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ABSTRACT

This report describes a prototype training program developed at Nova Southeastern University, Florida, to provide technology training to adjunct faculty, which comprises 60 percent of the university's faculty. The program relies mainly on self-paced instruction on the use of online information systems and Internet tools, and was structured so that participants would become familiar the university's computing infrastructure--with emphasis on: online access, the use of electronic mail, uploading and downloading files, use of the university's electronic library, file management, use of the World Wide Web and Internet tools, and use of Usenet newsgroups and listserv electronic mail discussion groups. Participants (n=18) in the 12-week training program were asked to evaluate the training videotape and to complete a self-assessment pretest and posttest of online computing skills. The videotape was given a mean rating of 4.5 (on a 1 - 5 scale). Participants' self-assessments showed a 31 percent increase in skill with online information systems. Individual sections of this report discuss the program's background, relevant literature, methodology, results, and recommendations. Appended are the two evaluation instruments. (Contains 60 references.) (DB)

ASSESSMENT OF A PROTOTYPE INTERNET AND ONLINE INFORMATION SYSTEM TRAINING PROGRAM FOR ADJUNCT PERSONNEL REMOVED FROM CAMPUS-BASED TRAINING RESOURCES

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EXECUTIVE SUMMARY

As evidenced by the University's Mission Statement, Nova Southeastern University embraces the use of technology as a means of supporting instruction. Although resident full-time faculty have the opportunity to receive technology training during sponsored campus-based events, access to technology training activities may be more difficult for adjunct faculty who are often removed from campus life during regular business hours. The difficulty adjunct faculty have regarding access to technology training is especially important when considering that over 60 percent of all faculty at the University are not full-time employees, but are instead adjunct faculty.

Recognizing that adjunct faculty generally do not have convenient access to campus-based training activities, a prototype training program was developed by the University's Senior Research Associate and implemented to assess the feasibility of adjunct personnel using largely self-paced instruction on the use of online information systems and Internet tools. The program was structured so that participants would become familiar with use of the University's computing infrastructure, with emphasis on: online access, the use of electronic mail, uploading and downloading ASCII files, use of the University's Electronic Library, file management, use of the World Wide Web and Internet tools, and use of Usenet Newsgroups and listserv electronic mail discussion groups.

Participants were asked to evaluate the training videotape and to also complete a pretest and a posttest on self-assessment of online computing skills. The videotape was judged acceptable, with a mean of 4.5 (1 = Poor to 5 = Exceptional). The mean for all pretest ratings was 3.2 on the five-point Likert scale (1 = No Skills to 5 = Exceptionally Skilled). The mean for all posttest ratings was 4.2 on the five-point Likert scale. Based on self-reported data, engagement in this 12-week training program resulted in a gain from Mean = 3.2 to Mean = 4.2, for a 31 percent increase in skill with online utilities and other tools associated with the Internet and other online information systems.

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BACKGROUND

The University

Nova Southeastern University was chartered by the State of Florida in 1964 as Nova University of Advanced Technology, and in 1967 a charter class of 17 Ph.D. students enrolled at the University (*Nova Southeastern University Fact Book*, 1995). The University is located in Florida's most urban area, with the Miami-Fort Lauderdale population at 3,192,582 permanent residents (*1990 Census of Population and Housing*). Including Palm Beach County, the University is within a 1.5 hour drive for over 4.2 million permanent residents of South Florida (Broward Economic Development Council; *1996-97 Broward County Statistical Profile*, 1996). Field-based programs further extend the University's outreach throughout Florida and at 66 cluster locations in 21 other states in the United States and 13 sites in five foreign nations, including the Bahamas, Canada, Jamaica, Panama, and Germany (*Off-Campus Program Directory*, 1995).

The University has a major physical presence in the South Florida area, with campus facilities in Coral Springs, Davie, John U. Lloyd State Park at Port Everglades, Fort Lauderdale, and North Miami Beach. Including the recently constructed Health Professions Division complex, the book value at end-of-year of the University's physical infrastructure, including land, buildings, and equipment, exceeded $175 million in Fiscal Year 1995-96 (*Integrated Postsecondary Education Data System Finance Survey FY 1996, Form F-1A*; 1996, p.12).

From an initial enrollment of 17 graduate students, the University has closely followed Florida's explosive growth. Serving over 22,000 individual students (unduplicated, cumulative headcount enrollment statistics are presented in Table 1) during Calendar Year 1995, the University reported a Fall Term 1995 headcount enrollment of 13,941 students to the United States Department of Education (*Integrated Postsecondary Education Data System Fall Enrollment Survey, Form EF-1*; 1995, p.7), with most students attending classes in South Florida:

- 82 percent of all students (18,242 of 22,221) attended classes in Florida
- 65 percent of all students (14,329 of 22,221) attended classes in South Florida (Broward, Dade, and Palm Beach Counties)

Table 1

Enrollment (Unduplicated, Cumulative Headcount) of Nova Southeastern University Students by Permanent Florida Residence and Florida Class Attendance by Academic Center: Calendar Year 1995

Academic Center	Enrollment CY 1995	Permanent Florida Residence		Florida Class Attendance		South FL Class Attendance	
		N	%	N	%	N	%
Abraham S. Fischler Center for the Advancement of Education	7,155	4,542	63.5	4,980	69.6	3,345	46.8
James M. Farquhar Center for Undergraduate Studies	5,333	4,731	88.7	5,022	94.2	3,852	72.2
School of Business and Entrepreneurship	3,349	2,112	63.1	2,257	67.4	1,632	48.7
Health Professions Division	2,074	1,614	77.8	2,074	100.0	2,051	98.9
Center for Psychological Studies	1,550	1,392	89.8	1,550	100.0	1,116	72.0
Shepard Broad Law Center	1,172	1,009	86.1	1,172	100.0	1,172	100.0
School of Computer and Information Sciences	804	418	52.0	791	98.4	765	95.1
School of Social and Systemic Studies	274	257	93.8	274	100.0	274	100.0
Oceanographic Center	122	101	82.8	122	100.0	122	100.0
University Total	22,221	16,183	72.8	18,242	82.1	14,329	64.5

Note: University total includes all NSU students, including non-degree seeking students, special status students, and students enrolled at the Panama cluster.

The University has experienced nearly 20 percent growth in cumulative yearly credits from Calendar Years 1990 to 1994 (*Enrollment Trends and Characteristics of Nova Southeastern University's Students: Calendar Years 1990 to 1994*, 1995). As evidenced in the University's *Master Plan* (1995), growth is largely the result of attention to a unique Mission Statement, where faculty and administrators have purposely selected to place an emphasis on a largely adult client base and the use of technology in teaching modality:

> Nova Southeastern University provides educational programs of distinction from prekindergarten through the doctoral level at times and in locations convenient to students, prepares students for leadership roles in business and the professions, encourages research and community service, and fosters an atmosphere of creativity and innovation utilizing technology where appropriate (*Nova Southeastern University Fact Book*; 1997, p. iv).

Unlike the other regionally accredited institutions in South Florida that offer bachelor's, first professional, or graduate degrees, the University emphasizes education for professional advancement of adult students, augmented by the use of innovative delivery formats and technology when appropriate, to meet student and community needs.

Adjunct Faculty

Growth at the University has been achieved, in part, by exploiting niche markets throughout the local region, other states, and selected foreign nations and then selecting adjunct faculty to serve these students. As presented in Table 2 and Table 3, 61.8 percent of all Fall Term 1996 faculty were employed on a part-time basis.

However, as identified in *Criteria for Accreditation* (1996, p.49), the Southern Association of Colleges and Schools recently established prescriptive accreditation criteria that mandate that "the number of part-time faculty members must be properly limited." Although the Commission on Colleges of the Southern Association of Colleges and Schools has not yet offered final judgment on the University's use of adjunct faculty, it is evident that the University faces new challenges in the integration of adjunct faculty into the overall faculty matrix and the delivery of services to students by a majority adjunct faculty.

This issue is significant to the University in that, due to distance away from campus-based resources, it is increasingly difficult and expensive for the University to support the learning resource needs of adjunct faculty who reside away from convenient access to campus-based facilities. At a broader level, as the use of distance education practices increases at other colleges and universities, this problem is not at all unique to the University, but is instead pervasive throughout the profession. Universities must find creative ways to support the educational needs of faculty, including adjunct faculty in field-based programs.

Table 2

Nova Southeastern University Full-Time and Part-Time Faculty Affiliation Status by Academic Center: Fall Term 1996

Academic Center	Full-Time NSU Employee		Part-Time NSU Employee	
	N	%	N	%
Fischler Center for the Advancement of Education	57	21.9	203	78.1
Farquhar Center for Undergraduate Studies	72	22.7	245	77.3
School of Business and Entrepreneurship	26	16.6	131	83.4
Center for Psychological Studies	28	41.8	39	58.2
Health Professions Division	158	96.3	6	3.7
Shepard Broad Law Center	40	51.9	37	48.1
School of Computer and Information Sciences	19	65.5	10	34.5
School of Social and Systemic Studies	16	76.2	5	23.8
Oceanographic Center	4	57.1	3	42.9
Total	420	38.2	679	61.8

Note. Statistics are from the beginning of Fall Term 1996 to mid-October 1996, as reported by each Center.

Table 3

Faculty Affiliation Status by Academic Center: Fall Term 1996

Academic Center	Status 1		2		3		4		5		6	
	N	%	N	%	N	%	N	%	N	%	N	%
Fischler Center for the Advancement of Education	40	15.4	17	6.5	0	0.0	0	0.0	49	18.8	154	59.2
Farquhar Center for Undergraduate Studies	54	17.0	9	2.8	5	1.6	4	1.3	71	22.4	174	54.9
School of Business and Entrepreneurship	16	10.2	6	3.8	3	1.9	1	0.6	24	15.3	107	68.2
Center for Psychological Studies	27	40.3	1	1.5	0	0.0	0	0.0	6	9.0	33	49.3
Health Professions Division	137	83.5	11	6.7	1	0.6	9	5.5	1	0.6	5	3.0
Shepard Broad Law Center	38	49.4	2	2.6	0	0.0	0	0.0	5	6.5	32	41.6
School of Computer and Information Sciences	17	58.6	2	6.9	0	0.0	0	0.0	0	0.0	10	34.5
School of Social and Systemic Studies	13	61.9	3	14.3	0	0.0	0	0.0	0	0.0	5	23.8
Oceanographic Center	4	57.1	0	0.0	0	0.0	0	0.0	1	14.3	2	28.6
Total	346	31.5	51	4.6	9	0.8	14	1.3	157	14.3	522	47.5

1 = Full-Time Faculty in this Center
2 = Administrator in this Center
3 = Full-Time Faculty from Another NSU Center
4 = Administrator from Another NSU Center
5 = Adjunct - 2 courses per year for 5 years
6 = Adjunct - NOT 2 courses per year for 5 years

Problem Statement

Recognizing the concern that many faculty did not have convenient access to the full suite of educational materials needed for curriculum development and scholarly research, such as library and learning resource materials, University administrators drew on the spirit of the Mission Statement and selected a technology paradigm as an appropriate way to address this problem. It would be a gross understatement to say anything but that the University has invested considerable resources to base faculty access to library and learning resource materials through the use of technology. In Fiscal Year 1992 to 1993, the University spent $3,953,000 on technology and related capital expenditures. The University has budgeted $8,559,000 on technology and related capital expenditures for Fiscal Year 1996 to 1997.

Through the use of telecommunications, this infrastructure is ostensibly available to all faculty, regardless of campus-based status, field-based status, full-time status, or adjunct status. However, there is compelling evidence that adjunct faculty do not use this technology-based medium to access library and learning resource materials. This evidence was gained from an analysis of *Self-Study* faculty surveys, an audit of online activities, and review from an external consultant. All three sources of information confirmed that, overall, adjunct faculty are not regularly active in their use of the University's technology infrastructure, as envisioned in the *Master Plan* (1995).

Self-Study Results

As part of the *Self-Study* process, the University distributed a series of surveys to a representative sample of stakeholders in the University's future. The use of technology-based access to library and learning resource materials was included in the many questions and statements presented to faculty (*Management of Self-Study Surveys Administered by Research and Planning*, 1995).

At the time of survey distribution, *Self-Study* results provided evidence that approximately 80 percent of all full-time faculty and 80 percent of all adjunct faculty do not use the library service provider most closely associated with faculty use of the University's technology medium for access to library and learning resource materials. Analyses of *Self-Study* survey results equally revealed that adjunct faculty offered ratings that were much lower than full-time faculty on statements relating to satisfaction with issues related to access and library services.

Online Access by Faculty

University records were queried to develop a database of all full-time faculty and adjunct faculty associated with the Graduate Teacher Education Program, the target group associated with this project. The list was compiled and uploaded to the University's host computer. The UNIX® finger command, as part of a shell program, was then used to prepare a listing of faculty usercodes and date and time of last login to the University's host computer. Analysis of this activity revealed several important outcomes:

- All full-time faculty in the Graduate Teacher Education Program had been online, to use the University's host computer, within three days of when this audit was conducted.

- In contrast, only seven percent of all adjunct faculty in the field-based teacher education program had been online to use the University's host computer within 30 days of when this audit was conducted.

- To be more exact, of the 417 adjunct faculty in the Graduate Teacher Education Program, approximately 84 percent (N = 351) did not have an online account at the University's host computer. Therefore, these individuals had no opportunity for access to the learning infrastructure envisioned in the University's *Master Plan* (1995, p.4), when expenditures were made to support "effective delivery of educational services through use of state-of-the-art information technology and telecommunications."

Accordingly, there is great disparity between full-time faculty and adjunct faculty in regard to access to the University's host computer. Full-time faculty access the University's host computer on a regular basis. In contrast, adjunct faculty make minimal use of the University's host computer and subsequent use of this medium as a means for access to library and learning resource materials, as planned and budgeted by the University (*Master Plan*, 1995).

External Consultant

As part of the continuous quality improvement process in place at the University and the desire to have an external review of internal processes, a consultant from another university was asked tc review the University's computing infrastructure. General findings (Memorandum from Mort Rahimi to Elizabeth McDaniel, October 6, 1995) revealed that:

- The University has an acceptable computing infrastructure. The consultant confirmed that "[t]he NSU network is properly designed and implemented. The technology used is state of the commercial art."

- The consultant, however, recognized the need for promoting faculty use of existing and evolving library resource materials that are increasingly found in electronic format, by stating "[i]t is important that your library look beyond the traditional library role and become a major player in providing your faculty (full-time as well as temporary) and students a virtual place to meet electronically and collaborate."

The general spirit of the consultant's report was that the University's computing infrastructure is acceptable, but it is not used to best advantage. The consultant specifically recognized the need for training in the use of Netscape, a graphical user interface that provides access to a wide variety of information resources on the Internet, stating that "[t]here is enough expertise at [the University] to begin a campus-wide effort to train individuals in the use of Netscape."

Causes and Effects of the Problem

Adjunct personnel in the Graduate Teacher Education Program, which includes instructors as well as facilitators, laboratory monitors, and advanced students who offer online assistance to other students, simply do not use the University's computing infrastructure with the degree of frequency found among the full-time faculty. Although there are many possible causes for not using of the University's computing infrastructure by adjunct personnel, it is suspected that the leading cause is that these professionals do not have the same degree of access to training and related support mechanisms as are available to full-time faculty and staff. As an example, before this project was implemented, the University offered during one complete month 16 hours of formal technology-based training on topics that would enhance access to library and learning resource materials available in digital format. Training was offered exclusively on the University's Davie campus during Monday to Friday business hours.

Although training was ostensibly available to all faculty, campus-based training is neither convenient nor readily available to adjunct personnel, many of whom live away from the South Florida area. For adjunct personnel who reside near the campus, training that is only offered during Monday to Friday business hours is also largely unavailable due to commitment to primary professional responsibilities. Although the University offers off-campus training at institutes and cluster meetings, it is still a concern that "training is sometimes restricted due to limitations in the availability of training personnel" (*Institutional Self-Study Report*; 1996, p.294)

The effect of this problem is that a large number of faculty and support personnel do not access the computing infrastructure the University purposely developed as a means of complying with accreditation criteria related to the availability of library and learning resource materials. It must be recalled that even though personnel in field-based locations may find other means of access to these materials, the University is explicitly required to

provide access and continuous training to all faculty, including adjunct faculty. Perhaps even more important, the University is also required to address statements in *Criteria for Accreditation* (1996, p.55), that incorporate the need for a technology-based orientation in access to learning resources, where "emphasis should be placed on the variety of contemporary technologies used for accessing learning resources."

Purpose of This Report

This project attempted to address the problem that adjunct faculty do not regularly use the University's technology infrastructure. To achieve this endeavor, this project encompassed the development and assessment of training activities for adjunct faculty and related support personnel, focusing on the skills these professionals need to access the wide variety of library and learning resource materials available in digital format.

When considering the importance of this problem, it should be recalled that the University is charged with the responsibility of complying with accreditation criteria related to the use of adjunct faculty and the practice of distance education. The University is also required to comply with accreditation criteria established by the Southern Association of Colleges and Schools in regard to the task of providing library and other learning resource materials to all faculty, including faculty who are distant from resources at the University's multiple campuses:

> Because adequate library and other learning resources and services **are essential** to teaching and learning, each institution **must** ensure that they are available to all faculty members and enrolled students wherever the programs or courses are located and however they are delivered (*Criteria for Accreditation*, 1996, p.56)

The University is additionally charged, in *Criteria for Accreditation* (1996, p.56), with the responsibility that it "**must** include an orientation program designed to teach new users how to access bibliographic information and other learning resources." More specifically, the Southern Association of Colleges and Schools, in *Criteria for Accreditation* (1996, p.57), included accreditation criteria on the need for a technology-based orientation in access to learning resources by stating that "emphasis should be placed on the variety of contemporary technologies used for accessing learning resources."

Further, the Southern Association of Colleges and Schools, in *Criteria for Accreditation* (1995, p.61), changed existing accreditation criteria (as evidenced by the use of an underscore in text) and clearly presented the view that faculty training in the use of information technology resources and systems was to be a continuous, ongoing activity:

> A reliable data network should be available so that students, faculty, and staff may become accustomed to electronic communication and familiar with accessing national and global information resources. There **must** be provisions for ongoing training of faculty and staff members so that they may make skillful use of appropriate application software. These requirements **apply** to all programs wherever located or delivered.

Again, the Southern Association of Colleges and Schools explicitly identified that training is to be offered as an ongoing activity to all faculty, including adjunct faculty and faculty in field-based programs. This project addressed one possible means of support for access to library and learning resource materials, with attention to training and retraining in the use of contemporary technologies, when participants are widely dispersed, away from campus-based resources.

LITERATURE REVIEW

Development of Online Information Systems

Computing is generally perceived to have begun only 50 years ago, when the University of Pennsylvania first demonstrated the Electronic Numerical Integrator and Computer (ENIAC) in 1946 (The Associated Press, 1996). Farrington and Patton (1996, p.3) stated that "Many historians date the beginning of the information age to the hushed moment when the ENIAC's 18,000 vacuum tubes first began to glow." Jennings (1990), however, provided anecdotal evidence that identified much earlier contributions to computing, by referring to the formative role of Schickard's calculating clock in the 1600s; Pascal's mechanical calculator in the 1700s; Ada Byron Augusta, the Countess of Lovelace, and Charles Babbage's analytical engine in the 1800s; and related contributions by Bush, Aiken, and Turing in the 1930s and 1940s.

ENIAC and other mainframe computers of the 1950s and the 1960s were standalone machines that were usually dedicated to mathematically-oriented calculations for business and military use (Jennings, 1990). Rutkowski (1995a) identified, however, that beginning in the 1970s the United States government sponsored the development of online information systems that were purposely designed to move away from computing as a standalone activity and to instead use computing machinery and standards to support collaboration and information transfer across wide computer networks.

Teleha (1993) offered detailed review of how agencies of the United States government sponsored development of distributed online information systems in the 1970s, including the contributions of the United States Department of Defense in development of the Advanced Research Projects Agency Network (ARPAnet) and the Defense Advanced Research Projects Agency (DARPA). Rutkowski (1995a) gave attention to evolving non-military uses of these online information systems by mentioning how the National Science Foundation became an active participant of this system in the 1980s. Rutkowski (1995b) further mentioned that ARPAnet, the 1970s online information system developed by the United States Department of Defense in support of military-university research, had evolved by the 1990s into what is commonly referred to as the Internet, a distributed confederation of well over 50,000 autonomous networks. Crocker (1993) offered poignant insight into the highly distributed organizational structure of the Internet by referring to the Internet as a network of networks, representing a global confederation of many different organizations.

Rutkowski (1994) offered a vision of the potential power of the Internet and clearly identified how this newly evolved global online information system provided a medium for

collaboration among professionals that transcended standard organizational practices. Although commercial applications of the Internet have received considerable attention, the potential educational applications of this network were central to Russett's (1994) theme that the Internet had become the largest and most elaborate library in the world.

Gehl (1995a) recognized the growing size of the Internet and offered statistics that confirmed that there are anywhere from 10 to 15 million Internet users in the United States. The educational potentials of this expanding network have not gone unnoticed in higher education. Press (1994) discussed the potential outcomes of distributed networks in higher education and clearly stated that the heavy infusion of technology into higher education has resulted in a new vision of how curricula are to be developed and delivered to students. Gehl (1995b, p.7) paralleled this theme and mentioned that, through the use of distributed online information systems, educators and educational policy makers will soon have no choice but to accept the realization that "Knowledge exists in the continuum of time, and the challenge of the student, the teacher or the 'change agent' is to process, understand and reflect upon constant flux."

The Need for Faculty Training

Although there are many individuals in the field who champion the educational value of the Internet and other online information systems, Manrique (1993) offered a preponderance of anecdotal evidence that the absence of formal training opportunities for faculty is the greatest impediment for acceptance and subsequent use of the Internet in higher education. Gehl (1995a) reported statistics on this issue and identified that, although American businesses invested over $2 billion in technology training in 1994, 90 percent of the teachers in America reported that they were self-taught in the use of technology. In parity to this observation on the lack of formal training opportunities in the use of technology in education, the American Library Association (1995) reported that only 23 percent of libraries serving populations of 100,000 or more offered direct public access to the Internet, even though public libraries have traditionally been viewed as the primary vehicle for public access to information.

Obviously, there are many reasons why higher education faces challenges in the use of online information systems. Goodman (1995) cautioned that educators need to consider culture as well as infrastructure when working with highly technical online information systems, especially when users do not have concomitant skills in the use of technology. The American Technical Education Association (1996) further stated that training in the use of technology needs to be based on recognition of the notion that technology is often the medium of instruction as well as the actual focus of instruction. Vasi and LaGuardia (1994) cautioned that the actual use of technology should be a background activity in any training activity that focuses on the uses of technology. Otherwise, those with minimal skills in the use of technology will have trouble understanding the process of instruction as well as the actual subject matter.

Regardless of the actual means by which faculty receive training opportunities in use of the Internet and other online information systems, it is imperative that this training be provided so that faculty and students alike have access to the growing body of reference materials readily available. Dorman (1995) mentioned that the United States Government Printing Office has established GPOaccess, an Internet-based means for the global body of Internet users to access free-of-charge an expanding suite of government information databases. To maintain cutting edge currency in curriculum development and scholarly research, faculty must be trained in how this, and other resources, can be conveniently accessed.

Forsberg (1992) recognized the historical role of faculty in higher education as leaders in the development of innovative and cost effective training for education and industry. Maxwell and McCain (1996, p.1) furthered the need for faculty to become involved in training activities, recognizing how the "Copernican Revolution as a shift from teacher-centered to learner-centered approaches gains momentum." Higher educations's role in the development of training programs related to the use of evolving information utilities has even received attention from the Society for College and University Planning, where Dolence and Norris (1995, p.23) clearly indicated the need for attention to the new technology-based information paradigm:

> As the Information Age progresses, information in all of its forms is increasing nearly exponentially. In many cases, its shelf life is shrinking correspondingly. To operate successfully in this changing environment, organizations in every sector of society are changing their basic philosophy of how they collect, process, synthesize, manage, and control information. Colleges and universities that do not accommodate changes in the use of information in learning may find themselves supplanted by more facile providers.

Challenges to Faculty Training

Although there are few who would argue with the overall usefulness of sponsored training, CCA Consulting, Inc. (1994) indicated that only 36 percent of all higher education institutions offered some form of technology support for faculty. Baiocco and DeWaters (1995) further reported that only 47 percent of all faculty in higher education had the opportunity to use campus computing systems to communicate with each other. In contrast to Deierlein's (1995) declaration that training should be viewed as an investment and not an expense, The Florida Postsecondary Education Planning Commission (1995) recognized that training is all too often neglected, and mandated that at least 20 percent of all funds awarded for the use of telecommunications in education should be used for training both faculty and student learners.

The University's Board of Trustees (1994, p.24) recognized the need for training in the use of telecommunications and mandated that "staff and faculty should be adequately trained to operate these systems effectively." The University's Master Planning Council (1994) clearly indicated the need for training in use of the University's technology-based computing infrastructure, by identifying how the training of faculty in technology skills will lead to significant improvements in student learning. To be even more specific, it was identified in the University's *Strategic Plan for the Nineties: 1995 - 2000* (1995) that training programs were to be self-paced, where applicable.

Higher education and the government have both reacted to the growing need for training in use of the Internet and other online information systems. Ryan and McClure (1995) discussed their involvement in the development of training programs for government managers on use of the Internet and identified the following as issues that need to be considered if these professionals are to accept this new information medium:

1. Resistance to acceptance of a technology-based communication medium by professionals who may not be fully adept in the use of technology.

2. The consequences of technophobia among senior staff.

3. Rapid changes in technology and the personal and organizational efforts that need to be considered when accepting technology as the medium for access to information in an organization.

4. Staffing for personnel who cannot adapt to this new technology-based information paradigm.

Equally pragmatic, Still (1994) offered the reminder that training in the use of a specific series of terminal skills, such as successful use of the Internet and other online information systems, should not be confused with the more global nature of education. Schrage (1995) offered the realistic caution that expert users of these otherwise complex systems are often the best source of information on how specific terminal training objectives in the use of information technology should be structured.

With the need for attention to specific technical terminal skills established, higher education has a host of opportunities available on how training in use of the Internet and other online information systems can be structured:

1. Crispen (1995) presented a one-time robotic electronic mail training program on use of the Internet to over 80,000 people from 77 different countries during a three-month period in 1994-95.

2. Mohapatra and El-Houcin (1995) reported that their training program was structured as a more formal half-day training activity, with reference to Internet utilities such as electronic mail, file transfer protocol, and gopher.

3. Benson (1994) identified how technology training in use of online information systems was integrated into educational practices throughout a wide group of learners.

4. Makulowich (1995) concentrated on the organizational activities needed for a successful training program on use of the Internet.

5. Marshall, Carr, Logan, Murphy, and Zorn (1994) focused on the actual tools to include in an Internet training program, including: electronic mail, electronic mail listserv discussion groups, search tools such as gopher and veronica, file transfer protocol, and telnet.

6. Barker, Helm, and Taylor (1995, p.8) reiterated a theme that is central to vocational, technical, and occupational education when they offered the reminder that any training program on the use of information technologies must equally include opportunities for continuous and planned retraining "on a regular and ongoing basis."

7. At the state-wide level, the Washington State Higher Education Coordinating Board (1993) offered specific guidelines on the structure and format of a quality technology-based distance education program, including issues as diverse as: faculty orientation and development, geographic limitations to access, community needs, curriculum development, technology support, planning and monitoring, and funding.

The common theme throughout these many training programs is that training in the use of technology, where technology is used as a medium for access to digital information, is highly visual. Printed media may be quite informative, but individuals involved in a training program on use of the Internet and other online information systems need to see the actual series of keystrokes executed to successfully use these highly complex information systems. Printed materials do not fully meet this learning need.

Although live instruction on use of the Internet and other online information systems provides the opportunity for visual presentation of keystrokes and screen images, these activities soon become only a memory after a presentation is over. Further, Mohapatra and El-Houcin (1995) offered comments on the undesirable quality of visual imagery that is common to large-group training, when screen images from a personal computer are projected to a large screen with training participants dispersed throughout a dimly lit laboratory.

With these concerns in mind, the training activities associated with this project combined the structure of Crispen's (1995) use of electronic mail as a training medium along with Beaudin and Quick's (1993) attention to the value and utility of videotape-based training activities. By using a combination of media, such as printed materials, electronic mail, and videotape, this project was designed to incorporate what Beaudin and Quick (1993, p.3) referred to as the "presentation, application, and reflection cycle" of training.

Accordingly, this project consisted of a self-paced instructional videotape, accompanying printed materials, and interactive electronic mail. These materials focused on use of the Internet and other online information systems. The videotape was designed to provide a convenient medium for participants to see and review, when needed, screen images associated with use of these information systems. To further the use of different instructional media, this project also included a series of direct instructional laboratory exercises on use of the Internet.

METHODOLOGY

Selection of Training Participants

This project was designed to assess the potential value of a prototype self-paced training program on use of the Internet and other online information systems for adjunct faculty and other support personnel, such as facilitators, laboratory monitors, and advanced students who offer online assistance to other students. Participants were all associated with the University's Graduate Teacher Education Program, the target group for this project.

There are over 400 available adjunct faculty in the Graduate Teacher Education Program and an equally large number of part-time support personnel. This initial training endeavor was purposely restricted in focus to participants with some online experience at the University's host computer, even if experience was limited. It was judged inappropriate to include individuals with no online experience to participate in this training program, until there are benchmark measures and other formative data to determine the online computing experiences needed for success.

To select training participants for this endeavor, a list of adjunct faculty, facilitators, laboratory monitors, and advanced students who offer online assistance to other students was compiled. The list was prepared in May 1996, and it was restricted to include only those adjunct individuals in the Graduate Teacher Education Program who had been online to the University's host computer within the last 30 days. Individuals on this list were then contacted by electronic mail, to request participation in this training program, until a list of 18 willing participants was eventually prepared.

The training program was offered during July-September 1996. Participants in the training program were widely distributed throughout Florida, reflecting the wide off-campus dispersement of the Graduate Teacher Education Program. Indeed, this geographic dispersement and lack of face-to-face contact with campus-based support personnel largely modeled the detached real-world conditions participants experience when attempting to learn the intricacies of online computing from home.

Instructional Products

Videotape

At the beginning of the 12-week training session, participants received an instructional videotape and a script of the videotape. The videotape focused on access and use of the University's host computer. With a running time of approximately 1.5 hours, the videotape addressed the following online training activities:

1. Identify workstation components needed to go online from distant locations.
2. Access the University's host computer by means of telecommunications.
3. Use electronic mail to send and receive information.
4. Upload a previously prepared file to the University's host computer.
5. Download a file from the University's host computer to a personal computer.
6. Use the University's Electronic Library to search ERIC, Dissertation Abstracts, and other educationally-oriented databases.
7. Manage files on the University's host computer with simple UNIX® shell commands.
8. Use Internet tools (lynx, gopher, ftp, ncftp) to transfer reference information from distant host computers to the University's host computer.
9. Use online tools to search for and monitor Usenet Newsgroups of scholarly interest.
10. Use online tools to search for and subscribe to listserv electronic mail discussion groups of scholarly interest.

After coordination with the program's Director of Academic Operations, the University's Center for Media and Technology provided technical assistance with duplication of the videotape. Participants were provided with *Instructional Videotape Evaluation Instrument* (Appendix A), to gain a sense of the content, instructional value, and technical quality of the training videotape. This tool was developed by Beaudin and Quick (1993) for the purpose of assessing quality indicators of instructional videotapes. Beaudin and Quick (1993, p.6) granted permission for end users to duplicate and use the instrument provided appropriate credit is acknowledged. No other permissions were needed to use this evaluation tool.

Laboratory Exercises

At the beginning of the 12-week training program, participants had the opportunity to use the videotape for acquaintance with the University's host computer and potential uses of the Internet and other online information systems. Approximately two weeks after this beginning, participants were instructed to focus on structured laboratory exercises. Laboratory exercises, which participants received at the beginning of the training program through U.S. mail, concentrated on:

1. Electronic mail
2. File transfer
3. Online libraries and information systems
4. World Wide Web

Self-Assessment of Online Computing Skills

The Director of Academic Operations authorized distribution of the videotape immediately after training participants were selected. Concurrent to videotape distribution, all training participants were contacted by electronic mail, informing them that they would soon receive *Self-Assessment of Online Computing Skills* (Appendix B), along with other materials. At this time, the assessment served as the pretest data collection instrument. The same assessment was administered at the completion of the 12-week training activity, as a posttest data collection instrument.

Although there may be initial concern about basing empirical measures on self-assessment, there is a body of literature that supports this assessment process. Howard (1981, p.574), while offering techniques that can be used to address the concern that self-assessment contaminates behavioral measures, stated that "self-report procedures have often been underappreciated and eschewed as a viable research tool." Hample (1982, p.21) echoed this theme and stated that "The case against self-reports seems therefore to be really a case against some self-reports."

Weatherby, et al. (1994, p.354), when examining self-reported drug use against the results of urine tests, "found discrepant results among only 15% of the respondents." Although this training program focused on an entirely different theme, it does call to mind Kosten, Gawin, and Schumann's (1988) support of the validity of self-reported data when confidentiality is assured and there are no negative sanctions for poor performance:

- Participants were not only assured confidentiality, but by using a mail script program instead of an electronic mail alias, electronic mail messages gave no indication of the usercode and name of other training participants. This process assured complete confidentiality to all training participants.

- Participation in this training program was a voluntary activity that had no association with a class or any other graded project. There was no opportunity for training participants to experience current or future negative sanctions because of performance activities.

Timeline of Training Activities

This project involved participation in training activities by a group of professional educators who had no structured face-to-face contact during the training period. A summary of week-by-week activities may be useful to offer clarity to the many tasks associated with this project:

Week(s)	Participant/Trainer Activity
1 and 2	Initial viewing of the training videotape
	Participants received all four laboratory exercises through U.S. mail
	Completion of *Self-Assessment of Online Computing Skills*, as a pretest assessment
	Completion of *Instructional Videotape Evaluation Instrument*
3 and 4	Laboratory activities associated with the use of electronic mail (mail, pine, and elm)
5 and 6	Laboratory activities associated with file transfer through use of ckermit, filetran, and ftp
7, 8, and 9	Laboratory activities associated with the University's Electronic Library (el) as well as access to library and learning resource materials at other host computers on the Internet
10 and 11	Laboratory activities associated with the World Wide Web, including reference to HTML programming

	Completion of *Self-Assessment of Online Computing Skills*, as a posttest assessment
12	Summary discussions through electronic mail

Process for Monitoring Progress

Participants in this 12-week training program received electronic mail on a regular basis, for the purpose of monitoring the progress of individual participants as well as the overall group. Progress was also monitored by critique of the four laboratory exercises. These laboratory exercises are highly structured, and they provided ample opportunity for participants to explore a rich selection of online tools and references available to the Internet community. Response to the queries at the end of each laboratory exercise provided the opportunity for monitoring the progress of individual participants as well as the collected body of all participants.

RESULTS

Assessment of the Training Videotape

A summary of *Instructional Videotape Evaluation Instrument* (Appendix A) ratings is provided in Table 4. Completion of the instrument was requested, but not required for participation in the training activity. The mean for all *Instructional Videotape Evaluation Instrument* ratings was 4.5 on the five-point Likert scale (1 = Poor to 5 = Exceptional).

Pretest and Posttest

Pretest results and posttest results are presented in Table 5. The rating scale for this evaluation tool (1 = No Skills to 5 = Exceptionally Skilled) and the basic notion of self-assessment of computing skills was previously assessed and found to be acceptable (*Graduates of Nova Southeastern University's Undergraduate Programs Tell Us What They Think About Their University Experience*, 1996). The mean for all pretest ratings was 3.2 on the five-point Likert scale. The mean for all posttest ratings was 4.2 on the five-point Likert scale. Based on self-reported data, engagement in this 12-week training program resulted in a gain from Mean = 3.2 to Mean = 4.2, for a 31 percent increase in skill with online utilities and other tools associated with the Internet and other online information systems.

Program Completion and Participant Withdrawal

The rate of persistence and program completion is an immediate concern that program administrators must consider when deciding whether or not it may be useful to implement any new training program. Persistence is an especially important concern for distance education training programs since the lack of regular human contact may dissuade some participants to continue. Knapper (1990, p.2) identified that "Withdrawal rates from [distance education] courses are typically around 35%, and it is difficult to pinpoint the cause, despite research on the problem and different intervention strategies."

Table 4

Instructional Videotape Evaluation Instrument Results

Quality Indicator	N	Median	Mean
Content			
Accurate	8	4	4.5
Useful	7	4	4.6
Bias-Free	8	4	4.8
Instructional Plan			
Stated the Objectives	8	4	4.6
Content Presentation	8	4	4.3
Learner Application	8	4	4.8
Learner Reflection	8	4	3.9
Met the Objectives	7	4	4.7
Learner Interaction	8	4	4.2
Integration - Learning Environment	8	4	4.5
Technical Production			
General Video Design	8	4	3.9
Focused on Intended Content	8	4	4.5
Visual Quality	8	4	3.6
Audio Quality	8	4	4.6
Audio-Visual Relationship	8	4	4.0

Although 18 participants originally agreed to participate in the project, three participants did not complete the pretest and instead immediately withdrew from the training program. Of the remaining 15 participants, three participants withdrew sometime during the 12-week training program, yielding posttest data from 12 of the original 18 willing participants. The 33.3 percent withdrawal rate for this voluntary training program was in parity with expected norms.

Table 5

Pretest and Posttest Results

Statement	Pretest			Posttest		
	N	Median	Mean	N	Median	Mean
Identify workstation components needed to go online from distant locations	12	4	4.0	11	4	4.5
Access the University's host computer by means of telecommunications	12	4	4.1	12	4	4.6
Use electronic mail to send and receive information	12	4	3.9	12	4	4.6
Upload a previously prepared file to the University's host computer	12	3	3.4	12	4	4.3
Download a file from the University's host computer to a personal computer	12	3	3.5	12	4	4.3
Use the University's Electronic Library to search ERIC, Dissertation Abstracts, and other educationally-oriented databases	12	4	3.6	12	4	4.5
Manage files on the University's host computer with simple UNIX® shell commands	12	3	2.7	12	4	4.1
Use Internet tools (lynx, gopher, ftp, ncftp) to transfer reference information from distant host computers to the University's host computer	12	3	2.6	12	4	3.9
Use online tools to search for and monitor Usenet Newsgroups of scholarly interest	12	3	2.3	12	4	3.8
Use online tools to search for and subscribe to listserv electronic mail discussion groups of scholarly interest	12	2	2.3	12	4	3.8

Note. Statistics are from the 12 participants who completed both the pretest and the posttest. Data from the three participants who completed the pretest but later withdrew from the project are not included in this table. However, data from these three participants were included in a separate analysis and there was no significant change in pretest results when they were included in group totals.

SUMMARY AND RECOMMENDATIONS

Instructional Videotape

Based on results presented in Table 4, it is clear that the content and structure of the videotape was acceptable. Materials were judged to be accurate, useful, and focused on content. There were concerns, however, about the clarity of screen images on the training videotape.

Based on statistics in Table 4, as well as general comments gained from electronic mail messages, the following recommendations may be useful guides if this prototype program is expanded:

1. The videotape focused exclusively on the computer screen. Although it is important to present screen images, more variety would have been helpful. It is recommended that future iterations of this videotape include variety in screen presentations.

2. The videotape could have been enhanced by greater clarity of screen images, particularly for prompts and other images along the outer edges of the screen, which is slightly curved. It is recommended that future iterations of this videotape use an electronic device to capture screen images in digital format. The readability and focus of screen images will then be of the highest possible quality.

Training Components

This prototype training program, which focused on the use of online information systems and Internet tools, was developed and implemented to help identify the feasibility of using a self-paced instructional training mode for adjunct faculty and related support personnel who do not have convenient access to campus-based training opportunities. As part of the selection process, participants had some degree of online experience with the University's computing infrastructure.

As evidenced by pretest results, it was obvious that participants had acceptable skill levels in basic online actives, such as the use of electronic mail and the University's electronic library. However, it was also obvious that these experienced users had far less skill in online file management and use of the Internet.

Even so, comparisons of posttest results to pretest results provide evidence that participants experienced considerable gain for each statement on the self-assessment instrument. The mean for all statements increased from 3.2 on the pretest to 4.2 on the posttest, for a 31 percent increase in skill at completion of the 12-week training program.

The following recommendations concentrate on improvements to the online components associated with the prototype training program. Outcomes presented in Table 5 as well as many insightful electronic mail comments from participants provide the basis for these recommendations:

1. The training videotape and accompanying videotape script demonstrated online connectivity through use of MS-DOS and an IBM compatible computer. Because of rapid changes in the computing industry, online connectivity should also be presented with a Macintosh personal computer and an IBM-compatible personal computer using Windows 95.

2. The University is considering ways to decrease the support cost for online connectivity, in part by encouraging participants to use the services of a local Internet Service Provider. This extra level of complexity may be problematic for some users. Future training activities should include presentations on the use of local Internet Service Providers.

3. The *pine* electronic mail program is the default mailing system in the Graduate Teacher Education Program. Although this program is very useful, it is simply not as robust as the *elm* electronic mail program. Greater emphasis should be placed on the use of *elm*, especially for faculty and students in computer-mediated majors where heavy use of electronic mail is expected.

4. Even though participants all had prior experience with the University's computing infrastructure, pretest results indicated that participants had only moderate skill with uploading and downloading of files. Posttest results indicated considerable gain in this area. Because file transfer is such an important activity for successful use of the online environment, this component should be expanded, to equally demonstrate the multiple transfer of files when using the MS-DOS 8.3 file naming sequence. This component of any future training activities should also be expanded to include presentations with a Macintosh personal computer and a personal computer using Windows 95.

5. Participants were quite enthusiastic with their use of the University's Electronic Library. However, this tool is dynamic and constantly

changing in terms of format and available databases. Future training activities should always strive to present the Electronic Library in full detail, identifying the many available databases and online ordering functions.

6. The UNIX® operating system was developed in 1969 and since 1973 (when it was rewritten in the C programming language), it has been widely used, although often in the background, at most Universities with host computers on the Internet (Lewis, 1994). Training on use of UNIX® shell commands should be prepared as a separate component, to accommodate participants with entry-level skills in the use of online computing, until they develop better skills and confidence levels.

7. Because of system limitations, many distant users at the University are currently unable to use Netscape, which supports graphics and imagery while online. It is likely, however, that graphics will soon become more convenient as the University's computing system is upgraded. Future training activities should include a component on Netscape and other leading graphical browsers. Although a graphical interface demands considerable computing resources, it is recognized that the convenience of a graphical interface will likely induce many non-users to accept the Internet and other online information systems as a medium for communication, research, and curriculum development.

8. Usenet Newsgroups and listserv electronic mail discussion groups provide useful roles as media for communication among professionals. Further training needs to be directed toward these media, to meet the current and evolving needs of faculty and students.

Conclusion

The University has over a quarter-century of experience in distance education. Online telecommunications has been a component of distance education at the University since the early 1980s. However, the University may soon experience severe challenges from other colleges and universities, with the Internet serving as the medium by which these potential competitors reach students. Bear (1996) warned that the California State University System plans to offer parts of an "online university" by June 1997.

Clerkin (1996) provided a summary of various surveys on growth of the Internet and identified that at the least, the user base in 1996 increased by 50 percent over 1995. This growth, and the growing abundance of quality information-rich resources available on the Internet, demands that the University must continually examine training and computing

infrastructure requirements needed for successful use of the Internet and other online information systems. Although training opportunities are made available when faculty and students are assembled on campus or at cluster sites, this project provided evidence that it may be equally desirable to provide self-paced training materials, to accommodate faculty and student needs when these participants are removed from convenient access to campus-based support.

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Instructional Video Evaluation Instrument

Video Title: _____

Name of Evaluator: _____

Phone: _____ Date: _____

Please rate the video according to the following quality indicators by CIRCLING one response for each item. Please use the attached sheets for narrative comments.

Content

Poor → Exceptional

1 2 3 4 5 **1. Accurate**
Was the content of the video accurate and up-to-date? If not, then the video is not ideally suitable for learning. There may be portions of the content that should NOT be used, as well as sections that are usable.

1 2 3 4 5 **2. Useful**
Was the context of the video generally useful? The video should stimulate, motivate and inform the learner to act on the information that was being presented. Will you incorporate the ideas presented into your life?

1 2 3 4 5 **3. Bias-Free**
Was the video bias-free, including stereotyping with regard to age, sex, ethnicity, race, physical impairment, values, dress, language, or social class?

Instructional Plan

1 2 3 4 5 **4. Stated the Objectives**
Did the video begin with a motivating introduction to stimulate interest? Were the objectives or key elements made clear in the introduction?

1 2 3 4 5 **5. Content Presentation**
Was the content detail controlled to promote understanding? Did the video simplify complex tasks and avoid introducing extraneous information? Did it try to cover too much material or introduce too much detail?

1 2 3 4 5 **6. Learner Application**
Did the video suggest methods for the learner to apply the newly acquired knowledge? Were suggestions for practice of what's being discussed considered? Practice can be designed into the overall program design as well as into the video itself.

1 2 3 4 5 **7. Learner Reflection**
Did the video allow for learner reflection? Was reflection, silence, or time allowed for the learners to react to a scene or statement? It is also important for the facilitator to interact with the student to provide feedback on the learner's application of the material.

1 2 3 4 5 **8. Met the Objectives**
Did the video meet the learning objectives and needs of the learner? Did what was being visually depicted fit the learning objectives? As in the introduction, people also remember the last things that are presented in a program, therefore, did the video have the key learning elements repeated in the summary or conclusion.

Poor → Exceptional

1 2 3 4 5 **9. Learner Interaction**
Was the video conducive to learner interaction? Videos can often be used to promote active learning.

1 2 3 4 5 **10. Integration into the Learning Environment**
Can the video be easily integrated into the learning environment by adding emphasis to or supplementing more traditional methods? Did the video bring remote experiences and places to the learner?

Technical Production

1 2 3 4 5 **11. General Video Design Characteristics**
Was the video well planned, organized, and structured? Was the technology transparent and non-threatening to the learner? Did the video demonstrate its ability to transcend space and time? The camera can go where the learner cannot and the video is an excellent medium for presenting information or demonstrations that are timely, however, care must be taken to prevent giving a false idea of reality.

1 2 3 4 5 **12. Focused on Intended Content**
Did the video avoid content not related to the subject matter stated in the introduction? Digressions could lead to confusion and may be a waste of video time.

1 2 3 4 5 **13. Visual Quality**
Is the camera looking at the scene from the learner's point of view? This is especially important when psychomotor skills are being taught. Did the scene changes appear to be appropriate? Were special effects used to enhance learning by drawing attention to specific attributes of what is being seen? Were varying types of camera shots, close-ups to long shots, used to provide variety in the video?

1 2 3 4 5 **14. Audio Quality**
Was the vocabulary of the narration appropriate for the intended audience? Was the speed of the narration slow enough to be understood? Was the music fitting for the visual effects or audio narration? Were background noises used that were conducive to learning? Were sound effects used to add emphasis to the visual tract of a video to enhance learning?

1 2 3 4 5 **15. Audio-Visual Relationship**
Was the audio-visual combined well? The audio and visual components should not contradict one another but complement each other. Was there a variety of differing types of sounds and visuals to attract and hold attention?

Self-Assessment of Online Computing Skills

Please review the following rating key and then mark or circle to the left of each item your level of skill relative to each statement.

RATING KEY	
1 No Skills	4 Very Skilled
2 Few Skills	5 Exceptionally Skilled
3 Moderate Skills	NA Not Applicable
	U Unknown or Unable to Answer

1 2 3 4 5 NA U	Identify workstation components needed to go online from distant locations.
1 2 3 4 5 NA U	Access the University's host computer by means of telecommunications.
1 2 3 4 5 NA U	Use electronic mail to send and receive information.
1 2 3 4 5 NA U	Upload a previously prepared file to the University's host computer.
1 2 3 4 5 NA U	Download a file from the University's host computer to a personal computer.
1 2 3 4 5 NA U	Use the University's Electronic Library to search ERIC, Dissertation Abstracts, and other educationally-oriented databases.
1 2 3 4 5 NA U	Manage files on the University's host computer with simple UNIX® shell commands.
1 2 3 4 5 NA U	Use Internet tools (lynx, gopher, ftp, ncftp) to transfer reference information from distant host computers to the University's host computer.
1 2 3 4 5 NA U	Use online tools to search for and monitor Usenet Newsgroups of scholarly interest.
1 2 3 4 5 NA U	Use online tools to search for and subscribe to listserv electronic mail discussion groups of scholarly interest.

Date _____ Name _____

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