UNDERSTANDING FACULTY ADOPTION OF TECHNOLOGY USING THE LEARNING/ADOPTION TRAJECTORY MODEL: A QUALITATIVE CASE STUDY

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ABSTRACT
Using a technology adoption model, the Learning/Adoption Trajectory model, and this study aimed to identify the technology adoption level of a faculty member, Mary. In addition, I examined how Mary arrived at her technology adoption level. Finally, using Mary's path to technology leadership as a guide, I offered several recommendations about how colleges and departments can encourage faculty members to integrate technology effectively. To be able to get enough data and to strengthen the internal validity and the reliability of this qualitative case study, the triangulation strategy or the multiple data collection method was used. In this basic interpretive qualitative study, the data were collected through interviews, classroom observations, and document analysis.

Understanding Faculty Adoption of Technology Using the Learning/Adoption Trajectory Model: A Qualitative Case Study

For more than three decades, the wide-ranging impact of computers and technology has significantly changed how we gain, convey, present, and analyze information and provided "the tools, applications, and processes that empower individuals of our information society" (See, 1994, p. 30). Hence, information technology (IT) has become an integral part of schools, colleges, and universities (Wilson, Sherry, Dobrovolny, Batty, & Ryder, 2002). The availability of technology gives higher education a vital role to model the effective and appropriate uses of technology in teaching and learning. To accomplish this goal, there is a need to understand the technology adoption process in greater detail. Using a technology adoption model, the Learning/Adoption Trajectory model, the purpose of this qualitative case study was to identify the technology adoption level of a faculty member, Mary. In addition, I examined how Mary arrived at her technology adoption level. Finally, using Mary's path to technology leadership as a guide, I offered several recommendations about how colleges and departments can encourage faculty members to integrate technology effectively.

Before discussing several adoption models, I will provide the definitions of some terms used in this paper. Carr (1999) defines "adoption" as "the stage in which a technology is selected for use by an individual or an organization." Also, he defines "innovation" as "a new or innovative technology being adopted." For Carr (1999), "diffusion" applies to "the stage in which the technology spreads to general use and application" and "integration" refers to "a sense of acceptance, and perhaps transparency, within the user environment."

Several scholars have proposed technology adoption models. As Farguar and Surry (1994) describe, these models are useful because "an analysis of the factors which affect a product's adoption can play an important role in increasing the utilization of the product" (p. 20). Perceiving the stage of the technology adoption and the factors that shape this stage can lead us to the effective use of technology. Stockdill and Morehouse (1992) describe the factors that influence the adoption of technology as educational need, user characteristics, content characteristics, technology considerations, and organizational capacity.

The adoption process of innovations has been studied for over three decades. As the most popular adoption models, Hall and Hord's (1987) Concerns-Based Adoption Model (CBAM) and Rogers' (1995) *Diffusion of Innovations,* have been used in many studies (Sherry & Gibson, 2002). Since the rapid and continuous changes in technology require using a dynamic and recursive model to evaluate the technology adoption process, Sherry, Billig, Tavalin and Gibson (2000) proposed another adoption model, the Learning/Adoption Trajectory model based on Rogers' diffusion theory.

THEORETICAL FRAMEWORK
The Learning/Adoption Trajectory model is a research based model established based on a five-year project with teachers in Colorado in the United States. "Throughout the project's five years, Boulder Valley Internet Project leaders introduced the use of telecommunications in the classroom to the Boulder Valley School District by training"(Sherry, 1997, p. 68). I will use the Learning/Adoption Trajectory (Sherry et al., 2000) model as a framework to define the level of Mary's technology use. The stages of this model are described in Table-1:

Stage 1. Teacher as Learner: In this information-gathering stage, teachers learn the knowledge and skills necessary for performing instructional tasks using technology.
Stage 2. Teacher as Adopter: In this stage, teachers progress through stages of personal and task management concern as they experiment with the technology, begin to try it out in their classrooms, and share their experiences with their peers.
Stage 3. Teacher as Co-Learner: In this stage, teachers focus on developing a clear relationship between technology and the curriculum, rather than concentrating on task management aspects.
Stage 4. Teacher as Reaffirmer/ Rejecter: In this stage, teachers develop a greater awareness of intermediate learning outcomes (i.e. increased time on tasks and greater student engagement) and begin to create new ways to observe and assess impact on student products and performances, and to disseminate exemplary student work to a larger audience.
Stage 5. Teacher as Leader: In this stage, experienced teachers expand their roles to become action researchers who carefully observe their practice, collect data, share the improvements in practice with peers, and teach new members. Their skills become portable.

Table-1. Learning/Adoption Trajectory (adapted from Sherry et al., 2000)

As an innovation, technology is changing every day. Thus, adopters have to learn about the innovation in every stage of this model (Sherry et al., 2000). Continuous technical support and mentoring by trusted peers are important factors in the earlier stages of the Learning/Adoption Trajectory model. If we want teachers "to be more willing to move to the next phase at which they become colearners and coexplorers with their students," we should provide them "adequate training, mentoring, access, and technical support" (Sherry & Gibson, 2002). The "teacher as leader" stage was added later to the current model (Sherry, 1999).

METHODS

Using this technology adoption model, I would like to identify Mary's technology adoption level and to examine how Mary arrived at her technology adoption level. Although Mary's class is about the use of computers in classrooms, teaching about technology or personal use of technology does not predict the integration of technology into the curriculum. Spotts (1999) supports this idea that "knowing the basics of a technology does not ensure effective use in instruction" (p. 96). In my opinion, the experience from the perspective of the faculty can lead us to understand the adoption of technology in teaching. To be able to achieve this goal, qualitative research is very appropriate for this kind of study since "qualitative research attempts to understand and make sense of phenomena from the participant's perspective" (Merriam (2002a, p. 6). Similarly, Merriam (2002a) contends that "in conducting a basic qualitative study, you seek to discover and understand a phenomenon, a process, the perspectives and worldviews of the people involved, or a combination of these" (p. 6). For Merriam (2002a), a basic interpretive qualitative study includes all the characteristics of qualitative research:

- The researcher tries to understand the meaning that participants have constructed about a situation or phenomenon.
- The researcher is the main instrument.
- The process is inductive.
- The finding of a qualitative study is descriptive.

In this basic interpretive qualitative study, the data were collected through two interviews, two classroom observations, and the document analysis.

To be able to get enough data, I used the triangulation strategy or the multiple data collection method to strengthen the internal validity and the reliability of this study. As Merriam (2002b) states, while internal validity checks whether researchers are viewing or assessing what they are viewing or assessing, reliability ensures whether the outcomes are constant with the data gathered. In addition, Mertens (1998) suggests that peer debriefing contributes to the internal validity (or credibility) of a study. Hence, during this study, I have received feedback from a group of graduate students about the findings, conclusions, analysis, and hypotheses presented in this study. Their questions and recommendations guided me in every step of my study. Moreover, external validity or generalizability, which makes certain that the outcomes of a study can be related to other circumstances or people, should also be considered in qualitative research. I believe the rich and thick description increases the external validity or generalizability of this study since "providing rich, thick description is a major strategy to ensure for external validity or generalizability in the qualitative sense" (Merriam, 2002b, p. 29).

DATA ANALYSIS

"In qualitative research, data analysis is a process of making meaning" (Esterberg, 2002, p. 152). To analyze the data, I used a qualitative coding method. Coffey and Atkinson (1996) state that qualitative coding involves three steps:

1. noticing relevant phenomena,
2. collecting examples of those phenomena,
3. analyzing those phenomena in order to find commonalities, differences, patterns, and structures (p. 29).

In the open coding stage, I worked intensively with the data to identify in which category in the Learning/Adoption Trajectory model the participant best fit. Then, I looked for examples supporting this category and the themes that shape and contribute to this stage. After finding some emerging themes in the open coding stage, I went through the data concentrating only on these themes. This was the focused coding step of analyzing the data. Also, I used memos when analyzing the data. These memos helped me remember how I did my coding and what my ideas and feelings were at the time I was analyzing the data.

PARTICIPANT

The participant, Mary, is an associate professor in the Department of Curriculum and Instruction at a Midwestern university which has about 25,000 students. Mary's bachelor's degree is in computer science and communications and her master's degree is in curriculum and training technology. She has a doctorate degree in instructional technology from the university at which she is working right now. After getting her doctorate degree, she started to work at this university. She has been teaching in higher education for 10 years and this is her 11^{th} year.

Since getting more detailed information about Mary would help me identify her position in terms of technology use, I searched the World Wide Web and the university search engines to learn more about her. Mertens (1998) confirms that Web searches are new, but useful methods for gathering background information: "World Wide Web (WWW) sites are a more recent development in the realm of literature searching" (p.39). Although some Web sites returned in the search were related to another person with the same name, I visited a total of 142 Web sites to gather information about Mary. After reviewing these pages, I briefly found out that she

- was the coordinator of an international program in 2003,
- served in a committee for the search for a new dean for the College of Education,
- was honored with a university award in early achievement in teaching,
- is the director of graduate education in the department,
- is faculty advisor in a ministry of a local church,
- is a financial aid representative of College of Education to university committees, councils, advisory boards and faculty senate,
- is currently in the recruitment and retention committee of the College of Education,
- worked to explore options for the university's future academic calendar and worked on the recruitment and retention of women and minority on an academic task force, and
- has a faculty position in another department.

In the selection of any participants, several biases must be considered. However, in this study, I will explain, rather than completely eliminate any possible bias, as is recommended by Merriam (2002a): "Rather than trying to eliminate these biases or "subjectivities", it is important to identify them and monitor them as to how they may be shaping the collection and interpretation of data" (p. 5). Although Mary is in my department, I have not taken any course from her so we did not have a student-teacher relationship during this study. She teaches classes at the undergraduate level. Moreover, the selection of the participant was intentional because "in qualitative research a sample is selected on purpose to yield the most information about the phenomenon of interest" (Merriam, 2002b, p. 20). I heard from one of my friends that Mary was using technology in her class and this class was about computer use in classroom. I thought she could give the greatest possible insight into my topic. Indeed, she provided sufficient information for this qualitative study because of her strong background in technology and its use.

OBSERVATIONS

I observed Mary in her class since "observation--looking in a focused way--is at the heart of qualitative research" (Esterberg, 2002, p. 58). In Mary's class, she teaches how to adapt computer applications into curriculum, how

to design classroom applications for tool software, and how to choose and assess educational software for the classroom. Also, this class consists of some discussions about the issues and trends in computer based instruction. Mary teaches this class on Tuesdays and Thursdays and each of these sessions takes 2 hours.

She teaches this course in a computer lab since the course includes using some computer applications. This computer lab has 23 computers including a computer for the teacher. Some of these computers have scanners installed. In addition, this computer lab has a projector, overhead, TV, VCR, white board, and projector screen. The structure of this computer lab and the distribution of these students in this lab are shown in Figure-1:

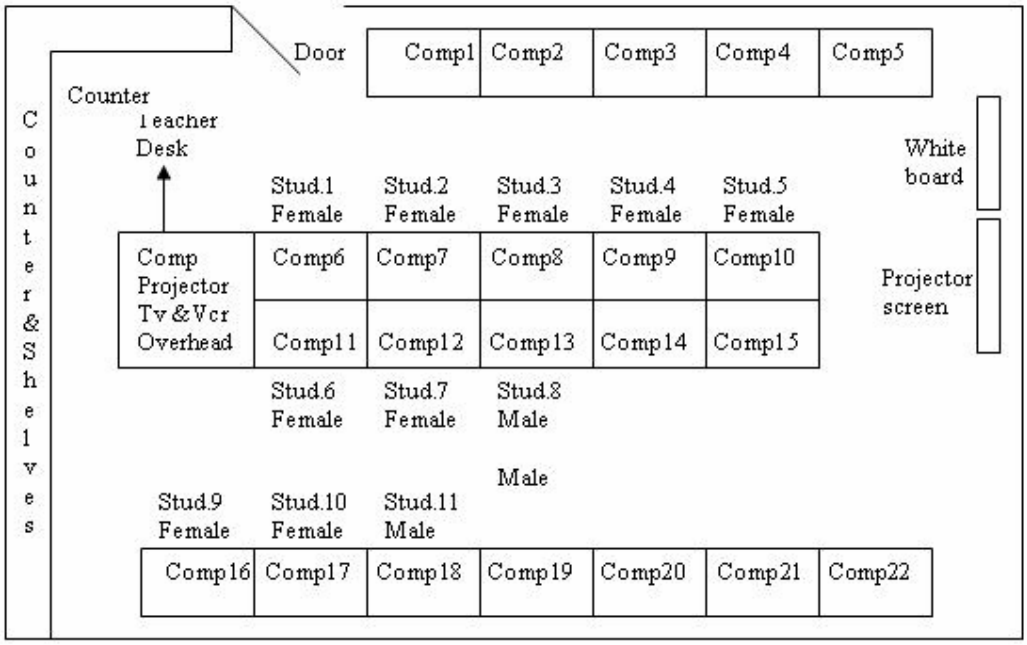

Figure-1. The schema of the observation site

INTERVIEWS

The interviews were conducted in Mary's office. Her office is on the first floor of the College of Education building which is a three story building with the brick walls. Since the office was quite small, one chair, two file cabinets, one lamp, some books and papers left us smaller space in it. Because of the limited space, some coffee mugs, files, and papers were on the floor. In addition, some pictures, notes, name tags were on the walls. In front of the only window of the office, there were some ornaments and family pictures. Two row shelves attached to the wall were full with books, journals, and notes, computer monitor, printer, books, articles, and reminders were covering her desk.

The interviews were the main source of data in this study. All the interviews were audio-taped and transcribed. A structured, open-ended approach incorporating both an interview guide and the observations was used in these qualitative interviews. This type of interview guide is recommended by Esterberg (2002): "The interview guide lists the main topics and, typically, the wording of questions that the researcher wants to ask… But the researcher does not follow the guide rigidly in conducting the interview" (p. 94). In addition to the interview questions which were included in the interview guide, some other questions were asked in the interviews. Thus, the interviews were semistructured as "a mix of more and less structured questions" (Merriam, 2002a, p. 13).

DOCUMENTS

As Merriam (2002a) states, documents are another major source of data in qualitative research. Examining the documents and records is important because they give "the necessary background of the situation and insights into the dynamics of everyday functioning" (Mertens, 1998, p. 324). Hence, in addition to the field notes and journals, which included the supporting data for analyzing the findings, my feelings, the changes that occurred during the study, I reviewed the course syllabus, the course reading packet, the presentation slides used in the class that I observed, and Web sites as the primary sources. All these documents enriched the data analysis and this article. Therefore, the data became saturated and the findings were well supported with the data.

FINDINGS

In the first interview, Mary talks about her role in the department and describes it as a "leadership role in terms of modeling." She articulates that when her colleagues have any problems or questions, they usually ask her for help and they are very comfortable with that. Why do her colleagues "feel free to come and ask her" for help? I believe this is the result of her leadership role.

"Exploring the role of leadership styles in converting knowledge into competitive advantages is important to our understanding of leaders and organizations" (Bryant, 2003, p. 32). All the factors described below shape the leadership role that Mary carries in the department. In the Learning/Adoption Trajectory model, she is definitely in the last stage, teacher as leader**.** She not only has the knowledge of technology but also uses it in her teaching and shares it with other faculty.

Technology Adoption and Expertise

In addition to her background in educational technology from her bachelor's degree to her doctorate degree, she knows about different software and hardware so that she adapts technology effectively and extensively in her classes. As mentioned earlier, her class is about computer use in classroom. In her classroom, she uses technology such as Power Point and different educational software:

I definitely use Power Point a ton just to project my ideas and to convey concept to students. It is a way to get all of the class focus on the same point….. it allows me to connect to other, to demonstrate, other information instead of just having static words up there. I can also connect to a Web site. I can also connect to other applications so they can see those things I also use. We use a lot of software in my classrooms. Everything from the whole Office to just different educational applications of software.

In the first class that I observed, she showed the students the uses of Excel in math education. The students practiced the spreadsheets in that session. She also integrates other software:

We use Inspirations and all kinds of tool software. File Maker Pro, we use. Excel, spreadsheets, we use. Microsoft Word and….. We use Inspirations, we use. We use Inspirations but we use other things like there is some software known as Building Perspective which is a 3-D software to help students develop their special reasoning skills. We use Number Monsters to show how kids can practice their basic math skills. We use Webquests. I mean, we use you name it we use it.

Mary adopts all this software into the curriculum. In addition, her use of technology is not limited with the software. She also has knowledge of different hardware: "We (I and the students) all obviously use the Mac," and "they (the students) use digital cameras for some of their projects. I don't require them to do any video things but we do use digital cameras sometimes."

Mary sees technology as "a tool or method to solve a problem." With her expertise, she can easily solve her colleagues' problems:

Sometimes it'll be out in the hall. And somebody will see me and they'll have a technical question. And you know, 9 times out of 10, I can fix it because I study the technology so I understand a lot of applications. And they just have a question about Power Point or Netscape or whatever. Sometimes it's more on how they're going to use the technology with their class.

Mary's skills become portable since she uses these skills to help others in different places.

Mary does not see technology as only computers. For instance, she used the white board to explain an example in her class that I observed. She uses the board to do some calculations or some other tools:

> "I also use quite often. I just used the dry erase board."

"And so I don't always have to use computer technology. I use the dry erase board or sometimes I even just recently used the over head because I had some things that the transparency was easier to show."

Sometimes online education is also a part of her classes: "I've done some things where we had discussion groups online." Is her expertise in technology the only reason that her colleagues come for help?

Helping and Caring about Other People
Mary uses her expertise to help other people. This certainly adds to her leadership role. Furthermore, she is very enthusiastic about helping others because she cares about them:

I've done extensively in terms of helping other faculty. I've been involved in some projects that we helped other faculty but I haven't lead any projects along this line. I've leaded some projects for students teaching them how to incorporate technology. I've done some things where I've had undergraduate students work with technology and work with K-12 students. So we've started the computer clubs and things like that out of the school.

Since Mary believes technology can be used to solve problems, she helps her colleagues use technology as tool to find solutions to their problems:

I think that what our job is in learning and teaching is to use that, those basic skills and help people go beyond that. They can learn those basic things but in terms of. Technology is kind of revolutionizing how we think about knowledge. And so I think it's really important that we do use technology as a means to help people learn.

They should have some basic technological skills. I think it goes beyond that... So we think about how that couples information. It makes how we use, how we can use the technology different in terms of helping people learn.

Mary worked as a manager of an educational programs laboratory. This job may have a positive effect on her caring about and helping others. The laboratory offers teacher workshops in science and mathematics. It has educational programs, including contests, mentoring, and classes that are also available for students. Also, she has been involved in some academic organizations that contribute to this characteristic of her. For instance, she has been in an academic organization which sets up meetings between people who find inspiring and helping others to learn important in higher education. In this organization, the colleagues in higher education "learn about themselves as teachers, explore new methods of teaching, and join a growing network of dedicated professionals who can share resources and offer mutual support" (Wakonse Foundation, n. d.)

As Wetzel (1993) states, even the faculty who have technical background may not use technology in teaching if they do not have knowledge of how to use it. Thus, technology is not being used at an expected level (Spotts, 1999). In addition to Spotts' (1999) and Wetzel's (1993) findings, Mary shows the importance of helping faculty members each other: "Sometimes they just need little guide. They know what they wanna do, they don't know how to do it".

Comfort and Accessibility
Since Mary is very helpful and an expert in technology and its use, her colleagues "know that I know how to do it so people feel free to come and ask me." She states, "in this case, technology happens to be something that I have some expertise in so they might feel comfortable asking me that." If she needs any knowledge or feedback, she is also asking other faculty for help:

For example, I'm not going to be expert in child literature. But there is sometimes when I need to know about children literature so I go ask the expert. Their goal is not to make me expert in this but to provide me with the basic information.

Mary shares her improvements in practice with her colleagues. Thus, the comfort is created and improved through the sharing and a two-way interaction:

When I need to understand content better for what I'm doing. And I might go and talk to some other math people. And they might suggest some articles and things that I need or I'll ask them about student understanding. Then I go and try something. And we'll have a follow up conversation about how well all went it.

I also feel comfortable asking them in areas where they have expertise and that I need some assistance in. And so it's just a kind of comfortable environment where everybody helps everybody. And most, a great deal I learn from my colleagues.

I believe the interaction and helping each other increase the comfort among them. Since Mary is approachable, her colleagues are more comfortable asking questions:

I think that my colleagues feel very comfortable while asking me. In fact, I've just had a question earlier today where could I help somebody solve a problem or something they didn't how to do. That happens a lot. I think it's probably more in terms of I am accessible.

Mary is accessible and approachable for her colleagues so that they can easily reach and ask her, "could you help me with this?" For instance, I believe her willingness to participate in my project was a sign of her openness. Although she was busy with some departmental responsibilities in addition to her researches, she replied to my request and agreed to be part of my project.

Time is a limitation to be accessible. However, Mary states that helping her colleagues is not a time consuming job for her. The problems or questions that her colleagues have usually do not require a lot of time or follow-up:

A lot of times they're not, they're not something that requires me to sit down for two hours with them and to re-meet with them regularly about it. But a lot of times something that I can show them how to do in 20 minutes or 30 minutes.

DISCUSSION AND IMPLICATIONS

The examination of Mary's stage in the adoption model suggests that colleges and departments can take several steps to encourage other faculty members to achieve Mary's level of expertise: administrators should implement faculty-to-faculty mentoring programs and insist upon and model appropriate use of technology.

Faculty Mentoring/Modeling

In terms of the faculty-to-faculty mentoring program, Mary expresses that we should not expect all faculty to be experts in technology: "They don't need to know every piece. They're not studying technology. They're using." Actually, "the broad discipline of technology has to do with the use of knowledge and resources to solve the problems." For this reason, faculty need help to be able to use the knowledge and resources in educational technology. For example, the training in which faculty members help each other can be the next step for faculty development programs:

It's probably the most effective way because faculty're developing when they have the need… So in that way, I think it is an excellent way of faculty development. It is not as formal as the mentoring program. But it's probably the next step for the mentoring program. Because after they've been mentored by some of our graduate students, then they know the kinds of questions. Sometimes they just need little guide. They know what they wanna do, they don't know how to do it. They just got stumbled little bit.

The mentoring program Mary mentions is a faculty development program in which a graduate student is paired with a faculty member, and the graduate student helps the faculty in terms of her or his instructional technological needs. Although the mentoring programs are successfully implemented in colleges of education (Smith & O'Bannon, 1999; Sprague, Kopfman, & Dorsey, 1999; Gonzales et al., 1997; Gonzales & Thompson, 1998; Beisser, 2000; Chaung, Thompson, & Schmidt, 2002), faculty mentoring can be considered as a next step for integrating technology into curriculum. For instance, a mentoring program having teachers as both mentors and mentees has been used as technology education for teachers. MacArthur et al. (1995) support this idea and state that mentoring helped teachers "to increase the mentors' knowledge of innovative and effective uses of technology and their awareness of technology resources in their own school district." This achievement can lead us to create a mentoring program having faculty as both mentors and mentees.

As Mary and Wetzel (1993) mention earlier, faculty who have technical background may not use technology in teaching if they do not have knowledge of how to use it. Also, Sherry et al. (2000) state that "teachers as learners" need ongoing professional development by colleagues rather than one-shot workshops by outside experts and "teachers as adopters" need mentoring with care and comfort as well as information so "teachers as leaders" play an important role in improving faculty in earlier stages. In addition, colleagues have a very important effect on whether their fellow instructors adopt an innovation or not: "While information about a new innovation is usually available from outside experts and scientific evaluations, teachers usually seek it from trusted friends and colleagues whose subjective opinions of a new innovation are most convincing" (Sherry, 1997, p. 70). For these reasons, I believe the faculty-to faculty mentoring and modeling should be considered in faculty development programs. As Spotts (1999) states, training programs need to show faculty members how the technology can be effectively used to enhance their instruction and learning:

Faculty development programs and training should not only focus on the equipment or software, but also on helping faculty members develop materials and effectively use the technology. Programs need to show faculty members how they can potentially benefit from using instructional technology. (p. 97)

Modeling the technology use is an effective way to meet this goal since "leaders play a central role at virtually every stage of the innovation process, from initiation to implementation, particularly in deploying the resources that carry innovation forward" (Light, 1998, p. 19). Moreover, Carr (1999) talks about the on-going peer support and expresses that "live peer support not only serves as assistance and encouragement; it contributes to the person-to-person communication that promotes diffusion throughout an educational community." To improve the faculty use of technology on campuses, colleges and universities may use this modeling in the faculty training. Hence, I believe the faculty modeling should be included in training programs. In this way, universities can become learning communities since "learning communities can also be more easily formed at later stages" of the Learning/Adoption Trajectory model (Sherry et al., 2000).

Appropriate Use of Technology

Modeling for faculty development should consist of the appropriate uses of technology. In the interviews, Mary states that the uses of technology in teaching and learning should be based on the research and gives the use of Palm Pilots as an example:

So for example, Palm Pilot. Using Palms in the classroom. That's something that at this point, in my perspective, it's pretty, umm, there is not much data out on that. We don't know a lot from the research. There hasn't been a lot research done on that. So maybe using it in an exploratory and a, in a means trying to figure out what is the best way to use it. Sort of a development trying to understand this technology. That makes some sense on a limited basis… I think a bad use's trying to figure out how to use Palm Pilot for everybody. Maybe we should do that in a laboratory situation and in a more research driven situation and not give it out there just because we have the palm technology. Maybe we should not just be doing until we understand from a research point of view how best to use it and what kinds of learning opportunities it can consistently and reliability afford us.

In addition, to integrate technology in teaching, faculty members need time. Mary sees this issue as very important when she talks about the needs and problems of faculty in her college in terms of technology use:

Time. Time is always a need for everybody. Probably time and in that opportunity is to think about the way technology can be used most effectively to expand the curriculum and not just do what we're already doing. And probably time to think very carefully about what we're building by increasing our use of technology: what are we saying and what are we getting into.

To make learning technology possible for faculty member, administration leaders should take the lead on using technology responsibly. Although "the primary role of administration is one to help facilitate access," technology brings more responsibility to administration:

I think another area of responsibility that people don't think about for administration. I think that's providing leadership so we're using responsible and efficient use of technology. In one sense, email is one of the most inefficient uses because sometimes students all email me and ask me question. And it would take me far a longer to type out my answer that for me than that for them to stop by my office. And so, umm, and sometimes I think administratively I get bombarded by emails from department chairs, leaders, and administrators. Be selective, don't send me everything. So part of their job is to lead in the responsible and thoughtful use of technology so we don't get carried, so consumed by technology that we forget what we're here for. We don't have time to do what we're really here to do.

Administrative support and "thoughtful use of technology" provide sufficient time to faculty with the integration of technology in the curriculum.

The responsible use of technology is not limited to the administration. Faculty members especially should think about the appropriate uses of technology:

There's a lot of support for it. I think that maybe what we need to focus on next is making sure that it's not overshadowing what we're trying to do. The reason's what we're really here which our research, which is teaching so we don't get so caught up that the technology takes over.

I think the technology is really going to push us make some decisions about the priorities. And we're either going to make decisions about the priorities or we're going to get run over by the technology.

Mary gives the email example several times to show how technology consumes the time of faculty:

It certainly uses one that sucks your time. You know, I would say that I use 25 percentage of my day on email. Just on communication where somebody sent me something so I've responsibility to get back to that. In part of that because I am the DOGE (Director of Graduate Education) so I get a lot of email from graduate students. But I've got to handle and respond to those individually, each one. So easily, easily, 25 percentage of my day is on communicating with people through email.

The expectation is that I am keeping up with my email. So that definitely affects my level of freedom. And it would what I can do because it's expected. It's part of the culture… All I'm trying do is to read my email and get the information. So there's just lots of, lots of, lots of conversations that are going on. Sometimes we get overlapped in the conversations… And you gotta be able to all keep up. And if you miss a half a day, you're out of league.

Email is only one of the examples using faculty's time. Availability of time is a key factor that influences the adoption and integration of technology in teaching and learning. To increase the utilization of technology in higher education, technology should be used carefully and appropriately by faculty, administration and students.

Limitation

Although I believe using the rich and thick description in this study increases external validity or generalizability, this study may be conducted with more participants in different schools so that the outcomes of the research may become more transferable to other situations. Conducting multisite designs or maximizing variation in the intentionally selected sample is another strategy to enhance the generalizability of a study (Merriam, 2002b). However, Miles and Huberman (1994) comment differently:

Thus there is a danger that multiple cases will be analyzed at high levels of inference, aggregating out the vocal webs of causality and ending with a smoothed set of generalizations that may not apply to any single case. This happens more often than we care to remember. (p. 435)

Therefore, as Mertens (1998) states, conclusions across the multiple cases should be done carefully and the uniqueness of each case should be considered.

CONCLUSION

This basic interpretative qualitative study shows that Mary has expertise in the instructional technology. Also, she adopts it effectively into her curriculum. In addition to these factors, she cares about other faculty members and helps them in the integration of technology into teaching. Since she is accessible and approachable to her colleagues, they feel comfortable to come and ask for help. Then, she shares the knowledge of educational technology with them. All these aspects form the leadership role that she carries in the department. Certainly, other factors may affect this leadership role but the themes described in this paper are the ones that are emerged from the data and support Mary's leadership in technology. However, as future research, a similar study can be conducted based on a leadership theory.

In the Learning/Adoption Trajectory model (Sherry et al., 2000), Mary is certainly in the leadership phase since she describes her position as a "leadership role in terms of modeling" and the themes discussed in this paper support this position. As Spotts (1999) affirms, faculty need help in how to use the technology effectively in teaching. Thus, they may need other faculty's leadership in technology. To develop faculty into leaders, faculty-to-faculty mentoring and modeling, and the themes that shape Mary's leadership role can be considered in faculty development programs. Moreover, it is essential that faculty who use technology effectively in their curriculum and have the leadership in technology should be good role models to their colleagues and students in terms of right and responsible uses of technology.

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