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ABSTRACT

A state department of education funded 14 Centers for Professional Development and Technology (CPDTs) to establish teacher preparation programs that are technology enhanced and field based. The restructured programs were required to be collaboratively developed, with classroom teachers comprising the largest single constituency group. This paper analyzes the impact on one of the college partners of the CPDT, when a grant representing approximately 20 percent of the college's state appropriated budget was awarded to restructure its teacher education programs. Funds from the grant provided 1.4 million dollars for technology equipment that was placed in eight school sites of five school districts and two colleges of education. Equipment included microcomputers, multimedia development stations, college-wide computer networks, and compressed video systems. Faculty workshops on technological applications at the college were not heavily subscribed and few faculty were using the featured software and skills after 18 months of the project. One faculty plan for restructuring teacher education recommends that teacher candidates proceed through three stages in order to become accomplished classroom practitioners with technology: learn about technology, learn from technology, and learn with technology. The paper concludes that the process of changing attitudes and cognition toward technology integration has been very challenging for the college faculty, even though adequate financial resources have been made available. (Contains 13 references.) (JDD)

Impact of a Technology Integration Grant to Restructure Teacher Education on the Faculty of One College

by

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A Progress Report of the Impact of a Technology Integration Grant to Restructure Teacher Education on the Faculty of One College

Teacher education faculty have traditionally accepted and worked within the constraints of very limited funding to accomplish the societal need of providing sufficient numbers of teaching candidates for the nation's public schools. With the advent of the "information age" during the past decade, citizens, corporate leaders, and government officials have become increasingly concerned with preparing students to join a competitive and productive workforce for today's international market economies (SCANS, 1992). Whether teacher preparation programs are preparing teachers with requisite technological skills to guide tomorrow's leaders is a major question. The lack of sufficient resources for preparing teachers has often created an expectation among teacher educators that they must go about their business in a very labor intensive way with very modest expectations for what can occur in today's classrooms. Rather than seek promising technological applications for storing, retrieving and presenting information from around the world in milliseconds, teacher educators have relied on textbook-based instruction because of the ingrained assumption that funds are not available to provide high-technology classrooms. Thus, the recurring lack of sufficient resources has created a stifling mindset that anything new - especially distance learning and multimedia enhanced instructional systems will be prohibitively expensive and thus not available in classrooms. By receiving substantial funding to acquire and implement distance learning technology and multimedia based instructional systems, teacher educators in one state are being challenged to re-examine longheld views on the nature of their work and the world of

the classroom. It is thought a re-examination of old assumptions will occur as they work with current classroom teachers, staff development specialists, corporate partners, parents and community leaders in developing technology enhanced teacher preparation programs.

If this approach is successful as the state's education department has assumed, this means of preparing teachers will dramatically affect Colleges of Education throughout the state and nation. A distance learning infrastructure will be created for positively influencing teaching and instructional processes. Information technology systems which use full motion video accompanied by sound tracks and instant access to reference materials represent dramatic changes from a textbook as the primary source of information for the classroom. Preparing teachers, both preservice and inservice, to use computer networks, distance learning systems and multimedia instructional systems is one of the outcomes associated with the funding provided to the colleges of education by the state.

Purpose

Over the past two years, the state's department of education has funded 14 Centers for Professional Development and Technology (CPDT's) to establish teacher preparation programs that are technology enhanced and field based. Among the funding requirements by the state was that all phases of the restructured programs[1] be collaboratively developed, with classroom teachers comprising the largest single constituency group. Initial partners for one of the CPDT's were two universities, eight schools from five school districts, two regional education service centers, and a community college. Corporate partners and parents were also involved in program planning and development sessions. Three primary objectives for

this CPDT to accomplish included: (a) obtain and implement evolving technology systems at school sites and colleges of education; (b) provide staff development regarding immediate instructional applications of these systems; and (c) develop teacher preparation experiences that accommodate the characteristics of learners at the schools as well as incorporate technology in their instructional delivery systems.

The analysis in this paper was undertaken to determine the impact on one of the college partners of the CPDT, when a grant representing approximately 20% of the college's state appropriated budget was awarded to restructure its teacher education programs[2]. This analysis has been shaped by the three objectives of the CPDT. Corresponding objective attainment and cost data were collected and interpreted with respect to how these objectives affected one of the member colleges of education.

Procedures

An evaluation plan based on the Context, Input, Process and Product (CIPP) Evaluation Model (Stufflebeam, Foley, Gephart, Guba, Hammond, Merriman & Foley, 1971) was used to provide data for this analysis. Information obtained from implementing processes associated with the **Context** phase of the CIPP model were used in framing the original grant proposal, especially the objectives. Background information concerning the school district participants, descriptions of the existing teacher preparation programs and available technology in the participating colleges of education and status data of educational attainment in the districts and teacher preparation programs were gathered during this phase. Relevant literature was sought during the **Input** phase to inform practice associated with Outcome-Based Teacher Preparation Standards under development

by the state (TEA, 1993), authentic assessment strategies (Kulm, 1990; Wiggins, 1993), multimedia instructional applications (Anderson, 1993; CTGV, 1993; Kozma, 1991), distance learning protocols (Steele, 1993; TAMU, 1993) and strategies for establishing Professional Development Schools (Goodlad, 1990; Holmes Group, 1990). **Process** phase data have been gathered for the past 18 months to monitor the project and provide the data for this analysis. Both qualitative and quantitative data have been collected. Qualitative data include videotapes of classroom observations and collaborative activities, audio tapes and notes from interviews with participants, meeting agendas, meeting minutes, memoranda and other project documents. Quantitative data include information drawn from questionnaires, student achievement scores clustered by grade level and school, teaching candidate performance on certification tests, and technology expenditure data. **Product** phase data will be collected after the programs have been implemented.

Findings

Equipment Acquisition: Funds from the grant provided 1.4 million dollars for technology equipment that was placed in 8 school sites of five school districts and two colleges of education. Table 1 provides a listing of major equipment purchases provided to each school district and college.

Place Table 1 about here

Over the course of the grant, college A has acquired and installed 101 desk-top or portable microcomputers, with 71 computers being provided to faculty[3] and staff associated in some fashion with teacher preparation. Six of the computers have become integral components of multimedia development stations, and 24 computers were acquired to equip an

instructional laboratory with new units. A similar distribution scheme was followed at college B, however every faculty member in this college received a new computer.

Another major investment linked to the computers has been the installation of college-wide computer networks at both colleges. Resources from other sources were used by college A to install the network. Because faculty members were permitted to choose IBM or Macintosh platforms when the computers were purchased, network software was required that enabled users with different types of platforms to communicate. The software that enables the different platforms to share messages and documents have RAM operating requirements that have become the standard across the college when new equipment is acquired. Also, a compatibility issue of transferring documents from computers equipped with different versions and brands of word-processing software have influenced decisions about software licensing agreements and college-wide software management systems. These issues have prompted the establishment of a college-wide technology strategic plan that delineates the management system and budget to maintain the technological infrastructure made possible by the grant. Among the elements of the management system are annual college-wide hardware and software audits. Accounting of equipment and software has become essential in determining the networking capability of workstations and assuring college-wide compliance with software licensing agreements. Another element in the management system has been the employment of three technology specialists to install and maintain workstations, and troubleshoot network problems.

Seven compressed video systems[4] were purchased and installed at an average cost of $76,000 per unit. Thus, a substantial investment was made in establishing distance learning capabilities across the members of the CPDT. Unfortunately, implementation has proceeded more slowly than anticipated with just 6 of the 7 systems being operational 18 months after the grant was awarded. A delay of six months occurred due to an under-estimate of the cost of the systems and monthly line charges assessed by telephone companies. Because monthly line charges were substantially higher than anticipated (i.e., over $2000/month at two of the sites) final installation was delayed until additional funding was available. Other delays associated with line installation to the sites, equipment delivery and various technical difficulties associated with start-up have also contributed to the slow implementation of distance learning capabilities.

As the initial year of the grant progressed, College A faculty who initially did not consider themselves to be involved with teacher education volunteered to participate in the development and delivery of restructured teacher preparation programs. This interest was unprecedented in this college, where tenured faculty have tended to distance themselves from teacher preparation programs. This phenomenon represents not only the influence of receiving a tangible incentive for affiliating with teacher education, but also with the realization that participating in one of the college's major initiatives is professionally as well as personally important and indicative of the change agenda the college has established.

Staff Development: Surveys and interviews conducted with faculty across the school sites and colleges indicated the staff development activities targeting technology applications were very successful at the

school sites given the number of participants served and the instructional applications of technology being applied across the school sites. Survey data collected at the conclusion of the first year of the project indicate that 432 teachers participated in staff development activities related to technology applications in the classroom. The following comments provided by school site participants illustrate the influence these activities have had at the schools. From a junior high school, a participant stated "our teachers worked as teams to prepare interdisciplinary units which could be presented on multimedia equipment. They also worked within their disciplines to develop HyperCard stacks for classroom instruction." From a middle school, a participant noted that 25% of the 6th grade students in that school completed research projects using technology to obtain information from electronic information resources, prepare word-processed reports and subsequently developed HyperCard stacks for presenting their research to their classmates. Finally, an intermediate school participant noted that teachers in this school communicate with one another through their E-mail system and use their network capabilities to download from the TENET system (state-wide computer network) current events from CNN to use in their classes.

Faculty from college A participated in technology staff development experiences during the year. Workshops were conducted that emphasized applications involving ClarisWorks, HyperCard, Persuasion, WordPerfect Office (network software) and the process of scanning print and pictures into computer files. Unfortunately, faculty workshops were not heavily subscribed and few faculty use the featured software and skills in fulfilling their professional responsibilities after 18 months of the project (15 to 20 faculty use presentation software and computer network users number

less than 40). The most effective strategy for providing college faculty with on-line information about software applications has been to establish appointments and meet in the faculty member's office to provide tutorial instruction.

Given the delayed schedule for implementing the compressed video systems across the CPDT, staff development has lagged regarding this innovation as well. Orientation sessions have been held at the operational sites, but extensive experiences on how to use the systems have just begun. At this time (second year of the project), one course is using the compressed video system to bring classroom experiences to on-campus teaching candidates and 38 video conferences (8 multipoint and 30 point-to-point connections) were made during a recent two month period. However, the systems are being used to present twelve other courses by the department that provides distance learning strategies as a cognate area for their graduate offerings in college A.

Program Development: Faculty from college A have responded to a request for proposals to restructure teacher education by submitting four plans that span the preparations of early childhood through secondary teachers and administrators for site-based schools. These plans propose to develop preparation programs during 1993-94 that integrate field experiences in school and community service programs with counsel from parents, care providers and governmental officials. Future teachers and administrators being prepared by these programs must be able to provide interdisciplinary experiences that successfully engage learners with different interests, backgrounds and abilities using current technology systems. This commitment to developing new professional educator

preparation programs has involved 70 faculty members in the development process during the second year of the project. One of these faculty (Zellner, 1994), recommends that candidates proceed through the following three stages in order to become accomplished classroom practitioners with technology. During the initial stage, **Learning about Technology**, candidates would learn about educational applications of technology in formal course work. Here, applications would be presented in an educational context, such as, productivity utilities (word processing, spread sheets, graphics), presentation utilities, instructional materials development, telecommunications, software licenses and public domain software. In stage two, **Learning from Technology**, information and skills acquired in stage one would be modeled by faculty in delivering their courses to the candidates. By observing their faculty applying technology in classes, candidates would learn from particular instructional applications of technology as well as potentially be influenced positively by faculty actually using technology in their classes. In the final stage, **Learning with Technology**, candidates would incorporate technology tools in performing their work as students, that is, in conducting literature searches, retrieving hard-to-locate resources, preparing assignment documents and products, establishing electronic records and files, and preparing presentation resources for project presentations. By learning with technology, candidates begin to realize how important these "electronic academic tools" are to them in performing their responsibilities as successful students and come to rely on these tools in preparing for their instructional reponsibilities. It is hoped that Zellner's technology integration model will be realized in the evolving professional development programs.

Interpretations of Findings

The process of changing attitudes and cognition toward technology integration into evolving teacher preparation programs has been very challenging for the Faculty of college A. This phenomenon has occurred even though financial resources have been available to place current technology systems in offices and classrooms and provide tutorial staff development experiences in the faculty members' office. It is thought this project has been especially trying to teacher education faculty because they are being asked to integrate new methods and technology tools into the curricula of teacher education and share decision authority about the programs with new players (i.e., college colleagues who traditionally have not participated in teacher preparation and colleagues from public schools who are embracing technology very readily in their instructional roles.) Although the dynamics associated with shared decision making with classroom teachers have not been addressed in the findings, these processes have added to the degree of required change that is being assumed by the traditional teacher education faculty. And while the pace has been deliberate in integrating technology into the proposed teacher education curricula, there is strong support and technical knowledge from the classroom teachers to bring the technology integration into teacher preparation through the CPDT project. In this instance, the enthusiasm and support from classroom teachers have fostered a change in the faculty's point-of-view regarding the role of technology in preparing the next generation of teachers.

Note 1: Restructuring is defined by Goodlad (1990) as reexamining the purposes of education, and reworking the structures and

practices of schools and university preparation programs in order to improve teaching and learning.

Note 2: While the grant was made to the CPDT, administration of the grant was provided by the college with an appropriated budget of approximately 10 million dollars. This statement was added to convey the relative magnitude of the grant to the budget of the larger college in the CPDT.

Note 3: Forty-seven percent of the tenure track faculty of the college received 16 to 33 MHz new computers as a result of this grant.

Note 4: Each videoconference system is built around a 386 PC-AT microcomputer that handles processing of the signals from three cameras and six microphones from an analog format to a digital format. This digital signal is then compressed to allow transmission through the T-1 network. At the receiving location, the digital signal is decompressed and converted back to analog signals that are displayed over color television monitors. This "compressed video system" condenses the information in the video picture to a format easily transmittable over the T-1 communications lines.

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Table 1. List of Equipment Items Exceeding $500 in Value Purchased with Funds from Grant

Type of Equipment	COE A	COE B	School District A	School District B	School District C	School District D	School District E	Total
Macintosh Microcomputers								
LCII	22		8	5	10	9	20	74
MacIIsi	21	4						25
MacLCIII	5	18		5				28
MacQuadra 700	1					1		2
Centris 610	4		5	1	4			14
Powerbook 145							2	2
Powerbook 160	14	2	3	7				26
Powerbook 165	4		1			1		6
Powerbook 180	2							2
Powerbook Duo 210	1							1
Powerbook Duo 230	3							3
Total Macintosh Microcomputers	77	24	17	18	14	11	22	183
IBM Microcomputers								
Thinkpad	3							3
IBM PS/Value Point 486DX	18	15						33
IBM PS/2	1							1
Notebook Color Assembly	2							2
Total IBM Microcomputers	24	15	0	0	0	0	0	39
Other Equipment								
Macintosh Duo Dock	3							3
LaserPrinter	9	4	3	8	1	1	1	27
Camcorder	6							6
Laser Disc Player	11			3	3	4	1	22
LCD Panel	3			1		5	7	16
NEC Drive ROM Gallery	1			3		4		8
Color Scanner		2	2	4		1	2	11
External hard drive	9							9
Computer Modem						1		1
Software Server-Appleshare	2							2
Computerboard	2							2
TV						1	2	3
Sony VCR		1						1
Compressed Video	1	1	1	1	1	1	1	7