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ABSTRACT

This paper describes the way in which the University of Lowell Instructional Network is being used to provide local schools with access to the university's facilities and faculty. The STAR (Science Teachers Accessing Resources) program is described in detail from its inception, through the planning stages, culminating in two-way television transmissions. The benefits of this program for schools and university alike have proven to be many-fold, including increased collegiality between university faculty and local school teachers, heightened interest of students in science, and collaboration providing an opportunity to recruit students to the university and, in particular, to the science programs. (13 references) (EW)

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LINKING SCHOOLS TO UNIVERSITY RESOURCES VIA INTERACTIVE TELEVISION.

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ABSTRACT

This paper describes the way in which the University of Lowell Instructional Network is being used to provide local school with access to the University's facilities and faculty. The STAR (Science Teachers Accessing Resources) program is described in detail from its inception, through the planning stage and culminating in two-way television transmissions. The benefits of this program for schools and University alike have proven to be many-fold.

INTRODUCTION

Instruction via two-way television is a curriculum component of educational institutions in many parts of the United States. At the University of Lowell the medium provides elementary and secondary teachers access to the varied resources of the University, with the potential to satisfy all curricular needs. In particular the STAR (Science Teachers Accessing Resources) program illustrates how students in local school systems actively participate in the design and execution of experiments using instrumentation otherwise unavailable to them. This application serves to distinguish the University of Lowell Instructional Network (ULIN) from other two-way television networks.

Two-way television is commonly used in secondary schools to offer advanced level courses to students at several sites who would otherwise be unable to receive instruction. This has been particularly important in rural areas where scarcity of resources has been alleviated by its use. (1). The states of Illinois, Wisconsin, Iowa and Minnesota among others have florishing two-way television networks for this purpose (2). Some networks have also givin high school students access to college level courses and provide school drop-outs with the opportunity to study for the General Equivalency Degree in the evenings (3). Only a few documented cases of the use of two-way television in elementary schools are available. Irvine, California has linked thirty-one locations in Elementary, Junior High and High schools and used the technology in a variety of ways including a cross age tutoring program in mathematics, and as a means to connect non-english speaking students with an English language instructor (4). Higher education establishments have also embraced the capabilities of two-way television. At Texas A & M University medical students on two campuses receive lectures via this medium (5). while at Buena Vista College, Iowa, many sites on the campus are linked for instruction, conferences etc. (6).

THE UNIVERSITY OF LOWELL INSTRUCTIONAL NETWORK

The University of Lowell Instructional Network was established in 1984 by the Center for Field Services and Studies in order to deliver instruction to elementary and secondary students and inservice opportunities for teachers. At the Center of the network is the University surrounded by a cluster of schools; 3 comprehensive high schools, a vocational school, and 7 elementary schools. A transmission may emanate from any room of facility of the University's four campuses by means of the institutional broadband cable network. It is then sent by a combination of subscriber cable networks and microwave technology to the various school systems. Many two-way television transmissions have originated from the Center for Field Services and Studies itself, which has a room specifically designed for the purpose. The equipment for two-way instruction consists of three color cameras placed in the desired positions before each transmission; one focused on the instructor, one on the students and the third placed above the head of the instructor in order that he/she might focus on demonstration materials or other visual aides. A special effects generator allows the instructor to switch between cameras and select the image to be transmitted to the distant site. Two monitors and a ceiling mounted projection television enable instructor and students to view the students at the distant site and the image being transmitted to them. Strategically placed microphones allow for clear verbal interaction.

The first transmission emanating from the Center were delivered by faculty and graduate students from the College of Education. These were directed toward providing lessons which enhanced the work occurring in classrooms while demonstrating models of effective teaching (7). Students were brought to the Center form a school system not connected to the instructional network, and participated in lessons with students ar a distant site. Exposure to instruction via two-way television delivered by the University of Lowell enabled school districts to recognize the medium's potential for providing their students with unique instructional opportunities employing the varied resources of the University. Thus evolved a collaborative association between the University of Lowell and local schools. To date, faculty from the departments of mathematics, chemistry, radiological sciences, administrative affairs and education have conducted interactive television classes with high school students and the departments of music and health sciences are also planning such ventures. The transmissions which have been developed through the STAR program have proven to be particularly successful.

STAR (Science Teachers Accessing Resources)

STAR is a collaboration between University and school faculties. It has resulted in the design and implementation of unique science experiences for local schools utilizing the faculty and facilities of the College of Pure and Applied science through the medium of two-way television. The experiments which have been transmitted or are planned for the 1987-88 academic year are shown in table 1.

STAR began in early 1987 mediated by instructional Network staff at the Center for Field Services and Studies. Since that time Network staff have acted as facilitators in order to:

assist school personnel in identifying areas of the science curriculum which may be enhanced in this way.

enlist the cooperation of University faculty and staff

arrange collaborative planning sessions

schedule each science program

TABLE 1

STAR experiments performed or planned for transmission via the ULIN

Experiment	Grade	# Students at reviving site(s)	
Irradiation of Aluminum	9	25	two separate transmissions
	12	22	
High Performance Liquid Chromatography	11	25	
Mass Spectrometer	11	28	
Electron Micrography	10	25	two separate transmissions
	10	27	
Meteorology	8	43	one transmission
	8	25	

Planning for STAR transmissions

The success of each STAR transmission depends on meticulous planning, commencing with collaborative meetings attended by science curriculum coordinators, classroom teachers,University faculty and staff and the Network coordinator. Discussion is centered around the design of an experiment appropriate for the needs and abilities of the students as well as suitability for transmission via two-way television. Preliminary lesson plans are written to meet the experimental and technical requirements identified at this meeting. Pre-lab sessions to be conducted at the schools are designed to review or to teach the skills necessary to enable students to participate actively in the experiment. These sessions are conducted by University faculty. Additionally, preparation of sample materials to be used during the experiment may be required. This is achieved during a scheduled laboratory period providing students real involvement with forthcoming experiment.

Scheduling the transmission often proves to be one of the hardest aspects of planning. In general University faculty have conducted the transmission at a time chosen by the school, but as program activity increases on the Network it may become necessary to negotiate a mutually convenient time between schools and University.

Since all rooms and laboratories within the University are wired by broadband cable, Instructional Network staff merely install requisite two-way television equipment in the room assigned for the experiment. School counterparts either wire the students' assigned classroom or arrange an alternative room assignment on the day of the experiment. This technical configuration is completely tested the afternoon before the scheduled broadcast.

The Transmission

The Universty faculty begin each experiment with a recapitulation of pre-lab procedures in order to involve students in the experiment from the outset. Students are encouraged to ask questions and to record instrument readings which will be required for analysis of results. A facsimile machine is used to transmit hard copy of graphs which have been generated by the equipment at the University, thus adding another dimension to student involvement with the experiment. In all cases, experiments are designed to replicate a real world application of the instrumentation being employed and the scientific concept under study eg. HPLC (High Performance Liquid Chromatography) tested the caffeine levels of popular sodas.

Experiments usually conclude with University and school faculties setting an assignment that requires analysis of the data collected. High school teachers assume responsibility for evaluation of student learning according to existing class standards.

THE IMPACT OF STAR ON SCHOOLS, UINIVERSITY AND STUDENTS

Collaborative efforts such as the STAR program are of value to school districts and universities alike and have been encouraged in nationally commissioned reports. (8). Similarly, state officials such as the Governor of New Hampshire, John Sununu, have called for the establishment of "...cooperative programs between universities and public schools, in which the insights, expertise and creativity of individuals in both kinds of institutions are honored and encouraged" (p222) (9). Collaboration of this kind has potential benefit for the students receiving instruction, and for the professional development of all involved faculty. The STAR program is no exception to this.

The success of the STAR program is not restricted to the gains in student understanding of the concepts presented, for the benefits it has created for University and school faculties alike cannot be over emphasized. Prominent among these is the increased opportunity that the program provides for the development of collegiality among and between the faculties of each institution. Teacher isolation and lack of exposure to advances in their field are features which characterize deficiencies in the teaching profession (10). STAR represents a way in which these deficiencies may be alleviated by linking teachers with University faculty and giving then access to resources and the opportunity to update their knowledge. In addition, planning for STAR transmissions requires the cooperative efforts of all involved. Further advantages for teachers are gained through the opportunity to observe differing teaching styles and to watch their students interacting with a variety of instructors.

The literature attests to the fact that students experiencing instruction via two-way television learn as well as their peers in ordinary classes (11). and that they do not find the medium to be impersonal or two-way teachers remote. In Iowa an evaluation of student attitudes to two-way television found that the overwhelming majority of students "experienced no more problems in the televised class than did in traditional classes", and that students "believed they accepted more responsibility for their behavior and learning." (p, 40) (12). Similar positive attitudes to two-way television instruction have been reported by the teachers and students involved in the STAR program. Further, it is believed that because STAR offers students the opportunity to see and be involved in the application of science concepts about which they could previously only read, their interest is heightened. Increased interest in science together with exposure to the facilities and faculty of the University may encourage students to consider further study of science at the college level.

If teachers and students benefit from the star program so too does the University. It is hoped that collaboration with local schools will act as a means of recruiting students to the University and in particular to the science programs. Ishler and Leslie, reporting on the collaboration between Texas Tech University and Lubbock Independent School District, state that "... universities have recognized that, by making their human resources available to the public schools, their own educational programs would be enhanced" (p615) (13). In particular Texas Tech University saw their collaborative efforts as a means of recruiting more minority students to the university. The need to recruit students of all ethnic backgrounds to the University of Lowell has also been a factor in encouraging university departments to involve themselves in two-way television transmissions.

CONCLUSION

The collaborative venture between University and schools represented by the STAR program is proving to be a successful model for an innovative use of two-way television. The University of Lowell, in common with other universities having links with two-way television networks, continues to offer college level courses to high schools, but we believe that we are unique in preparing transmission specifically designed for K-12 students. The ULIN has allowed the University to reach the community it serves and to share its resources and expertise.

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ABOUT THE AUTHORS

MARGARET McDEVITT is the Instructional Network Coordinator for the Center for Field Services and Studies, University of Lowell and an adjunct faculty member of the College of Education. Her responsibilities include the development and management of the Instructional Network which links the University to local school systems, and teaching courses concerned with the integration of technology with curriculum. In 1986 she collaborated with elementary teachers on the development of a computer curriculum which was supported and funded by Apple Education Affairs. She began her professional career as an elementary teacher before returning to the University of Lowell to receive a Master's degree in Education. She is currently working to gain a doctorate in Leadership in Schooling.

ANITA GREENWOOD is a Lecturer in Science Education at the College of Education, University of Lowell. She is responsible for supervising high school student teachers, as well as for directing and training elementary teachers in the use of activity-based science experiences for the classroom. During 1986/87 she presented science lessons via the University's Instructional Network and orchestrated liaison between the University's science faculty and local schools. She holds a Master's degree in Education and served as Chair of the Biology department in a British secondary school prior to moving the the United States in 1983.

Appendix 16

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