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Preparing Future Teachers to be Instructional Technology Leaders

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This paper will briefly discuss the preparation of pre-service teachers as instructional technology leaders. The expectation is for students to graduate from high school technologically literate to enter post-secondary education, the military or the private corporate sector. To accomplish this goal, K-12 teachers must be technologically literate to help prepare the students. The current group of K-12 teachers must operate at this level and new, pre-service teachers must be trained to operate at this level, also. The State of Pennsylvania alone dedicated approximately $50 million to staff development from 1996 to 2000 (Edwards, 2001). This effort provided the funding to raise the information technology skills of existing faculty. However, recent attrition rates suggest that more teachers are leaving the field quicker than new teachers are entering (State of the Fund, 1999, State of the Fund, 2001).

Thus, the concern should be increased to the thousands of teachers currently in pre-service (undergraduate) programs and to mandate that those programs graduate new teachers that are not only literate in information technology but are also leading-teachers in instructional technology.

A number of professional organizations and articles devote their efforts to not only raising the awareness of technology literacy, but also call for action to prepare our citizenry for the explosion of information technology in our global society. The U.S. Department of Education published "Getting America's Students Ready for the 21st. Century: Meeting the Technology Literacy Challenge" (Riley, 1996). This guide referenced the digital divide that called for action to bridge the gap between the "haves and have-nots" (Riley, 1996, p.44). It called for the achievement of four goals (Riley, 1996, p11):

1. "All teachers in the nation will have the training and support they need to help students learn using computers and the information superhighway."
2. "All teachers and students will have modern, multimedia computers in their classrooms."
3. "Every classroom will be connected to the information superhighway", and,
4. "Effective software and on-line learning resources will be an integral part of every school's environment."

However, while the hardware was ordered and installed, a smaller proportion of the funds were committed to staff development and teacher preparation programs. The desire to produce a technology literate work force continues to be a concern to all involved in the global community. Black (1995, p. 7) stated, "...students (need) to be better prepared for workplace challenges requiring a strong technology background". Black further discussed the skills needed by a technology literate workforce (Black, 1995, p. 21). It was noted that minimal technology skills reside in the areas of: 1) word processing skills, 2) data base entry and manipulation, 3) spreadsheet entry and manipulation, 4) desktop publishing, 5) graphic development and manipulation, and, 6) audio-visual recording and manipulation. (Black, 1995, p. 21).

The instruction in the use of technology for pre-service teachers needs to begin in the first semester of the freshman year. Teachers are needed to prepare students for the technologically rich 21st century (Black, 1995, p. 15). Those teachers need to be skilled in using technology to teach (Tomei, 2001, p. 4).

Black (1995, p.7) surveyed corporations to determine the skills needed by a technology literate work force. She found that America seeks novice workers that possess the skills necessary to create, edit and print word-processed documents. They must also be capable of reliably entering data into a database and querying that database. Regarding the use of spreadsheets, she found a need to be skilled in entering, editing, and printing spreadsheets and to be able to create and print a graph from spreadsheet data. One must be able to import and manipulate graphics from the Internet and to obtain them from CD-ROM files.

The next logical step is to ensure that the Nation's teachers are prepared to lead the infusion of technology into the curriculum. This infusion not only provides instruction on how to use these skills, but inculcates a new paradigm for learning and leading in our students so that the skills are not only second nature, but that they use, instruct and infuse those skills and concepts into the curriculum for their students.

The process begins in the freshman year. A simple survey of basic skills was administered to the incoming class of education majors as part of a class on educational technology. Ninety-two percent of those surveyed knew to use Microsoft Word® to create a research paper and to use email to send information to a friend. However, only fifty-three percent knew the difference between a search engine and a web portal. Further, only ten percent were aware of ftp as a utility to download files.

The following table indicates a proficiency in the capabilities of word processing and electronic mail. This level of awareness is probably due to the resourcefulness to learn these skills at home (Robinson, 2001, p. 10). Students must prepare papers and assignments in a professional manner using the specified tools (Clark, 2000, p. 179). Some of this professionalism is portrayed at the high school level because the students entered the university with these skills. They needed to prepare word-processed documents. Thus, they acquired the skills to perform in this manner before matriculating.

Table 1: Number and present correct of selected survey questions asked of freshman education majors–September 2001

Question Description	Total	Number Correct	Percent Correct
RAM	94	38	40.40%
Word Processing	94	89	92.71%
QWERTY Keyboard	94	32	34.00%
FTP	94	10	10.42%
Search Engines	94	51	53.10%
Apple Mouse	94	61	63.50%
Email	94	89	92.71%

The skill set to operate electronic mail was learned for similar, necessary reasons. Email is probably used in conjunction with Internet use, chat rooms and one's friends living away from home. Email skills are sharpened so that communication takes place between friends and family. Another local university recently installed email kiosks to handle the thousands of email messages per day (Reshaping Access to Electronic Communication, 2001).

The reader will notice a difference in the reported knowledge of the various skills listed in Table 1. Word processing and email are the most known skills, while FTP is the least known skill. A follow-up study will be needed to accurately identify the reasons for this disparity

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but one may speculate that frequency of use and previous experience will account for the difference. Also, the necessity to use word processing for term papers and email to communicate with friends may be the motivation to acquire and use some technology skills and not to use others.

These students have the ability to quickly take their place as leaders of our world; a world that is rapidly changing. It is increasingly evident that there is a "need for technological literacy in an increasingly global society" (Black, 1995, p. 14 from Boston, Chan, and Mukai, 1991).

The Leading Teacher Program at Duquesne University prepares the undergraduate students to be leading teachers in all facets of 21st. century education. They are prepared to be expert practitioners, learning theorists and instructional technologists. The School of Education uses the Instructional Technology National Education Technology Standards for teachers and students to guide the Instructional Technology Program's development and growth (International Society for Technology in Education, 2001). More importantly, Duquesne University is authorized by the Pennsylvania Department of Education to award the Instructional Technology Certificate. In order to acquire the certificate the candidate must exhibit the competencies of a leading instructional technologist. The program ensures that all graduates are operationally competent in basic technology skills of word processing, spreadsheet, database and graphic presentation. It progresses to skill sets in pedagogy, instructional technology management, and ethical and moral uses of technology to help students learn. It culminates the experience by providing opportunities for the students to practice the infusion of technology into the curriculum (Tomei, 2001, unpublished class notes). Students construct integrated thematic units that use office productivity tools in the context of providing instruction for the students. The students have to opportunities to construct rich experiences using technology tools to enhance learning. This construction process permits the growth of knowledge from within each student. This growth enhances problem-solving and critical thinking skills. These skills grow and mature over the four years of undergraduate education at Duquesne University.

The Instructional Technology program begins with an assurance that all students practice the skills of basic office productivity tools and progress to the infusing technology into the curriculum. The students experience it in all of their education classes and receive opportunities to use instructional technology tools to construct lessons. It must be noted that the expectation level and practice of technology infused into the curriculum begins in the freshman year. This practice ensures each student ample opportunity to grow to his or her maximum potential. It also ensures that the pre-service teacher is ready and skilled to become a leading teacher to the nation's students. The education students from Duquesne University will be empowered with the knowledge and skills to provide quality education to America's students so they can be better prepared to become a competent and expert workforce and citizenry. This workforce will be poised to lead the global community.

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