ranged from the need for university and inter-system coordination to specific policies relating to the awarding of graduate credit for non-classroom or off-campus offerings.

ACCEPTANCE AND SUPPORT
(Phase Two)

Phase Two in the strategy for technology adoption had two parts. One part included extensive circulation of the plan and a request for comments and reactions. This encouraged many academic departments and other units to hold discussions of all or portions of the plan resulting in identification of a few new opportunities and strong general awareness of the topic of distance/electronic delivery.

The second part of Phase Two strategy had the executive council reviewing the recommendations and considering several in depth. Ultimately, this body -- after requesting information and reviewing various levels of video teleconferencing and two-way television -- decided to support small-scale use of several low-cost options and to concentrate on a major budget request to support one-way video teleconferencing via satellite with two-way audio for student-instructor and student-student interaction.

A budget request underwent university review and as a result, an appropriation request was developed for the 1989 legislative session. The request included capital expenses to install an uplink and over 100 receiving dishes, to create a classroom and studio for program origination, and to purchase the equipment necessary to develop and produce broadcast-quality video. The budget also included recurring funds to staff and operate the facilities, to cover the costs of course redesign, and to secure faculty release time for new course development.

Policy Issues

At the same time that the budget was under development and review, policy issues identified in the original report to the executive council were discussed and decisions about whether and how to address them were made. While the study did not set out to undertake a comprehensive review of university policies which might relate to distance education, existing policies which needed review surfaced as did new issues which would need to be considered for policy development.

Among the broadest issues raised was the lack of university-wide coordination. Existing university programs/units can usually be identified clearly as teaching, administrative support, or research; but, Minnesota has academic computing groups, tele-

communications, administrative computing groups, media resources, TDC, etc., operating in various parts of the university structure. Distinctions between academic and administrative units and purposes will continue, but increasingly their communications will overlap. The high cost of telecommunications systems made it imperative that any system or link being developed have the capacity to serve all needs effectively.

Cognizance of the needs of coordinate campuses was weak; the situation with regard to branch experiment (or research) station and county extension offices was even more alarming. The institute wanted to push for either formal or informal coordination. Recent departure of the assistant vice president for information systems, and other adjustments made in staffing the provost's office, presented options but also led to a lack of continuity.

At the time of data collection, three of the state's agencies and independent governmental units were conducting discussions of statewide needs regarding telecommunications in education. Since that time, one agency has refocused its plans and the other two collaborated on a joint needs assessment. The university has not yet identified a structure or other mechanism for coordination; informal but regular contacts among a handful of key players (below the level of dean) resulted in briefings for university decision makers and, in a planning group, the Telecommunications Steering Committee.

A second policy issue of concern related to seemingly unequal graduate school policies governing the assignment of graduate credits to non-classroom-delivered courses. At present, TV broadcast of a master's level course yields graduate credit for qualified students. The same video presentation delivered on tape in the student's home or office and supplemented with the same assignments is not accepted by the Graduate School, but may be taken for credit toward an undergraduate degree or major. This policy will have detrimental impact on the institute's ability to serve the needs of practicing professionals when those individuals are seeking degrees.

A third policy area needing attention was that of instructional support. Access to and the cost of using existing production facilities for video, graphics, or software were two major aspects, but other factors included: a need for consultants (existing faculty or others) to assist instructors in redesigning courses for electronic delivery; technicians and producers to run equipment, edit tape, and troubleshoot; writer/editors to produce supplementary print material; and, in some cases, persons to coordinate remote delivery sites.

The way in which off-campus students will be enrolled and counted is another area of concern. Distinctions between degree seeking and adult-special students or full-time and part-time students may provide disincentives for the institution and/or its students to using distance delivery methods. The issue of who gets to count a particular student and for what purpose is important to colleges, departments, and instructors.

The university will need to consider whether to limit the geographic area in which it will deliver programming. As technologies are improved and expanded, it will become as easy to deliver a program/course at distance of 1,500 miles as at 150 miles. Though most states now have regulatory mechanisms

governing in-state, post-secondary instruction, it is not clear how state education agencies will deal with telecommunicated instruction.

The university may need to consider how it would respond to other universities' "incursions" into Minnesota. Hypothetically, other states could begin recruiting Minnesota's adult students today without asking them to leave home. In practice, few students in Minnesota have chosen to participate in the few existing distance degree programs (for example, National Technological University), but this may be more attributable to lack of awareness of this option than to student preference.

Two other issues to be considered are tenure policies and funding. To the extent that the faculties feel teaching is undervalued in the tenure/promotion process, those faculties will be unlikely to enter enthusiastically into the arduous work of rethinking and rewriting courses. A proposal to move to a semester system could, if implemented, provide the justification for course redesign. Questions about funding include: reallocation versus new sources; tuition surcharges for courses delivered at a distance; chargeback of delivery costs to departments or colleges; as well as others.

Strategies

When the original distance education plan was submitted to the Institute Executive Council, (IEC) five strategies were suggested to prepare for eventual implementation. The suggested strategies were:

1. identification of pilot sites
2. identification of specific courses, programs, and contents for priority delivery
3. further discussion of the merit and potential of distance education
4. engagement of non-educational entities (e.g., employers) in planning for electronic delivery.
5. pursuit of collaborative relationships

Because of conditions within the institute and outside of it, some of these strategies have been pursued more fully than others. An additional strategy was identified when the IEC and subsequently the university's chief executives decided to move forward immediately and to seek legislative funding for a distance education plan.

At this time, none of the strategies has been completed, so it is not possible to generalize about the impacts -- positive or negative -- of adopting these approaches.

Identification of Pilot Sites

As part of this strategy, several efforts are underway. Under the auspices of TDC, up to 10 sites will be participating in a study of satellite delivery of educational programming. These sites have access to or will be equipped with satellite receiving dishes. Detailed records of participant outcomes (learner and staff) are planned along with activities which will measure: geographic areas served, success of various marketing approaches, impacts on normal site operations, and other variables.

Another major effort has been the establishment of a faculty study committee to develop the concept of "area research

and extension centers" and to make recommendations concerning the locations, roles, staffing patterns, and funding. While the study committee has not yet produced its final report, it appears that these centers will be key elements in providing student services and other resources to distant learners. Branch experiment stations, other university facilities, and other existing post-secondary sites are under consideration as possible centers.

In any case, the actual identification and activation of centers/sites for distance education will have to be accomplished as a phased process and undertaken in consultation with Minnesota's Higher Education Coordinating Board, which has responsibility for articulation and coordination of the state's post-secondary education mission.

Identification of Specific Courses, Sequences and Degrees

No concerted activities are underway, but individual departments may be considering this issue as part of their internal planning efforts. Development of at least two tele-mediated courses has proceeded far enough that additional funding support has been requested. Possible use of existing K-12 interactive television systems in greater Minnesota for delivery of credit courses is also being discussed. Such use is already being made for delivery of informal educational programs such as those provided by extension.

As part of this strategy, discussions need to be undertaken concerning how much education can and will be delivered at a distance. Total degree programs (undergraduate or advanced), high demand courses, core courses and programs, selected disciplines, etc., are all possibilities. Which should come first? Which not at all?

Further Discussion of the Merit and Potential of Distance Education

Ideally such discussions would take place via a range of forums -- faculty governance structures, other committees, department and college meetings, etc. -- but address a common set of issues. Both of the Annenberg/CPB studies previously referenced suggest at least some of these issues:

A range of . . . faculty issues needs to be treated if faculty are to be involved in the technology planning. Articulated policies regarding faculty involvement in technology, faculty incentives for using technology such as compensation or teaching load adjustment . . . the institution must avoid penalizing faculty members who use technology . . . .[8]

There was a general consensus that information technologies should be used primarily to supplement faculty. They do not want technolo   to perform functions they already perform well on their own or with textbooks.[9]

The degree to which these and other issues have been raised varies by college and department. It is probable that some members of the faculties are still unaware of the discussions and, indeed, the plans for distance education.

Engagement of Non-Educational Entities in Planning

Considerable activity has been undertaken within this category. Major employers in public and private sectors have been engaged in discussions with deans, department heads, and directors of graduate studies. Some of the elements of these discussions include location and scheduling of courses and programs, tuition and/or other fees, and input as to specific programs desired.[10]

Pursuit of Collaborative Relationships

Collaborative efforts can be cost-effective, increase the total instructional resource, and result in more appropriate service to clientele (students, consumers, employers, etc.). In-state collaboration will be discussed more fully in the next section of this report. Preliminary explorations of cooperative activities, especially with other Land-Grant institutions in the upper midwest, have been initiated. Existing relationships, for example among cooperative extension units or North Central Region research committees, might provide a basis for expanded activities.

State boundaries are imperceptible to electronic delivery mechanisms, but they represent very real obstacles to both institutions and individuals.

Support

Even before university administrators decided to expand the institute's plan to the total University and to pursue legislative funding (Summer 1988), the institution had been involved in a wide range of statewide planning efforts for telecommunications. Minnesota is known for commitment to an educated citizenry. The state's post-secondary community includes the University of Minnesota (six campuses); a State University System with seven campuses; a community college system (18 sites); a two-year, technical institute system (34 sites); 33 private colleges and a variety of seminaries, teaching hospitals and proprietary schools. Minnesota's K-12 system of education is among the best-funded in the nation and has consistently been an innovator in uses of appropriate educational technologies.

With such a wealth of educational institutions, and a corresponding array of governing and advisory boards, coordinated planning and cooperative efforts require complex and often time-consuming consultation. That a statewide telecommunications network (STARS for State Telecommunications Access and Routing System) proposal has now reached the legislature with support from educational systems and key state agencies (including finance, planning, and administration) is indication of the effectiveness of such consultation.

During 1987 and 1988, university representatives participated in at least eight, simultaneously active committees considering the network or related statewide issues. Numerous local and regional groups were also meeting to develop component plans, and many, though not all of these, included university representation. Several committees with agency and system representation will continue to meet, consult, and lobby until appropriations and a management structure are established via legislative action.

Internally, the university has taken steps to prepare for the availability of a system to facilitate distance delivery of education. In August 1988, a Telecommunications Steering Committee was established to recommend policies related to telecommunications for instructional, research, and administrative uses. This group, as well as TDC and others, has undertaken briefings for key administrative staff, has initiated contact with

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faculty governance structures, has developed plans for informing faculty members about telecommunications, and is working to describe current uses and immediate needs (including instruction) for telecommunications infrastructure and facilities.

As this article was prepared for publication, legislative decisions had not yet been reached concerning the level of new funding for the university's distance education activities. But, in preparation for university-wide distance education implementation, the academic affairs office is working to expand IAFHE planning efforts to the university as a whole. As a part of this process, policy issues will be examined and changes recommended as necessary.

CONCLUSIONS

Until funding decisions are reached and a distance delivery system implemented, the project cannot be termed a success or failure. Even if funding and implementation were to be delayed, some would argue the success of the project based on the beneficial impacts it has had on overall planning for distance education.

From TDC's involvement in this project and its involvement in a number of other technology demonstration projects, several factors seem to be emerging as critical to the success of such efforts. It would be premature, at this time, to describe these as guidelines, but they can be presented as strategies to consider.

Planning
1. Secure administrative support for the technology-based initiative.
2. Involve key players/representative groups throughout the planning process.
3. Allow adequate time.
4. Structure the process to allow for discovery of the unexpected.

Implementation
1. Sequence the implementation.
2. Consider implementation of low-to-moderate priority components first. (Select your risks carefully!)
3. Allow innovators and early adopters to implement first; they are interested enough to stick with the initiative through any difficulties.
4. Solicit and use peer recommendations and testimonials.

Maintenance
1. Provide adequate training and technical support, especially necessary as one move from early-to-mainstream adopters.
2. Ensure that key administrators and others share realistic expectations about the real costs of supporting the initiative over the long term.

NOTES
[1] The colleges of Forestry and Home Economics have adopted new names in the past year. For the sake of convenience and continuity, this report will refer to these colleges as well as the institute by the names in use as the project began in 1987.
[2] McGill, M., & Jonsen, R. (1987) State Higher Education Policies in the Information Age. Boulder, CO: WICHE.
[3] Hezel, R.T. (1987) Statewide Coordination of Educational Telecommunications. Executive Summary. Washington, DC: Annenberg/CPB Project, p. 7
[4] Telecommunications Development Center. (1986) Minnesota Technology Resource Notebook. St. Paul, MN: Minnesota Extension Service.
[5] Service courses are those which IAFHE colleges provide to meet graduation and/or major requirements in other departments and colleges.
[6] Since 1983, the Minnesota Extension Service has operated the EXTEND project which provides: financial support for microcomputer purchases, training in computer use, technical support for software development, and user support.
[7] Lewis, R.J. (1985) Faculty Perspectives on the Role of Information Technologies in Academic Instruction. Executive Summary. Washington, DC: Annenberg/CPB Project, p. 3.
[8] Hezel, p. 7.
[9] Lewis, p. 4.
[10] For example, university engineering courses taught over a microwave TV system linked to employing organizations in Minnesota and Wisconsin currently carry a "distance delivery" surcharge and require employers to finance all receiving equipment.