

Impact of a Professional Development Project on University Faculty Members' Perceptions and Use of Technology

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Abstract: This study describes how faculty members' perceptions and use of technology changed as a result of participation in the professional development activities of a PT3, Preparing Tomorrow's Teachers to use Technology, implementation project. Online surveys of the faculty, supplemented by a phenomenological study, were used to gather both quantitative and qualitative data to address the research questions. Quantitative data showed that faculty members integrate a variety of technologies in their teaching and are reasonably proficient in the use of these technologies. Qualitative results indicated that to induce faculty, especially those who have negative feelings towards technology, to become effective technology users in the classroom, professional development must address their content needs and pedagogical practice and provide effective personalized support on technology and communication.

Introduction

Technology knowledge and skills are increasingly viewed as essential to success in the 21st century. Glenn (1997) noted that computers have advanced from simple machines with limited functions and capabilities to powerful machines with sophisticated applications and high-speed networking capabilities, and this increase in capability is impacting education like the rest of society. As a result, computers and the Internet have become the focus of major educational initiatives and reform efforts, such as the U.S. Department of Education's PT3 program, Preparing Tomorrow's Teachers to use Technology, which aims to impact teaching and learning by improving the preparation of teachers to use technology effectively in the classroom. This focus on technology stems from its potential to positively impact education.

However, technology use in colleges of education has historically been suspect. While the U. S. K-12 schools have many computers and widespread Internet access, only about one-third of teachers feel well prepared to use these technologies (Smerdon et al., 2000). Several national reports have lamented the poor state of teacher preparation with respect to technology use (e.g., Moursand & Bielfeldt, 1999; Office of Technology Assessment, 1995; Panel on Educational Technology, 1997; Smerdon et al., 2000). These reports indicate that technology often is not central to teacher preparation in colleges of education. Problems include limited use of technology in teacher education courses, an emphasis on teaching about technology rather than teaching with technology, lack of faculty modeling, and insufficient faculty professional development opportunities.

To meet these challenges, faculty development to assist faculty members in integrating technology into teaching and learning is of concern to many institutions. Researchers have pointed out that training and support are significant in helping and facilitating faculty to effectively integrate technology into classes (Groves & Zemel, 2000; Matthew, Parker & Wilkinson, 1998). Yet, these are not the only factors that could get the faculty to use technology. Faculty may have different responses to innovative practice, therefore, faculty development needs to address the individual needs in profession practice when motivating faculty members to adopt technology, in addition to institutional

incentives such as rewards and resources to support (Padgett & Conceao-Runlee, 2000). According to Hagner (2000), for faculty members who are self-starters in technology integration and those who are hesitant in adopting technology, five factors will affect their engagement: training, grants and start-up resources, technical support, assessment, and communication.

Project Background

After several years of reform planning by its faculty and administration, the School of Education at Purdue University recently completed implementation of completely restructured elementary and secondary teacher education programs. Purdue's new teacher education programs were launched with students entering teacher preparation programs in the fall of 1999, and the final new courses were put into place in spring of 2002. The new elementary and secondary education programs feature a cohesive set of courses, arrayed in a series of blocks, with field experiences accompanying each block. The programs are anchored by four thematic strands – technology, field experience, diversity, and portfolio assessment.

P3T3, Purdue Program for Preparing Tomorrow's Teachers to use Technology, a 2000 PT3 implementation grant project, supports the new teacher education programs. Three interrelated implementation activities have been undertaken by the project: a faculty professional development and support initiative, the use of two-way video conferencing technologies for linking pre-service teachers with K-12 students at a distance, and the development and implementation of an electronic portfolio system for pre-service teachers. This paper focuses on the professional development components of the project.

The P3T3 project is working to prepare teacher education faculty in Education, as well as selected faculty in Science and Liberal Arts, to teach pre-service teachers in technology-rich environments, modeling approaches that future teachers should use themselves. To effectively support the technology integration in teaching, P3T3 provides a set of professional development activities. These include a two-day "start-up" workshop, technology skills development workshops, information sessions, and a year-long support/mentoring program for participating faculty members. Approximately 95% of the faculty in the School of Education, along with selected teaching assistants and colleagues in the Schools of Science and Liberal Arts, have participated in the project.

Each participating faculty member completed a two-day "start-up" workshop, which focused on a problem-centered approach to technology integration and an overview of available technologies, to become initiated into the project. At the conclusion of this workshop, each faculty member developed a personal technology integration plan, which was used to assign a graduate staff member as a liaison and helper to the faculty member. Subsequent skills development workshops were offered to help faculty members develop their expertise on various technology topics, such as WebCT, web page authoring, Powerpoint, digital video, and more. Brown-bag TechieTalk sessions, short informational sessions, were offered as a forum for faculty members to share their successful experiences and gain new knowledge about various technology topics (e.g., Inspiration, Word tips, using email). Regular help sessions were slated once per week throughout the academic year to let faculty consult with P3T3 graduate staff whenever assistance might be needed. Finally, P3T3 graduate staff liaisons provides one-on-one tutoring and assistance to any faculty member who needed the help.

Since the project's inception in the summer of 2000, faculty members have engaged in a variety of activities to integrate technology in their classrooms as part of P3T3 project. How have faculty members' perceptions and use of technology changed as a result of participation in the P3T3 project? Answering this question will not only assist in the evaluation of the project's efforts but will also add to the growing knowledge of faculty development in technology integration and provide a valuable reference for similar projects in faculty professional development.

Purpose of This Study

This study describes how faculty members' perceptions and use of technology and how they changed as a result of participation in the professional development activities of the P3T3 project. Specifically the study addressed the following questions:

1. What technologies do faculty integrate in their teaching, and how proficient are they with these technologies?
2. What experiences and attitudes shaped the perceptions of faculty members toward the use of technology in teaching?
3. How did participation in the professional development activities affect faculty members' perceptions and use of technology in teaching?

Method

In an attempt to answer the research questions, both quantitative and qualitative data were collected. Quantitative data were gathered through the use of online surveys that were administered to the faculty and students as part of the project's evaluation. Faculty were asked to identify the technologies that they use in their teaching and to rate their own proficiency with these technologies. Students were asked to identify the faculty's use of technology and rate the faculty's proficiency as well. Survey data were compiled and frequencies are reported.

Qualitative data were collected through a phenomenological study. According to van Manen (1990), phenomenological research describes how people experience the phenomenon through their perceptions, descriptions, feelings, interpretations and judgments. This framework is appropriate for the study of the change of faculty members' perceptions and use of technology. The faculty's involvement in P3T3 project is an educational phenomenon representative of similar projects in higher education. What kind of experiences have faculty members had and how did they construct the meaning from their experiences?

In a phenomenological study, data are gathered from those who have direct experience of the phenomenon. For this study, qualitative data were collected through structured interviews of faculty members who provided rich information concerning their experiences with the faculty development initiative and subsequent technology integration. Three faculty members who had participated in P3T3 project and had had successful experience in integrating technology in teaching practice in different programs of the School of Education were purposefully selected as the interviewees.

Standardized open-ended interviews included three categories of interview questions. One category asked participants about the development of their perceptions and experiences in technology use, such as "Please describe your initial attitudes, feelings and experiences with technology. Did you encounter barriers in using or learning to use technology? If so, how did you overcome them?" A second category asked about the influence of the P3T3 professional development activities, such as "What has been the project's impact on your perceptions and on your use of technology?" A third category asked about background information, such as "Did you use technology in each semester when you were teaching course(s)?" The interviews were conducted privately with each participating faculty member at a time and place of their convenience. Interviews were audio-taped, and the tapes were transcribed.

The data obtained from the interviews were analyzed inductively using a cross-case analysis method. The responses from the three faculty members to the common questions were grouped together to be analyzed on the basis of patterns and themes emerging from the data. The data were coded in systematic way to identify the patterns and the themes that address the change of faculty's perceptions and use of technology, how P3T3 affected such change, as well as their opinions about P3T3's work in facilitating and supporting faculty's development in using technology. The analysis enabled the researchers to generate a description of the faculty members' experiences in participating P3T3 and assertions of the affect of P3T3 on their development in technology use.

Findings and Discussions

Data from the fall 2002 faculty survey, completed by 44 faculty members, showed that faculty are making significant use of various technologies in their teaching. See Table 1. Nearly all responding faculty members reported that they integrated technology into their teaching, and 86% reported having changed their curriculum within the past year to add or increase the integration of technology. Many of the commonly used technologies

centered on the Internet, for communication, information retrieval, and class discussions. Whereas only 43% of students in 2001 agreed that faculty members used technology in class, on the 2003 student survey 97% of students agreed that faculty members used technology in class. This dramatic increase suggests that the project has been successful in encouraging faculty members to integrate technology into their teaching and so model its use for students. The faculty themselves rate the P3T3 project highly: 86% agreed that the two-day workshop was useful, 81% agreed that the technology skills workshops were useful, and 78% found the one-on-one assistance and mentoring useful.

Common Technology Uses	% Faculty Reporting
Communication with students	86%
Information retrieval	84%
In-class presentations	74%
Student technology projects	64%
Online class discussions	51%

Table 1: Most Common Uses of Technology by Faculty

Faculty also show a relatively high level of proficiency with various technologies. On spring 2003 surveys administered to both the faculty and students, faculty self-assessments and students' assessments of faculty proficiency levels tended to agree on most items. Table 2 shows the percentages of the faculty considered fully proficient (rating categories included introductory, intermediate, and proficient) with various technologies. While students tended to rate the faculty somewhat lower on use of the Internet and email than the faculty rated themselves, there was general agreement across categories. Very few faculty members were rated introductory level by either themselves or their students.

Ratings	General Computer Hardware and Software Use	Use of the Internet	Use of Electronic Mail	Use of the Computer for Presentations	Instructional Technology Integration Issues Knowledge	Overall Technology Competency
Faculty Self-Ratings	73%	59%	89%	38%	43%	49%
Student Ratings of Faculty	46%	45%	68%	59%	44%	47%

Table 2: Percentages of Faculty Rated Proficient with Various Technologies

The analysis of the qualitative data yielded a portrait of the participating faculty members and assertions concerning their integration of technology and the influence of the P3T3 project. The participants tended to be afraid of technology or thought technology was unnecessary for their professional development prior to project involvement. As one participant reflected: "Prior to coming to Purdue, I would say I was completely anti-technology, hated technology, always felt frustrated by everything being...seeming so time-consuming for the end results." Through the involvement of P3T3 project, they changed their perceptions and successfully integrated technology into their teaching practice. Since P3T3 provided workshops on various technology topics, the faculty members got familiar with the use of different technology. As one faculty member commented that attending those workshops was like "a taste sampling", which helped to decide whether there would be particular need to use it in specific teaching practice. These workshops were regarded valuable in teaching faculty use of technology.

Assertion 1: Technology integration must be focused on content needs

In general, the participants perceived technology as the tool that can facilitate teaching and learning. They thought that using technology should not be just for the sake of technology; instead, technology should be used to accomplish educational missions. As one participant put it:

I think technology is nothing without a content of having some other purpose. It has to facilitate some kind of purpose...It shouldn't be just technology for technology sake. I want technology to facilitate some other purpose that we have. And then the students are learning about technology...in a very meaningful way, not in an empty way.

When selecting the use of technology, the faculty members tended to focus on how the technology can contribute to their teaching. One participant attended the workshop on digital video. However, she did not incorporate it into her teaching practice. She commented that "I know the potential is there, [but] I haven't felt I really need to do that. I don't really see why I particularly need to do that. It's very application specific how I feel about it." Faculty did not use technology just to use it; the application had to address a curricular need.

According to Lan (2001), to motivate faculty, technology integration must have a purpose and be perceived by faculty as beneficial to their professional practice. This study confirmed this point and further indicated that the purpose of technology integration should meet the content needs. The P3T3 project required the faculty members to submit a technology integration plan after training to induce them to consider how to use technology in the course(s) they were teaching. One participant who used videoconferencing to create a virtual field experience for pre-service teachers commented that:

I don't care about videoconferencing at all. But if my students here at Purdue...can use technology to access a place that they've never seen in their life, that they would never go to, that they had no experience of and then if they can interact with those third graders in classroom, and then those students can turn around and say to me: "I can't believe how smart those kids are", and I think technology has really accomplished something because only through technology can we be linked to that school. That's the only way my students can have access.

This finding suggests that faculty development oriented to meet content needs may induce faculty members to adopt technology in the classroom.

Assertion 2: Personalized support on technology and communication is the most effective way to assist faculty who are trying to integrate technology in the classroom.

The participants reflected that P3T3 staff offered a lot of support in their use of technology through teaching, facilitating, and troubleshooting problems. One participant recalled:

When I first began this technology hook up, I used to have Bill help. Paul occasionally helped and Phillip helped...Arthur and George were there almost if not every time we hooked up, almost every time... I feel so privileged. I can't imagine any other place where I could have the kind of support to try to do this kind of thing. And it's hard. Without that kind of support, there would be a lot of problems.

The participants regarded one-on-one assistance and regular help sessions as very valuable and helpful, since these activities were flexible and provided immediate assistance. One participant said, "My personal use is much stronger because the support...When I got stuck, there was always help." The support from P3T3 graduate staff helped faculty members solve technical problems, which made them feel confident in using technology.

Quick (1999) pointed out that faculty not only want support personnel to know the technology and the application, they also want the support personnel to have people skills. This study supports the view that when faculty try to integrate technology into teaching, personalized support on both technology and communication is necessary. In this study, one participant commented on the coordinator of P3T3 project:

She is incredible. She facilitated everything, all the communications, communications between me and P3T3, between P3T3 and that school, between me and the school...she is a really really integral part because no matter what P3T3 is about technology, it's still people.

Assertion 3: Professional development in a supportive environment can effectively change faculty members' perceptions and promote use of technology.

The participation in the P3T3 project changed the perceptions and use of technology of the faculty members who had resisted technology use. One participant noted:

I'm not adventurous in technology, but I see that it has its place and now I see it's extremely useful, so I am more willing to learn the things that I have to learn. Before, I didn't see its place... There is direct switch in my understanding, my use. My feeling towards the technology have shifted around pretty dramatically."

In general, P3T3 has changed the faculty members from being reluctant to use technology to actively integrating technology into teaching. As one faculty member commented:

You know the capability is there, you know it has good potential. But it takes a lot of time to learn how to use it...a little bit hesitant to start, that kind of reluctance, maybe. But have the combination of the workshops which provided direct instruction, and know there was support, and have the equipment also available, all have been really helpful.

It can be seen that creating a supportive environment with necessary facilities, support and resources can help those who are not determined to adopt technology to begin to use it in teaching. The P3T3 project effectively promoted technology use among faculty members. One participant affirmed the impact of P3T3 on her perceptions and use of technology:

I do recognize that P3T3 has been really good... Purdue got that grant for the three years at this time because we're going to be more involved in it and it provided opportunity for me to learn about it and use it with my own students. [It] opened the doors that I would've never opened otherwise.

The faculty members' participation in the P3T3 project and efforts in technology integration were encouraged and promoted on campus. One participant who received a teaching award after integrating technology in her teaching made the following comments:

And for me frankly, it's such a plus like even I got a teaching award, which I wouldn't have got it other than that...and opportunity to write even little about it, not a lot, but a little bit about it, is there. It's very important for person getting tenure. It's not like doing technology took me away from tenure. Well, it facilitates me getting tenure.

Assertion 4: Professional development in technology use needs to take into consideration individual faculty member's needs. Exemplary technology use is necessary to encourage faculty to incorporate technology.

When promoting the faculty's use of technology, it is necessary to help faculty members articulate individual needs in their specific fields; otherwise, technology incorporation will become meaningless.

I think if there was some way that P3T3 could communicate to individual professors how they could help them with what they are actually doing in terms of their research, their writing, and their teaching...to tell the individual person how technology could help them in their work...to make their teaching better, make their research better.

In addition, exemplary use of technology is a good way to motivate faculty members, especially those who did not actively adopt technology use in teaching. Among the P3T3 activities, brown-bag TechieTalk sessions allowed faculty members to share successful experiences and obtain new knowledge, which was welcomed by the faculty members. In these sessions, successful technology users presented what had been accomplished in teaching and the effectiveness of technology incorporation. As one participant in this study suggested "We might continue to build...the ways that we can share how we use these technology in our teaching... It always helps to see some

example” Another participant also mentioned that to “hear and see other faculty using different things” was a real motivation.

The biggest barrier faced by the faculty is time. In this study, time was frequently mentioned as a barrier for faculty professional development in using technology. Although faculty members attended workshops to learn how to use specific technologies, their workloads and tight schedules often limited their opportunity to practice technology skills. As one faculty member commented “You need to use it. You just need to get to the point where you sit down. The constraint is my skills, my time to develop those skills.”

Implications and Educational Significance

The results of this study indicate that Purdue's P3T3 project has been successful in helping faculty to integrate technology into their teaching and so model its use for pre-service teachers. The faculty make use of various technologies, many of which focus on the Internet and its ability to enhance communication with and among students.

To induce faculty, especially those who have negative feelings towards technology, to become effective technology users in the classroom, professional development must address their content needs and pedagogical practice and provide effective personalized support on technology and communication. The PT3 project has been successful, at least in part, because it has helped the faculty members to develop a belief in the value of technology and assisted them to successfully integrate appropriate technology into their teaching.

In this study, it was noted that time was a significant barrier to faculty professional development related to using technology. Under such circumstances, the kind of one-on-one personalized technology support that was provided by the P3T3 project becomes critical to enable the faculty's use of technology. The various activities of P3T3 effectively provided the faculty members with assistance when they needed it.

Faculty professional development in technology use is of great significance to educational practice. The national PT3 initiative was created to respond to this need. As a part of this national initiative, Purdue's P3T3 project has been working to induce and help faculty members transform traditional teaching into technology-infused teaching. This study highlighted the impact of P3T3 on faculty's perceptions and use of technology. The results of this study not only present valuable data for evaluation of P3T3 work, but also provide important references for the other faculty professional development projects.

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