A Paradigm Shift: Technology Integration for Higher Education in the New Millennium

Donna L. Rogers

According to the 1998 National Survey of Information Technology in Higher Education, integrating technology into instruction looms as the single most important issue confronting institutional Information Technology (IT) efforts over the next 2-3 years (Green, Campus Computing, 1998). This view is reinforced by several recent studies of the faculty's use of technology in instruction, which indicate that many instructors do not use it in any systematic or curricular way, if at all (Caffarella, 1999; Parker, 1997; Albright, 1997; Schwieso, 1993). With National Technology Competencies being prepared for K-12 schools, it only stands to reason that technology competencies for higher education must also be implemented. But it is important to note that requiring a set of skills or technology competencies for each instructor does not insure technology will be used in the classroom or that it will be used effectively to enhance instruction. Implementing technology competencies may be a catalyst, but effective use of technology in the classroom will require a paradigm shift from "teaching" to "learning," which will require adequate training in technology and learning styles, as well as adequate technical support. Thus, it is the contention of this article that for universities to remain competitive in the new millennium, they must develop cohesive training programs with an emphasis on learning and provide adequate technical support that will assist faculty in integrating technology into instruction.

MOTIVATING FACTORS

Two key factors create an urgency for technology integration into higher education: technology competency standards and competition. Even though competition in higher education plays a major role in the use of technology, the real pressure for higher education to implement technology into the classroom will come from federal agencies and accrediting standards.

National Technology Competencies

National technology competency standards for students graduating from secondary schools are seriously being discussed by the U.S. Department of Education (Thomas & Knezek, 1999). Moreover, school districts throughout the country believe technology literacy is a critical factor in equipping students with the skills and knowledge necessary to succeed in the 21^{st} century (Prime, 1998). In fact, many school districts across the country have already placed technology competency requirements upon their teachers and their graduates (Northover, 1999).

In conjunction with student requirements, the National Council for Accreditation of Teacher Education (NCATE) is also seriously considering implementing technology competencies for teacher licensure (NCATE, 1999; ISTE, 1999). Groups such as the International Society for Technology in Education (ISTE), a professional education organization, and the CEO Forum, a think tank comprised of twenty business and education leaders based in Washington, D.C., are responsible for recommending guidelines for accreditation to NCATE. The CEO Forum has recommended that teacher training in computer technology become a *mandatory* component of licensure by 2002 (CEO Forum, 1999; Galagan, 1999). According to the Forum, schoolteachers in the United States are undertrained on using the computer technology available to them. The Forum also estimates that schools spend roughly $88 per student on computer equipment, but only $6 per student on training teachers to use the technology (Galagan). Many teachers are unable to integrate the technology into their lessons because of a lack of training, and only 20% of teachers were comfortable using computer technology in the classroom (Galagan).

How does this affect higher education? Faculty members serve as role models for prospective teachers and their use of, and attitudes toward, educational technology can have a significant impact on future teachers' implementation of technology in instruction (Parker, 1997). Since colleges and universities produce the K-12 teachers, it only stands to reason that if technology competencies are placed on the primary and secondary schools and teachers, that competencies will have to be placed on higher education professors, as well – and not just professors from Schools of Education, because secondary teachers come from all disciplines (e.g., Biology, Mathematics, English, and the Social Sciences). In response, many universities have already begun to require technology competencies as part of the students' graduation requirements (Davis, 1999; Zargari & Patrick, 1998; Goetsch & Kaufman, 1997; Okpala & Okpala, 1997). In fact, as of Fall 1998, 40% of the nation's colleges had some sort of computer literacy or computer competency requirement (Green, 1999). The question remains whether a university can expect those instructing not to possess the same competencies required of its graduates?

Competition

Competition is the other key factor driving universities to "think outside the box," or implement new innovations. Any college or university can now offer their courses and degrees at a reasonable cost anywhere in the world. A recent Department of Education study of postsecondary schools found that 58% of two-year and 62% of four-year public colleges offer distance education courses (Hodgson, 1999), and over 150 accredited institutions offer entire bachelor's degree programs to students who rarely, if ever, visit campus (Herther, 1997). In fact, as of the Spring 1999, it was estimated that over one million students were taking distance learning (DL) courses (Educause, 1999). The number is expected to reach 2.2 million by 2002, according to a report by the International Data Corporation (College Entrance Examination Board, 1999).

But even with the phenomenal growth in DL, higher learning institutions did not really view DL programs as competition, because they could not receive financial aid subsidies, which are a major component of funding for colleges and universities. That is, until now. Beginning with the 1999-2000 school year, for the first time, financial aid was made available to students in selected distance learning programs. Congress authorized the U.S. Department of Education to begin a DL demonstration program, allowing DL students of 15 selected virtual colleges and universities to receive aid through programs such as the Pell Grant and Stafford Loan programs. Previously, to qualify for financial aid programs, a school had to offer at least half of its courses in a traditional classroom environment, and 50% of its students had to study on campus (Distance Learning in Higher Education, 1999; Inside Technology Training, Jan 1999). The Higher Education Act also budgeted $10 million for the Learning Anytime Anywhere Partnership program (LAAP), through which schools, working with other organizations, compete for grant money for distance learning projects (Distance Learning in Higher Education, February 1999). Traditional colleges and universities no longer have a monopoly on traditional funding for a college education.

Distance Learning is booming, due in large part to the advent of the Internet. A recent survey reveals that a desire to be linked to the Internet drove nearly 4-million buyers to purchase their first computer in the first half of 1998 (Distance Learning in Higher Education, February 1999). Another report predicts that 90% of U.S. households will have Internet access by 2010 (College Entrance Examination Board, 1999). It is predicted that by 2005, Americans will spend more time on the Internet than watching TV (Anson, 1999). A recent survey of 8500 young people ages 16 to 22 (Shirer, 1999) reveals that young consumers are internalizing Internet usage into almost every aspect of their lives. No doubt, these technology savvy surfers will shop around the web for courses and universities that are most appealing to their style of learning – and they have a plethora of choices. The U.S. Department of Labor's America's Learning Exchange project expects to list over one million online courses from over 10,000 providers by the year 2000 (College Entrance Examination Board, 1999). More than ever, style and skill will matter, but unfortunately, most surveys report that only 20-30% of faculty incorporate technology into their instruction (Jaffee, 1998).

BARRIERS TO TECHNOLOGY ADOPTION

In all fairness, the lack of technology use in the curriculum may not entirely be the blame of the instructor, but could very well lie with the institution. Foremost among the barriers to the full adoption of information technology is a set of established institutional norms relating to teaching methods, faculty autonomy, and notions of productivity. The set of teaching-method norms include such considerations as teaching loads, student-teacher ratios, and class size (Massy & Wilger, 1998; Caffarella & Zinn, 1998; Schwieso, 1993). There are three ingredients for faculty behavior modification: (a) access to resources which promote the desired behavior (i.e., computer on their desk, training when and where they need it, consultants, mentoring, release time), (b) convenience in adapting the desired behavior (i.e., standardizing presentation technology across campus, providing onsite technicians, technical support), and (c) reward and recognition for following the desired behavior (i.e., monetary compensation, credit toward promotion and tenure) (Rao & Rao, 1999). Less than 12% of U.S. campuses provide any type of formal recognition or reward (Rao & Rao). Institutions may well have to reassess the relative balance in faculty rewards between teaching and research. But many faculty members are slow to adopt new technology simply because they are not convinced that using it will improve their students' learning (Neal, 1998; Reid, 1996).

Effectiveness of Technology

There are several studies that have focused on the educational effectiveness of technology. According to the U.S. Department of Defense nearly a decade ago, we have short-term retention of approximately 20% of what we hear, 40% of what we see and hear, and 75% of what we see, hear, and do (Gantt, 1998). Now researchers conclude that 60% of American students are visual dominant learners, 37% are auditory dominant learners, and 3% are kinesthetic dominant learners. Moreover, trainees complete courses with multimedia in one-third of the time as those receiving traditional instruction, and reach competency levels up to

50% higher (McCormick, 1999). In most cases the overall cost of instruction is lower.

A recent detailed study of IT learning behaviors outlines several other benefits of learning through multimedia:

- It mirrors the way in which the human mind thinks, learns, and remembers by moving easily from words to images to sound, stopping along the way for interpretation, analysis, and in-depth exploration.
- The combination of media elements enables trainees to learn more spontaneously and naturally, using whatever sensory modes they prefer.
- Combining media elements with well-designed, interactive exercises enables learners to extend their experience to discover on their own.
- Many multimedia programs are designed to allow learners to pause, branch, or stop for further exploration (interactive qualities that encourage non-linear thinking).
- By combining words with pictures and audio, multimedia programs enable people with varying levels of literacy and math skills to learn by using sight, hearing, and touch. Evidence suggests that using multimedia segments as context for trainees significantly aids in reading comprehension.
- Instructional technologies help people learn to problem-solve and work in teams, which supports the development of interpersonal skills.
- With a multimedia program as assistant, trainers can provide more individualized attention to trainees as they need it most.
- Instructors have time to focus on activities that demand participation while students are able to learn on their own (Gantt, 1998).

THREE LEVELS OF TECHNOLOGY ADOPTION

There are three levels of information technology adoption: (a) personal productivity aids, (b) enrichment add-ins, and (c) paradigm shift (Massy & Zemsky, 1995). *Personal productivity aids* are applications, which allow teachers and learners to perform familiar tasks faster and more effectively (such as word processors and spreadsheets). Virtually, all institutions of higher education are at least at Level a. *Enrichment add-ins* inject new materials into the "old" teaching and learning without changing the basic mode of instruction. Examples include e-mail and listservs, web pages and searches, and the use of video, multimedia, and simulation to enhance classroom presentations and homework assignments. This level is quite common. As of Fall 1998, more than two-fifths of college courses used e-mail, while fully a third of college courses drew on content from the Web (Green, 1998). The *paradigm shift* is where faculty and their institutions reconfigure teaching and learning activities to take full advantage of new technology. The result is a mix of the best of the old and best of the new. Technology in higher education has operated almost entirely at Levels a and b (Massy & Wilger, 1998).

Who are the players in this scenario? Rogers' (1983) five categories have been cited by many experts over the years (Edmonds, 1999; Massy and Wilger, 1998; Jaffee, 1998). First come *the innovators* – people who are willing to experiment. These make up 3% of faculty. Then the *early adopters*, risk takers, enter after the course has been charted. This population makes up about 10% of faculty. Next come the *early majority*, for whom the trail has been blazed and charted. Seventy percent of faculty fall into this category. The last two types of adopters comprise less than 2%. The *late majority* take even fewer risks. And finally the *die hards* or *laggards* come into the picture when they have no alternative, or perhaps they simply retire from teaching.

TRAINING – THE WEAK LINK

The application of technology can be complicated and time-consuming until it has been mastered. Training and technical support is critical, yet most faculty have had little formal training on how to make effective use of IT resources in their instructional and scholarly work (Barley, 1999; Parker, 1997). The weak link in the knowledge infrastructure in most institutions is the skills and training in Information Age tools and processes for learners, faculty, staff, and other participants (Norris & Dolence, 1996, p. 18). Research suggests that some progress has been made in recognizing that adequate faculty training is necessary in higher education – as of Fall 1998, more than three-fourths of the two- and four-year colleges had IT support centers to assist faculty with instructional integration (Green, 1998). But does this effort demonstrate true institutional support for faculty members interested in improvement through technology? Many critics think not. True change will only occur with long-term institutional support (Rickard, 1999, Reiss, 1998).

A Shift from "Teaching" to "Learning"

Most faculty conduct a teacher-centered classroom; therefore, successful use of technology, whether it be in cyberspace or a traditional setting, will require behavior modification from faculty, or a shift from "teaching" to "learning." Because research indicates that students are learning differently today (Anson, 1999; McCormick, 1999; Shirer, 1999), classrooms need to become learner-centered (Boettcher, 1999; Sprague & Dede, 1999; Moersch, 1995). The infusion of information technology into the teaching and learning domain creates shifts in the skill requirements of faculty from instructional delivery to instructional design – with faculty being responsible for course content and information technologists being responsible for applying information technology to the content (Anson, 1999). The most important step from teaching to learning, is moving "from a teaching culture that ignores what is known about human learning to one that applies relevant knowledge to improve practice" (Angelo, 1996).

It is imperative that institutions realize that it is not only technology that is important, but also the learning methodologies utilized to employ the technology (Turoff, 1999). Successful use of the technology involves virtual classes that are very different from the face-to-face class. Rather than being the "sage on the stage," the instructor must become the "guide on the side" (Alexander, 1999). It requires a shift from being a teaching franchise to being an enterprise that emphasizes "learning." Using a *constructivist theory* to education in which students learn by taking in information from the world and constructing their own meaning from the experience, as opposed to someone telling them bits of information – instructors allow student responses to drive lessons, shift instructional strategies, and alter content (Arminio, 1999; Sprague & Dede, 1999; Turoff, 1999). Again, it will require behavior modification by the faculty, which requires time and guidance.

Behavior modification can be assisted through Faculty Development programs, but not just with technology training and technical support. Faculty development that was typically termed "software" training will need to evolve into "training faculty in how to use the software in a learning environment" (Rao & Rao, 1999). Simple technology training sessions often lead to nonuse or low levels of use of the technology in the classroom because most computer technology is used for isolated activities unrelated to a central instructional theme, concept, or topic (Moersch, 1995). Training should go beyond teaching technology skills to include teaching faculty to understand the learning styles of the students, because a major influence on the faculty's vision of teaching is on the perceived view of learning outcomes (Rainer, 1999; Guffey, Rampp & Bradley, 1997). Until faculty are comfortable using and accessing information with technological literacy, there will be no significant change in instructional practices in the classroom (Porter & Foster, 1998).

Learning styles. Learning style theorists suggest that different people learn best in different ways, and that appealing to learning style preference increases learning efficiency and retention (Frye, 1999; Becker & Dwyer, 1998). While a classroom lecture might appeal to some students, others may learn more efficiently by reading text, or collaborating on a group project. There are three types of learners: (a) visual, (2b auditory, and (c) kinesthetic or tactical. *Visual learners* are stimulated most effectively by the use of a multi-sensory approach provided by movement, color, graphics, and sound. This type of learner prefers seeing what he is learning and will benefit most from multimedia presentations (Butler & Mautz, 1996). *Auditory learners* prefer to get information by listening. *Tactical learners* prefer hands-on learning such as making models, doing lab work, and role playing. A strong case for more technology in the classroom can be made since 60% of students today are visual learners (McCormick, 1999).

Motivation Theory is another important aspect of learning theories. Up to thirty-eight percent of student achievement is due to motivation (Fyans & Maehr, 1987). The argument is that relevant phenomena better fulfill personal needs or goals, thus enhancing effort and subsequently, performance. The goals that people undertake are the goals that are perceived as relevant and valuable to the individual (Means, Jonassen, & Dwyer, 1997). In a study of adult learners in a continuing education class, relevance was the most important instructional factor identified (Viechnicki, Bohlin, & Milheim, 1990).

Three classifications of learning. Researchers have sought to describe clearly identifiable, qualitative distinctions in student learning styles, resulting in three classifications of learning (Mockford & Denton, 1998). *Deep learning* is based on high levels of intrinsic motivation, in a variety of strategies in the search for understanding. This is the ideal model of learning. *Surface learning* occurs when the student simply puts in the minimal effort to avoid failure. Finally, *strategic learning* is focused towards the product of learning rather than the process and the achievement of high grades. Specific, predetermined outcomes are a motivating factor for the learner's efforts, no matter what his learning style.

Lifelong learning is necessary for success in the next century. This will require individuals to be skilled independent learners; therefore, effectively supporting self-directed learning is one of the critical challenges of higher education. Effective assessment strategies which enable the instructor to tailor learning to individuals and to evaluate the appropriateness of the work is essential (Mockford & Denton, 1998; Fischer & Scharff, 1998; Stoffle, 1998), especially for the "virtual classroom professor." Learning scales such as the Grasha-Riechmann Student Learning Style Scale (GRSLSS), identifies six learning styles: independent, dependent, competitive, collaborative, avoidant, and participant. Using findings from an inventory such as GRSLSS, instructors can design learning activities to best meet the needs of students (Frye, 1999).

Table 1. Old Versus New Assumptions About Learning

Old Assumptions	New Assumptions
1. People transfer learning with ease by learning abstract and decontextualized concepts.	1. People transfer learning with difficulty, needing both content and context learning.
2. Learners are receivers of knowledge.	2. Learners are active constructors of knowledge.
3. Learning is behavioristic and involves the strengthening of stimulus and response.	3. Learning is cognitive and in a constant state of growth.
4. Learners are blank slates ready to be filled with knowledge.	4. Learners bring their own needs and experiences to learning situations.
5. Skills and knowledge are best acquired independent of context.	5. Skills and knowledge are best acquired within realistic contexts.
	6. Assessment must take more realistic and holistic forms.

Source: (Grabinger, 1996, p. 667)

DL breaks the association of 'learning' with 'classroom', thus preparing students with skills for the self-directed continuing and recurrent education which will be essential for their continuing professional development in a world of rapidly changing information and ideas (Johnston, 1997, p. 113).

The Distance Learner

The successful distance learner is characterized by a variety of traits, including a strong sense of independence, appreciation of owning the direction of their inquiry, and an ability to shape and manage change (Cook, 1997; Barell, 1995). These students tend to be more mature, motivated, self-directed, and self confident. A variety of DL media can allow students to select modes to match their own learning styles. Online courses are ideal for the independent learner, but instruction that appeals to a variety of learning styles becomes more critical when delivered over the Web (Frye, 1999). When you place a course on the Web, it is open to anyone, anywhere, anytime which makes learning preferences even more important. By varying the instruction, you will have a chance of meeting the learning styles of several kinds of learners.

The "Virtual Classroom" Professor

Many educators question the legitimacy of online courses (Mendels, 1998; Reich, 1999; Stancill, 1999). They view online courses as inferior to the traditional classroom lecture, because they assume distance courses cannot be rigorous enough to be academic. On the contrary, the instructor, with proper knowledge of how to use technology, can create a cyber classroom equal to – and in some cases, superior to – the traditional "bricks and mortar" classroom (Schulman & Sims, 1999). Interactivity has long been considered to be a key to success in traditional classrooms (Webster & Hackley 1997). Students experiencing higher levels of interaction have been shown to have more positive and higher levels of achievements (Fulford & Zhang, 1993). The same applies to successful DL programs (Gold & Maitland, 1999). California State University at Northridge, for example, found their virtual students tested 20% better across the board than their counterparts who learned in a traditional classroom and spent 50% more time working with each other than people in the traditional class (Black, 1997). It is important to note that a good classroom professor is not necessarily a good online professor. The virtual classroom professor must select and filter information and provide thought-provoking questions to generate discussion. One professor noted that online, in "six months, I have routinely led the level of discussion that I only dreamed of leading as a traditional professor" (Kettner-Polley, 1999).

How can this be? These seven points of educational technologies, using teaching/learning principles that can facilitate interactive learning communities, can foster such results:

1. Asynchronous communication technologies (i.e., email, listservs) provide more frequent and timely interactions between students and faculty.
2. Both synchronous and asynchronous computer-mediated communication (CMC) technologies expand options for working in learning groups and encourage reciprocity and cooperation among students.
3. Well-planned online teaching environments support active learning techniques such as reflective thinking, peer interaction, and collaborative learning activities.
4. Computer-mediated DL has the capacity to support immediate instructional feedback; it is easy to send out new information, revisions to the syllabus or schedule, or immediate feedback on student work at any time instead of waiting for weekly class meetings.
5. IT can make studying more efficient by providing immediate online access to important learning resources. Emphasis is placed on meeting instructional goals and performance objectives, rather than spending time in class.
6. Use of IT can assist students in improving their cognitive skills by providing examples of excellence and convenient, accessible, flexible forums for self and peer evaluation.
7. Web-based asynchronous learning programs permit each participant to progress through the program content at his or her own pace, and the wide range of text, images, and multimedia available can support a variety of learning styles (Cravener, 1998; Sorcinelli, 1995).

When higher education institutions define competencies that state what students are to learn (while incorporating learning styles), criteria for evaluating them, and the standards for how well students and faculty must perform, only then, will higher education take the important step toward becoming learning communities (Angelo, 1996).

> Opportunities for real change lie in creating new types of professors, new uses of instructional technology and new kinds of institutions whose continual intellectual self-capitalization continually assures their status as learning organizations (Privateer, 1999, p. 72).

TRAINING PROGRAMS

Change is facilitated by active leadership at the highest level. Successful technology integration depends on the

Table 2. Elements of Faculty Development

• must offer immersion and transformation.
• must inspire faculty to invent.
• must be experience-based, with learning resulting from doing and exploring.
• must hook the curiosity, wonder or passion of faculty.
• must respond to faculty's appetites, concerns and interests.
• must consider the feeling, fears and anxieties of the learners.
• must engage the perspective of faculty.
• must appeal to learners at a variety of development stages.
• must be properly funded.

Source: (McKenzie, 1991)

institutional support to harness and develop individual commitment and talent to move in the direction of the university's goals. This translates into additional spending by the institution for faculty development. Although money is allocated for faculty development expenses in the different disciplines, a designated faculty development center with a "learner-centered" philosophy is essential (Bakutes, 1998; Shapiro & Cartwright, 1998). Literature on adult learning theory and effective faculty development programs together provide a powerful knowledge base that offers guidance in the design, development, and implementation of effective faculty development programs (Butler, 1999).

Further analysis of the concept of the Faculty Development Center (FDC) results in the conclusion that FDCs that go beyond software skills training to becoming involved in course design and teaching strategies are successful. (See Table 2).

One example of a successful FDC is the Instructional Development Program at the University of Oklahoma. The director stated that faculty members were more likely to change their teaching methodology as a direct result of involvement in their program's activities (Bakutes, 1998; Quinlan, 1991). Another example is the Faculty Center for Teaching and Learning at the University of Central Florida, which applies learning theories and innovative instructional techniques to face-to-face and technology-enhanced teaching and learning (Smith, 1997).

A Faculty Development Center

Five years from now, emerging young teachers generally will be comfortable with technology in the classroom. However, the current integration entails a steep learning curve for existing faculty members. Because of this, attention must be given by educational institutions to providing a FDC with an extremely sensitive and supportive staff. The FDC, as used in this discussion, is an identified group of resident experts dedicated to helping the faculty integrate technology into the classroom. The Center must provide a knowledge base with a variety of resources that are accessible and comfortable for use at the convenience of faculty. A Center must house onsite personnel, videos, computer-based training (CBT), online courses, hands-on computer tutoring and seminars, and a help desk (Cifarelli, 1998). Faculty cite the combination of having a place for them to work on projects and full-time staff members at that place as critical in the integration process (Candiotti & Clarke, 1998).

Table 3. Technology and Professional Development – 10 Tips to Make it Better

1. Offer training
2. Give technology they can take home
3. Provide on-site technical support
4. Encourage collaboration with colleagues
5. Send professionals to professional development conferences
6. Stretch the day
7. Encourage research
8. Provide online resources
9. Influence preservice education
10. Celebrate success
Source: (Solomon & Solomon, 1995; pp. 38-39, 71)

Characteristics of the staff. First of all, the training staff needs to understand the strategic goals of the institution, be part of the development of these goals, and be able to engage in strategic application of their skills so that the impact is not marginalized or limited by individual "consultative" action (Reid, 1999). The staff must also possess "people skills" in addition to their technical skills (Norris & Dolence, 1996). The staff will have to play many roles to assist in the transformation: navigator, guide, interpreter, mentor, and learner.

Faculty are accustomed to being experts, and when they are novice learners they experience the same anxiety as any new learner. Being sensitive to these factors, while at the same time helping faculty come to grips with being a student again, is a key success factor in helping faculty to adopt new technologies (De Vry, Greene, Millard, & Sine, 1996). The Faculty Development Director should look for mentor qualities such as sensitivity, suspending judgement, rapport building, using diagnostic frameworks and developmental goal setting, providing feedback, and monitoring (Hale, 1999).

Support personnel must be familiar with basic adult education theory and practice (Cravener, 1998; McKenzie, 1998). They must also know and understand the various learning styles and be familiar with alternative delivery methods to fit the learner's profile. Trainers will need to understand and represent the learners needs. After all, the "learner-centered" concept is what the FDC will need to instill in the faculty for them to incorporate learning styles and technology into the classroom.

The key in successfully implementing a FDC is to find technology-savvy students in other fields. A technology-training group at the University of Washington cautions universities to avoid hiring computer science majors as consultants, and "aggressively seek out non-technical people who are comfortable with technology" (Young, 1999). The group teaches its consultants *not* to use technical terms, which tend to intimidate non-technical people. Their reasoning is to make technology integration as easy as possible. The technical names are not important – it is knowing how to use the technology that is important. Employ student workers with those same characteristics.

Resources. Once a staff is organized, the Center should develop and share a plethora of resources on learning: books, monographs, articles, and clippings on emerging technology trends and forecasts, research on the impact of technology on learning, and examples of best practices that exemplify the ways to transform into a learning community (Norris & Dolence, 1996). These resources should be accessible to faculty at all times in the center.

Training methods. The next step is to organize and plan a variety of methods for training. Classroom training is better for beginners because it makes learning easier (Trepper, 1999). Studies show that small groups of no more than nine students work best (Nunez-Cruz, Hines, & Dominguez, 1996). Best practices of other university faculty development departments reveals many good training models which are based on the principles of effective faculty development, requiring hands-on experiences, meaningful instruction, and examples of how technology can be integrated into the classroom (Cifarelli, 1998). (See Table 3).

Before implementing any training, assess the learning styles of each faculty requesting assistance from the Center to determine the type of class from which he or she would benefit most (Collins, 1999). One-shot afternoon workshops will not provide for the full range of learning needs, nor result in behavior modification. Profound shifts of attitude and behavior are acquired through immersion (McKenzie, 1991). Other available options include informal lunchtime presentations, individualized instruction for faculty, sets of self-paced materials in printed text, CD-ROM, and videotape formats. The process will require a lot of time and a variety of training methods in order to be successful. The types of training outlined in Table 4 are a combination of ideas from a vast array of research and best practices. The ideal facility would incorporate all of these examples. Faculty immersion in a program such as this will help to facilitate a paradigm shift through technology integration (Collins, 1999).

Conclusion

In conclusion, technology is forcing rapid changes in higher education that cannot be ignored. Technology competency standards and competition of DL are two key factors that create an urgency for technology integration into higher education. Whether or not one agrees with technology competencies for higher education faculty is immaterial. Research suggests that standards are inevitable because of both the impending K-12 and NCATE technology standards and the expected dynamic growth in DL. However, research also suggests that integration will require more than just establishing competencies. If universities are to remain competitive in the new millennium, they must effectively integrate technology into the classroom. This will require universities to develop cohesive training programs with an emphasis on learning and provide adequate technical support that will assist faculty in integrating technology into instruction. Faculty cite the combination of having a place for them to work on projects and a full-time staff member at that place as critical in the integration process. Therefore, FDC must be established to *train* faculty to use technology, *show* them how to use it effectively in the classroom, and offer just-in-time technical support. That Center must house onsite personnel and a wide variety of materials and methods for teaching and learning (i.e., videos, computer-based training, online courses, tutorials, seminars, best practices database, help desk). Training must not only be technical – it must also include teaching faculty about learning theories and how to recognize learning styles of individual students in order to maximize learning experiences in the classroom. The combina-

Table 4. Types of Training

1. One-on-One – Faculty should be offered the opportunity to arrange tutorial or "just-in-time" sessions. They allow for a flexible working environment: the facilitator may visit faculty and work directly on their workstations (Engeldinger & Love, 1998).
2. Small-Group Workshops – operate in a small group setting. To accommodate the maximum number of faculty, workshops should be offered in multiple sessions and at varied times throughout the year.
3. Departmental – Promote principles and practices of effective teaching by working with specific departments to develop specialized instructional techniques to enhance teaching effectiveness (in other words, 'by discipline') (Bakutes, 1998).
4. CBT or WBT – computer-based training or web-based training. Must be interactive. Users must be able to enter and exit the training package at any time and any point, return directly to where they previously exited, and highlight areas they would like to revisit. Frequent, short tests should be given to confirm that users have mastered specific skills; an audit trail should be provided to track users' progress. Great for the independent learner.
5. Tutorials – must contain skill-sets that cater to a range of users, from novices to the very experienced. Should be self-paced. Should contain screenshots to allow users to easily match what they see in the manual with what they do at their own workstations. Most importantly, manuals should be short and concise (Northover, 1999).
6. Teletraining – method of bringing offsite training into your university. Twenty percent of all faculty development is provided through distance learning: satellite teleconferencing, interactive television, and computer-based interactive systems (Bender, Clinton, & Hotaling, 1996).
7. Lunch Bytes – Brown bag lunch sessions featuring individual faculty who have used technology in effective ways such as visualization of earthquakes in geology (Frayer, 1999; Rups, 1999).
8. Faculty Institutes – classes and workshops which focus on the creative integration of computing resources and technology into teaching. Innovative teachers share their work, efforts, and experiences (Rups, 1999).
9. Multimedia User Groups – a group of faculty who are actively using and developing multimedia applications meet monthly to share expertise and exchange ideas (University of Delaware, 1996).
10. Mentors – can lead to the development of skills where training courses often fail. Similarities between mentor and mentee learning styles can speed up the relationship, but contrasting learning styles may actually lead to more powerful learning. Four roles: (1) *coach* - learner does not actually own the process (2) *guardian* - who is a source of advise and role-model (3) *counselor* - psychological support to learner (4) *facilitator* - helps the individual take charge of his own learning (Hale, 1999). Has been the relationship of choice in the business arena for many years (Cunningham, 1999).
11. Help Desk – faculty should be able to call for help when they need it (McKenzie, 1998).

tion of technical skills and applied learning theories will catapult the paradigm shift from "teaching" to "learning." This will give educational institutions a competitive edge in the new millennium. ■

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Donna L. Rogers, Arkansas Tech University, Professional Development Institute,
Dean Hall 117B, Russellville, AR 72801-2222 USA
donna.rogers@mail.atu.edu