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Developing and Sustaining Positive Change in Faculty Technology Skills: Lessons Learned from an Innovative Faculty Development Initiative

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The *e-Teaching and e-Learning Initiative* was developed at a regional university on the east coast of the United States to help faculty increase their proficiency and use of technology in their courses in order to improve student learning. This campus-wide faculty development program included "hands-on" collaborative learning during a week-long, intensive "Academy," followed by ongoing mentoring, turn-key workshops, on-call technical support, and a web-based e-learning resource site. The program helped to link educational technology to pedagogy in order to educate, enable, and empower faculty in providing interactive technology-based content learning experiences to students, a significant proportion who are training to be K-12 educators. Key factors in the initial training that had a positive impact on faculty technology usage are discussed as well as important elements that helped sustain the gains brought about by the training over the next five years. These insights will help provide a blueprint for designing effective and long-lasting faculty training programs in educational technology both nationally and internationally as well as other kinds of faculty development efforts across diverse content areas, educational levels and contexts.

Keywords: faculty professional development; faculty training; adult learning; educational technology; collaborative learning; e-learning; e-teaching

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INTRODUCTION

Today's college students live in a digital environment and technological skills are becoming more essential for their success in the contemporary workplace. A medium-sized public university on the east coast of the United States has a long history of preparing its students to contribute to the regional economy. With research showing the importance of preparing students who are technology savvy (Metiri Group, 2003), it became imperative for the university to offer professional development opportunities that would educate, enable, and empower faculty in providing interactive, technology-based learning to their students.

The university already had in place a variety of education technology workshops offered by the Academic Computing Center which provides computing and information technology services and assistance to the campus community. Additionally, the college of education's Faculty Technology Center provided similar help to education faculty. The university also made available equipment and assistance to those faculty members who became early adopters of educational technology or who taught educational technology courses. However, in many cases, it was observed that faculty had to be self-motivated when it came to learning new technologies and in seeking funds to support innovative approaches for using technology in their courses. Therefore, it became apparent that a systematic plan and infrastructure needed to be established in order to increase faculty educational technology literacy across the university

In 2002, technology educators in the college of education at the university were awarded the *Improving Technology at Colleges and Universities (ITCU)* state grant to design and implement a professional development program in educational technology. This program became known as the *e-Teaching and e-Learning Initiative (ETLI)*. The original purpose of the initiative was to help education faculty to increase the use of technologies in their education courses in order to improve student learning and to model effective instructional uses of technology to these future teacher educators. The project coordinators decided to expand the training initiative to include faculty in the other colleges at the university since teacher candidates take courses in many departments across the institution.

The design of the project was based on the ideas of systemic change used in business and education and the research on adult learning and effective professional development. The ultimate goal of the project was to increase involvement of students in relevant, interactive, accessible learning through the inventive use of digital technologies, interactive communication, and distance learning environments created by university faculty. Twenty-three faculty members participated in the program. Many valuable insights about how to design, implement, and sustain successful faculty professional development programs in educational technology were gleaned from *ETLI* and are shared in this article. Most of these insights are not limited to university faculty professional development in educational technology, but can be applied across contexts, content areas, and educational levels and used as a blueprint for helping institutions promote professional and personal growth.

LITERATURE REVIEW

Many people would agree that today's adult needs to be a self-directed, life-long learner (Knowles, 1984; Bolhuls, 2003). Higher education institutions are expected by accrediting agencies to train faculty in acquiring new technology skills, competencies, and strategies so that their students are better prepared for the future (Rogers, 2000). According to the Metiri Group (2003), the current generation of students has grown up in

the "digital age" and anticipates using technology in the classroom and in the workplace. Educators must develop and use new teaching strategies based on the research about how people learn, the effective uses of technology for learning, and the 21st Century skills needed to be successful in today's society.

In higher education, scholarship is a major part of a faculty member's professional development. As faculty focus on acquiring scholarly credentials and contributing to the research in their discipline, they often do not have the time, knowledge, or support needed to learn about and implement innovative teaching practices that will lead to more effective student learning and career preparation (Chang & Baldwin, 2008). They may have to be self-motivated when it comes to learning about ways to improve their pedagogical skills.

However, expecting faculty to be self-motivated may not be the best way to ensure that these skills are in fact acquired. Diaz, Garrett, Kinley, Moore, Schwartz and Kohrman (2009) found that "21st Century faculty" will continue to need assistance in incorporating technology into their instruction and measuring the impact of different instructional delivery approaches on student learning. They point out that "encouraging faculty adoption and innovation in teaching and learning with IT" was one of the top five challenges in the EDUCAUSE Top Teaching and Learning Challenges for 2009 (http://www.educause.edu/eli/challenges).

According to Meacham and Ludwig (2001), effective faculty development "…is not a luxury, but a necessity as higher education faces the 21st Century" (p. 254). Wei, Darling-Hammond, Andree, Richardson, and Orphanos (2009) defined "effective" or "high quality" professional development as that which improves teacher knowledge and instructional practice and results in improved student learning. However, not all professional development models necessarily result in professional learning and change in the classroom.

In some cases, faculty professional development programs tend to be "one-shot" training approaches where educators might attend workshop sessions on a variety of topics without necessarily understanding how the training will influence their teaching. Meacham and Ludwig (2001) found that bringing experts to campus for a one or two-day workshop did little to change faculty's teaching practices. They felt that this model of faculty development was rarely effective unless faculty members received continued support and follow-up activities to reach their goals. According to Wei et al. (2009), these "episodic and fragmented" traditional workshop models do not provide the sustained time and continuity necessary to transform instructional techniques.

Research on systemic change in education and adult learning provides a framework for designing professional development programs that can have a significant impact on teaching practices. According to the Regional Laboratory for Educational Improvement of the Northeast and Islands (1995) as cited in NCREL (1995), systemic change in education is a "dynamic process" that occurs at many levels and affects all stakeholders including students, teachers, parents, administrators, and community members. It requires continuous communication and evaluation, and has implications for many areas of education including professional development. Anderson (1993) described six key elements to lasting educational change:

- a shared vision
- support from all levels of the system
- networking and interconnectedness
- research-based teaching and learning principles to change instruction and student learning
- administrative support and shared decision-making, and

- policy alignment to reflect new beliefs and practices.

Studies of how adults learn can also be used as a guide for designing quality professional development programs. According to Lawler (2003), the research on adult learning, education, and development provides a "rich resource" for professional developers. Lawler and King (2000) proposed six adult learning principles for effective professional development:

- climate of respect
- active participation
- building on the participants' experiences
- collaboration
- learning for action or application, and
- empowering participants.

Adult learners prefer the opportunity to make choices from a "rich and varied menu" of learning experiences and possibilities and to take personal responsibility for professional growth (McKenzie, 2003). Adult learners thrive in an atmosphere of team learning and collaboration, but, according to Brancato (2003), this collaboration is often difficult to achieve. Opportunities for ongoing professional development can help to keep faculty "…vital, productive, and working together as a community of learners" (p. 61). MacDonald (2001) reported that the "Teaching Community" model for professional development has brought about remarkable changes in university faculty teaching skills, motivation, and enthusiasm.

Wetherill, Burton, Calhoun, and Thomas (2001) proposed a redefinition of professional development that emphasized the need for long-term personal and professional growth rather than an event or activity framework that would be more characteristic of staff development. According to Wetherill et al., every educator, including university faculty, must engage in continuous professional development, and schools, including colleges, need to provide professional experiences that satisfy individual as well as organizational needs. Educators should be reflective practitioners, who continuously evaluate their professional competence and set goals for their professional growth. Faculty should have opportunities to share their knowledge, experiences, and insights within a community of learners.

Darling-Hammond and Richardson (2009) discussed a new paradigm for professional development that includes intensive, extended, and cohesive training with active, hands-on learning experiences where teachers can apply and reflect on what they have learned and collaborate and share with peers. They described a model emerging in the literature that meets these criteria, the "professional learning community" where teachers work together, reflect on new practices within their specific context, and share their knowledge and expertise in a collegial working environment. Wei et al. (2009) in their review of the status of professional development in schools in the United States and abroad found that high quality professional development must be sustained and content-focused, and done within a collaborative, trusting environment where teachers can feel safe to take risks.

Several of the strategies for professional development articulated by the Indiana Professional Development Committee for Learning and Technology and the Metiri Group (2001) further supported the research on high quality professional training. These strategies included:

- immersing teachers in an extended, intensive experience where they can learn content and develop necessary skills
- encouraging action research to track the impact of innovations
- allowing individualized learning where teachers can personalize their professional development activities to meet their own needs and interests

- mentoring from a colleague with expertise to share
- networking to share insights and experiences
- reflecting on one's teaching and learning, and
- turn-key training or creating teacher trainers who serve as resources and provide support and training to others.

Brown, Benson, and Uhde (2004) stressed the need for sufficient time to learn and opportunities to practice newly acquired skills in a risk-free environment where ideas are shared and mistakes are allowed. Providing "just-in-time" support directed at individual need and incentives that recognize participant effort are essential components for effective faculty development in educational technology (McKenzie, 1998; Rhodes & Goveia, 2002). Lisowski, Lisowski, and Nicolia (2006) found that a "what-we-need, when-we-need-it" training component was the most successful aspect of their faculty development project.

DePauw University's model for successful technology initiatives discussed by Trinkle (2005) in *The 361° Model for Transforming Teaching and Learning with Technology* emphasized the importance of aligning technology to educational objectives and best teaching practices. Mishra and Koehler (2006) argued that pedagogical uses of technology require the development of a complex form of knowledge that they labeled Technological Pedagogical Content Knowledge or TPCK. According to Mishra and Koehler, until recently, the knowledge of technology was separated conceptually from content and pedagogy. Mishra and Koehler directed educators' attention to the importance of making connections among pedagogy, content, and technology. According to Otero, Peressini, Meymaris, Ford, Garvin, Harlow, Reidel, Waite, and Mears (2005), university faculty "…must come to understand content-specific, pedagogical uses of technology in their own instruction" (p. 8). When these connections between content, pedagogy, and technology are made evident, educators are more willing to learn and use technology in their classrooms.

In their recent study of successful professional development programs for 21st Century faculty, Diaz et al. (2009) found several common elements which included focusing on student success, providing opportunities for faculty input, incorporating flexibility in program offerings, blending technology with pedagogy, and providing support at different levels of expertise. Amburgey (2006) identified three primary barriers in faculty technology use: access to technology, appropriate training, and the time to redesign curriculum. Faculty participants interviewed by Amburgey reported that a reduction of their teaching load was a valuable aspect of the program because it allowed them the time to practice what they learned while redesigning their course curriculum.

Amburgey (2006) also pointed out the importance of providing faculty the support to continue to develop their technological knowledge and skills. According to Diaz et al. (2009), *sustainability* continues to be a "critical component" of any effective learning situation. Ziegler & Pulichino (2004) noted that a "community of learners" approach to sharing technology skills was important for developing and maintaining technology skills. Other important elements for sustaining the impact of educational technology training programs included infrastructure (Lisowski et al., 2006), ongoing funding and allocation of resources, incentives, and a shared vision within the school of the purpose and importance of educational technology (Lindemann, 2004; Otero et al., 2005; Schrum, Skeele, & Grant, 2002).

Keeping up-to-date with the constantly changing digital world requires teachers to continuously adopt new technologies. Stroud (2009) described technology adoption as "a complex, inherently developmental process" that involves cognitive, emotional, and contextual concerns. According to Stroud, when adopting a new technology, teachers

consider ease of use, value for improving teaching and learning in their particular classroom contexts, ability to choose which technologies to use, and the amount of administrative support available.

When planning the *ETLI*, the project directors incorporated many of the findings from this extensive research on systemic change, adult learning, and high quality professional development. Active learning, collaboration and communities of learners, mentoring, support, incentives, personalization, goal articulation, and action research and self-reflection were all part of the *ETLI* model. Evaluation of the program's effectiveness was also an integral piece of the program design. The sustainability of the program was also evaluated. The description of the model as well as the findings and insights gleaned from the evaluation of the *ETLI* experience are described in the following sections.

THE *ETLI* MODEL

DESCRIPTION OF THE MODEL

Administrative awareness and support for the program was an important component of the *ETLI* model. When the initiative began early in the fall of 2002, the two directors of the project met with each of the deans of the five colleges at the university. The purpose of the meetings was to explain the project in order to receive administrative buy-in and to identify a "point person" who would serve as an advisor and liaison between the college administration and the project directors. A Request for Proposal (RFP) was sent out to faculty members across the university inviting them to participate in the initiative. In the RFP, faculty defined their objectives for participating and described their current level of technology proficiency and usage. Fifty-five faculty members applied, and because of funding limitations, twenty-three were selected to participate in the project. The selection was based on their having tried some form of classroom technology. All five colleges were represented.

A laptop computer and a $300 stipend were the incentives for participating in the initiative. Participants attended a five-day intensive workshop during winter break in January of 2003 referred to as the "Academy". They were required to incorporate technology into a course that they would be teaching during the spring 2003 semester and to conduct an action research study to capture their experience. They were allowed to choose the technology they wanted to adopt as well as the degree to which the technology would be used in their spring course.

The Academy was an intensive, one-week immersion training program that was structured based on the research on adult learning. In a pre-Academy baseline survey participants were asked to articulate their needs and expectations to help the project coordinators plan the Academy. The training was built around four areas: *concept building, leading edge technologies, collaboration and community building,* and *individual professional development.* Experts were brought in to discuss best teaching practices and how technology can support these practices. A business leaders' roundtable highlighted the skills needed for the 21st Century workplace. Participants were shown leading edge technologies and how they could be used to improve pedagogy and student learning. Participants were given opportunities to relate the training to their own individual professional growth and were given time and assistance during the Academy to incorporate what they learned into a spring semester course. Sharing, cooperation, and collaboration among participants occurred throughout the Academy training.

A web-based e-learning site called *Blueprint for Transformation* was developed to serve as an additional resource for assisting faculty in their use of technology and to provide an avenue for dissemination of information. This website was also designed to

capture the total *ETLI* experience and to serve as a model for others to use. It was available to interested faculty, administrators, and other professionals beyond the project year. Participants were asked to share their experiences and knowledge through the website and through additional methods, such as lunchtime learning sessions, conferences, and publications.

One faculty participant from each college was identified to be a mentor. The five mentors were required to offer a minimum of three workshops to other interested faculty in their college during the spring semester following the Academy. They, along with the project directors, were responsible for the train-the-trainer workshops with technical support from graduate assistants. A graduate assistant was selected and assigned to each college to provide any technical support needed by faculty during the Academy training and also during course implementation the following spring semester.

EVALUATION OF THE MODEL

Multiple methods were used to evaluate the *ETLI* model and both qualitative and quantitative data were collected. At the micro-level, faculty were encouraged to self-reflect and conduct their own action research in order to provide feedback to the project directors about the effectiveness of the training on their own professional development and on their students' learning.

At the macro-level, outside evaluators used pre- and post-online surveys and interviews in order to measure the program's impact on faculty technology literacy, usage of technology in the classroom, and effects on student learning. Data were collected on an ongoing basis to help the project directors to plan activities and make necessary adjustments during the program.

To evaluate longer-term program effects, faculty participants provided anecdotal narratives describing their use of technology 18 months after the project. In addition, a five-year follow-up online survey was conducted and individual telephone interviews with open-ended questions were administered to measure ongoing successes and challenges to technology usage as well as faculty needs for further training and support. The data collected from these follow-up studies helped project directors to identify important elements for sustaining the positive gains from the initial program. The following section reports the results obtained from the evaluation study.

KEY EVALUATION FINDINGS

Academy Evaluation: Prior to the Academy, an online survey was used to find out what faculty wanted to achieve from the training. Project coordinators used this information to design the Academy training. The faculty participants responded that the training accomplished their goals by providing not only knowledge building in technology but also tying the technology into best practices, highlighting the important connection between technology and pedagogy. The major goals were to:

- increase their knowledge, skills, and conceptual understanding related to information technology
- stay up-to-date in current and emerging technologies
- make their classrooms more student-centered, interactive and participatory
- make instruction more varied, visual and stimulating, and
- increase their students' productivity, creativity, and performance.

Before receiving the training, faculty reported that the technologies they used in their classes included Blackboard (the university's web-based course management

system) to post materials, followed by LCD projection of websites, PowerPoint, and videos. Only 21% of the faculty mentioned using Blackboard's Discussion Board on a frequent basis, and there was insignificant mention of other technologies such as SmartBoard. After the training, faculty reported that they intended to include a wider variety of technologies in their instruction, such as Discussion Board, Chat, SmartBoard, portfolios, web-based simulations, video conferencing, and use of wireless laptops. Their willingness to try new, more interactive, and cutting-edge technologies was attributed by faculty to the readily available, ongoing support available to them during the training and as they incorporated technology into their spring courses. In their own words, they were not "left out there on their own."

Prior to the Academy training, the majority of the faculty participants said that they used technology where appropriate to enhance student learning. After the training, they gave lower ratings on their appropriate use of technology. This could possibly be due to their post-training increased level of awareness of what technologies were available and how to effectively integrate them into their instruction.

An important part of the *ETLI* model was the series of workshops provided within each college to mentor other interested faculty. Approximately 58 faculty attended a total of 17 workshops given by the five mentors from each college during the spring 2003 semester. Feedback about this turn-key training was very positive. Faculty indicated that the content of the workshops was very appropriate for relating technology to their teaching style and subject area, and several commented that the workshops were among the most relevant training sessions that they had attended while at the university.

Faculty participants' comments about the *ETLI* model supported prior research about what makes faculty development programs effective (Anderson, 1993; Meacham & Ludwig, 2001; Wei et al., 2009). The best parts of the *ETLI* mentioned by faculty and reflected in the research were: the opportunity to meet like-minded peers from across the university, working within a "safe" and accepting community of learners, the ongoing technical support, the provision of mentors and turn-key workshops that related technology to content and pedagogy, the opportunity to practice the skills learned and to stay in contact and share experiences, insights, and challenges with others (Brancato, 2003; Darling-Hammond & Richardson, 2009; Lawler & King, 2000; McDonald, 2001; Mishra and Koehler, 2006).

Faculty felt that *ETLI* had a positive impact on their teaching and on their students' learning. However, faculty expressed some concern over being able to maintain this level of impact as new technologies emerge. This constantly changing technology horizon is an issue that needs to be addressed by faculty professional developers corroborating research findings that emphasize the continuous need for professional development (Wetherill et al., 2001).

Follow-up Evaluation: Eighteen months after the program, eight faculty members from several departments provided a brief email update describing how they were continuing to use the technology that they learned at the Academy. Blackboard was still the most popular technology used. Faculty reported using Blackboard to post assignments and grades, conduct online testing, and submit work via Digital Drop Box. They also continued to use the more interactive features of Blackboard such as Discussion Board and Chat. Aligning courses to National Educational Technology Standards (NETS), using the internet as a resource for essential course content, and designing online courses were also mentioned as ongoing outcomes a year and a half after the training. Interaction with other faculty members across the university continued through workshops, mentoring, and the website**,** as well as widespread sharing of personal experiences and knowledge through professional conferences and journal articles.

For the five-year follow-up, the original faculty participants were asked to fill out an online survey and participate in a telephone interview. The eleven faculty who participated in the follow-up were from four out of the five colleges at the university and from eight different departments. Ten out of 11 (91%) of the respondents reported using technology 15 or more times per semester and assigning their students to produce work or participate in projects requiring technology at least six or more times per semester. All agreed that the *ETLI* was influential in their continued use of technology as an instructional tool with the majority, seven out of 11 (64%) indicating that the training initiative was "very influential".

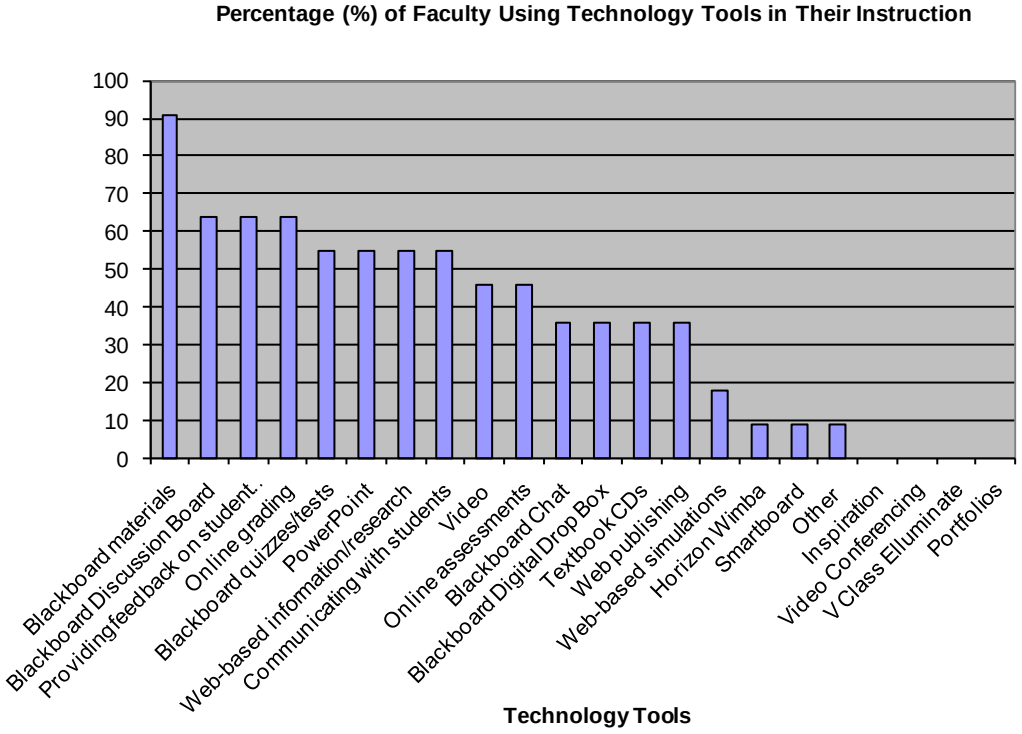

Figure 1: Percentage of faculty who continue to use different technology tools five years after the initial training.

Many technology tools were still used by *ETLI* participants five years after the program (see Figure 1). The most popular technology tool, used by 91% of the respondents, continued to be Blackboard materials (posting assignments, articles, grades, etc.). The next most popular tools used by 64% of the faculty were Blackboard Discussion Board, providing feedback on student work, and online grading. Fifty-five percent (55%) continued to use Blackboard quizzes and tests, PowerPoint, web-based information/research tools, and tools for communicating with students. Instructional tools such as SmartBoard, Inspiration, video conferencing, VClass Eluminate, Horizon Wimba, and portfolios were not used as frequently as they originally expected. However, when asked what technologies they would like to use in the future, faculty expressed an interest in expanding to tools beyond Blackboard and PowerPoint, such as SmartBoard, developing web pages for classes, video streaming, movie-making, Web 2.0, personal response systems, podcasting, and virtual office. Although faculty may want to adopt these new technologies, they may feel that they do not have the level of knowledge, time, and support that they need to implement them in their courses.

Five years after the training, the most popular ways in which faculty required their students to use technology included accessing course materials like handouts, lecture notes, etc., using links, and posting messages (see Figure 2). Over half of the faculty respondents still required students to engage in online discussions and hands-on activities related to course materials, submit assignments, conduct research, and share files or documents. Taking assessments and using electronic chat were required by less than half of the faculty respondents. Getting faculty in the future to expand student use of newer technologies is likely to involve more knowledge-building, time, and support to learn and plan.

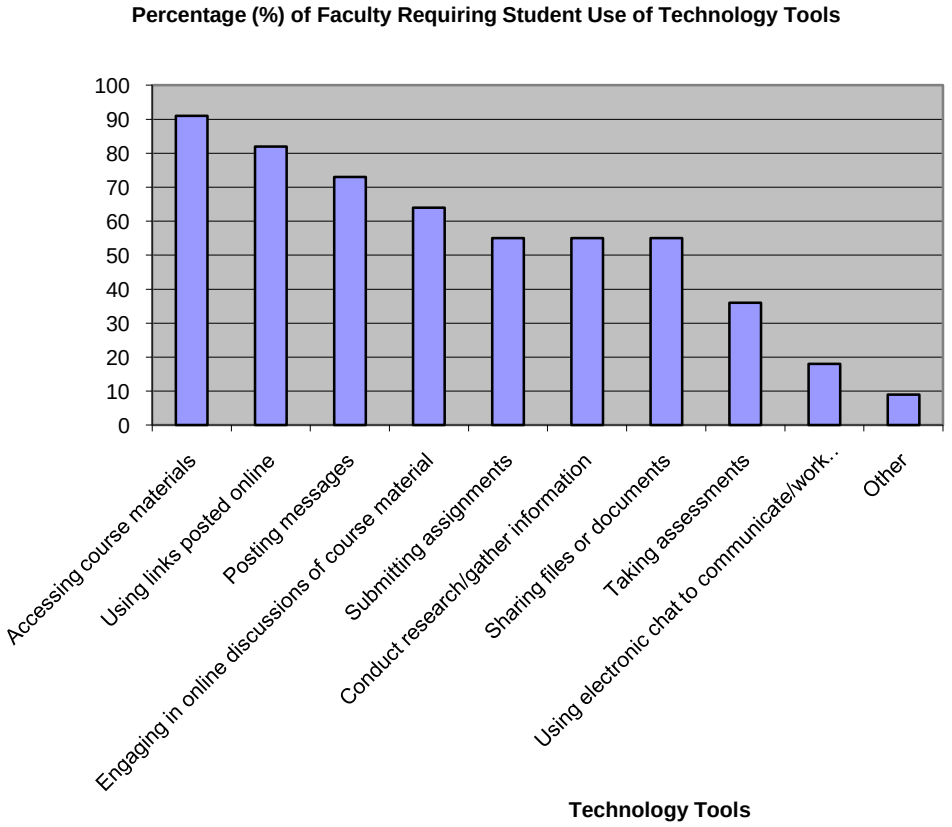

Figure 2: Percentage of faculty requiring students to use different technology tools five years after the initial training.

Most faculty survey respondents (82%) reported that they still provide turn-key training and mentoring to other faculty in their college on topics such as the use of Blackboard Discussion Board, Blackboard for testing, pod-casting, video-editing, PowerPoint, interactive whiteboards, and accessing research materials on the web. Faculty also reported that they continued to share their experiences in using technology with other faculty through conference presentations and articles. They emphasized the enduring value of meeting other faculty from across the university that the initial training provided. This community of learners that was established during the training has therefore had a lasting impact on many of the faculty participants which supports previous research findings (Zieger & Pulichino, 2004).

Faculty reported that the factor that most influenced their sustained use of technology was student success. According to faculty, technology addresses the different types of student learning styles, keeps students engaged and organized, and provides immediate

feedback. Materials and information are easily accessible and students know where they stand in the course and what is expected of them. These elements help to make the students more confident in their ability to be successful. Technology provides opportunities to more deeply process information through interactive discussions and collaboration with peers. Questions can be addressed quickly and easily by either the course instructor or fellow students. Students are comfortable with technology and expect to use it in their courses. Technology enables faculty to "take what they (students) use and enjoy and integrate it into the classroom as a learning tool."

Another key factor mentioned by faculty was the personal benefit derived. Technology helps with organization and saves time. Using technology, faculty reported that they can vary the types of instructional methods they use which makes their teaching more diverse, interactive, and engaging. It is easier to contact students and provide them with important course information, such as assignments and grades. This helps instructors to be more receptive and responsive to their students. All of these factors enable faculty to provide a course that will lead to student success. Continuing to use technology in their classrooms makes teachers more skillful and effective. They are eager to share their expertise through workshops, mentoring, presentations, and publications.

Training, equipment, and support were additional factors sustaining technology use. Because technology "keeps evolving," in order to keep up-to-date, faculty reported continuing to improve their skills and knowledge by attending workshops provided by the university and others and interacting with other faculty across the university. The community of learners established during the *ETLI* appeared to have a strong impact in sustaining the positive gains from the training. But quality and lack of equipment and appropriate software and the time constraints in developing materials and taking additional training were also mentioned as the main barriers hindering the continued impact of the training program. Faculty stressed the importance of incentives such as more time to increase their knowledge and skills, to provide mentoring and support, and to develop courses that utilize technology. Stipends, laptops and software programs, and increased recognition for using technology were mentioned as other effective motivators. This also supports previous research findings (Lindemann, 2004; Otero et al., 2005; Schrum, Skeele & Grant, 2002).

Many lessons were learned from the evaluation study of *ETLI* and these key findings have revealed some very useful insights and directions for developing model educational technology programs. These insights and directions are summarized in the next section.

INSIGHTS AND DIRECTIONS

Based on the quantitative and qualitative findings of this evaluation study, the authors identified the following essential ingredients of an effective faculty technology education model that will have lasting impact on both faculty and students (Kenney, Banerjee, and Newcombe, 2009):

- The technology tools addressed in the training must result in student success. The tools should enable faculty to make their courses more student-centered, interactive, supportive, and collaborative, and their instruction more varied and stimulating for the students.
- The training must be based on adult learning principles. Faculty need to see how the training meets their professional growth goals and have the opportunity to practice the skills they learned within the context of their course. They should be encouraged to conduct action research to see the results of the training on their

teaching and on student learning, and to become reflective practitioners, modifying their teaching as needed.

- The technology tools and assistance provided needs to be "customized" to fit an instructor's teaching style and course content. To ensure initial and continued implementation of technology in the classroom, instructors need to see how the technologies fit into their curriculum and pedagogical style. Faculty development programs need to provide "…specific workshops that tie pedagogy, curriculum, and technology together so that faculty can see connections". Support in the form of "technology specialists," faculty or staff who both know the discipline and also the technology, can fulfill that need. The professional training must provide the "right technology at the right time for the right purpose."
- The establishment of a "learning community" is essential for maintaining the skills learned during initial training. A successful professional development program must provide faculty with ongoing opportunities to meet like-minded peers from across the university and to learn in a "safe" and accepting environment.
- Faculty must not be "left alone to fend for themselves" after the training. Technological and pedagogical support must be provided not only during initial implementation of the new skills, but must also be readily available on an ongoing basis. Sharing of knowledge, skills and best practices through workshops, mentoring, conferences, and publications is important. Participants must "see the returns" for the time invested such as making their teaching easier, less time-consuming and more effective. They must "see the hook" that will motivate them to become technology implementers.
- Incentives are important motivators. Laptops, travel funds, stipends, and technology hardware/software can be "the hook" that initially pulls faculty into the training. Having the time to develop professionally and to incorporate new knowledge and skills into their teaching is also an attractive incentive for faculty with numerous responsibilities. Making professional development "a priority" and recognizing and rewarding the time and effort put into implementing new instructional techniques are also important incentives for faculty training programs.

CONCLUSION

The *ETLI* had a positive and lasting effect on the technology development of the university faculty. Although it was originally intended for faculty in the college of education, making the initiative university-wide impacted more faculty and students including education majors taking courses in departments outside the college. Faculty use of technology in their instruction provided powerful models for teacher candidates to apply in their future classrooms. Turn-key training by faculty mentors also expanded the impact and cost effectiveness of the initiative.

This study found that despite their commitment to classroom technology use, faculty generally have not yet adopted newer technologies such as SmartBoard, class web pages, video streaming, movie-making, Web 2.0, podcasting, and virtual office. While most faculty mentioned an interest in newer technologies, on the whole, they have been unable to engage in training and to use these tools in their classrooms due to obstacles such as lack of time and conflicting priorities. Faculty training programs are limited in their ability to bring about lasting positive change. Eventually, it is for institutions to

periodically infuse momentum into the faculty learning community by providing supportive measures, such as time-release for course development and mentoring, stipends, and other forms of recognition that would enable faculty to enhance their pedagogical skills. The *ETLI* may have been more successful if institutional-level involvement had been sustained in the years following the Academy training.

The evaluation study itself was effective in that data were collected on a range of indicators using multiple measures involving faculty at different strategic points during the original faculty development initiative as well as during two follow-ups at 18 months and five years. However, the evaluation was limited in the area of direct student impact. A pre/post measure of student learning might have more directly demonstrated the effectiveness of the technology usage on student outcomes. The evaluation study could not measure pre/post student outcomes because the Academy took place between fall and spring semesters and the population of students changed for faculty trainees. The study was also limited in that less faculty responded to the follow-ups than anticipated. More faculty feedback would have further strengthened the validity of the follow-up part of the evaluation study. In spite of these limitations, the study exposed and reinforced many insights about effectively developing and sustaining positive change in faculty technology education.

The results of the *ETLI* experience are not limited to technology skill-building by university faculty. They can be used as a model for developing skills across contexts, in many different content areas, and at all instructional levels. These insights could be useful to educators not only in the United States but also globally in designing professional development programs that will have a sustained positive impact on both teaching practices and student learning.

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