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Investigating faculty technology mentoring as a university-wide professional development model

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Abstract A growing and increasingly important area of research in higher education is the investigation of how different forms of support and training programs facilitate faculty adoption of technology into pedagogical practices. This study explored the implementation of a faculty technology mentoring (FTM) program as a university-wide professional development model, focusing on the success factors and critical strategies that encourage technology adoption in faculty teaching practices. The goal of this effort is to provide evidence-based discussion on an FTM model tailored to faculty members' needs in a university context. Participants included 12 faculty members (mentees) and 12 graduate students (mentors), paired throughout the FTM program. Analysis of mentors' weekly blog posts, case reports, and interviews with faculty members revealed six critical strategies: determining needs; exploring technologies' affordances and limitations; scaffolding; sharing feedback; connecting technology, pedagogy, and content; and evaluating. Success factors included motivation, meeting challenges, the nature of mentoring relationships, communication channels, and support. The results point to key recommendations for higher education institutions that plan to implement similar mentoring programs in order to support technology integration into faculty members' teaching practices.

Keywords Faculty technology mentoring · Higher education · Technology integration · Professional education

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Introduction

The integration of technology into learning and teaching is now widely accepted as an essential component of contemporary higher education. While little attention was given to faculty training at the beginning of the IT movement in higher education, the need to support faculty while transforming traditional classrooms into technology-enhanced learning environments is now a top priority (Georgina and Hosford 2009). A recent EDUCAUSE report revealed that faculty, dedicated to and motivated about using technology to support student learning, now demand professional development opportunities that equip them with the skills to integrate technology into their classrooms (Dahlstrom and Brooks 2014). Faculty interest in applying technology in innovative ways has grown, yet despite increasing capital investments in campus technologies and worldwide interest in pedagogical innovations such as online learning, mobile learning, and massive open online courses (MOOCs), the pace of faculty technology adoption has been rather slow (Friel et al. 2009). Investigating the impact of different forms of faculty support and training programs that facilitate the adoption of technology into their pedagogical practices is a critical area of research for higher education.

Challenges explaining faculty members' slow adoption of technology integration practices have been frequently noted in the literature, such as lack of time, resources, technology infrastructure, and support, as well as limited understanding about technology (see, for example Al-Senaidi et al. 2009; Xu and Meyer 2007). A host of faculty development and support programs have been designed to meet these challenges, including workshops, tutorials, technology training programs, and course development grants. While offering valuable solutions, these approaches have had limited success transforming faculty teaching because of an overemphasis on teaching about technology rather than teaching with it (Koehler et al. 2004). One-size-fits-all models have also failed to meet faculty members' unique needs in their authentic teaching contexts (Zhao and Cziko 2001). Ng (2015) proposed a shift in professional development that considers a faculty member's individual needs a priority; elicits his/her existing knowledge, concerns, and practices; immerses him/her in learning by doing and collaborative problem solving activities; sustains the continuity of his/her learning; and develops learning communities. The field has a tremendous need for models that incorporate these features into workable professional development contexts.

Among the many forms of faculty support and training programs, faculty technology mentoring (FTM) has emerged as the most likely to meet the needs of teacher education faculty for technology integration (Swan et al. 2002). FTM programs address the challenges presented by traditional programs, offering faculty opportunities to work one-on-one with a mentor. Despite the advantages noted in the literature (Chuang et al. 2003; Kopcha 2010), FTM programs have mainly been implemented for teacher education faculty within schools of education, not as university-wide professional development models. Many exemplary practices come from research about FTM conducted with teacher educators (e.g., Leh 2005; Thompson 2008), but success factors and strategies for effective implementation with faculty from different colleges and departments is still unknown. More importantly, best practices with teacher education faculty may not be generalized to other disciplines and teaching cultures, such as engineering, economics, and the humanities, and instructors in other fields may lack formal training in pedagogy. As Ng (2015) observed, “effective PD programs and their embedded activities should be informed by research on effective learning and teaching with educational technologies” (p. 29). Thus, this research aims to fill in a gap in the literature by presenting FTM as a university-wide professional development model and identifying success factors and critical strategies. The goal is to provide evidence-based discussion on an FTM model tailored to faculty members’ needs in a university context.

Adopting technology into faculty practice: success factors and critical strategies

Many scholars have discussed the adoption of technology into faculty teaching practices, focusing on success factors and critical strategies. Several factors have been identified as essential for successful adoption, such as time commitment, access to technology and resources, perceived usefulness, support and training, and an emphasis on pedagogical transformation rather than technology training (Buchanan et al. 2013; Georgina and Olson 2008). Zhao and Cziko’s (2001) model of goal-oriented behavior noted that teachers’ perceptions about the effective use of technology determine whether or not they will adopt it into their teaching practices. This adoption requires faculty members to reconceptualize their teaching methods and find ways to enhance their teaching with technology. Institutional factors such as accessibility and availability of technologies, technical and pedagogical support, and recognition are also frequently noted as being critical to successful technology adoption (Ng 2015).

Despite these known success factors, high-level technology integration is still sporadic, and low-level technology use is more common (Ertmer 2005). Low-level technology use is linked to teacher-centered practices, such as drill and practice, while high-level integration is associated with student-centered technology integration activities, such as problem solving activities (Ertmer 2005). The factors that impede high-level technology integration in higher education classrooms can arguably be linked to the limits of traditional support and training strategies offered to faculty members, who have unique needs in adopting technology into their teaching (Baran and Correia 2014). Current trends suggest adopting individualized training models that specifically address faculty members’ needs and goals (Ertmer 2005), peer training approaches that promote the sharing of ideas among faculty members (Georgina and Hosford 2009), forums that address local needs and model pedagogical strategies within departments (Georgina and Olson 2008), and purposeful faculty development strategies that utilize learning by doing (Friel et al. 2009). Prioritizing faculty members’ individual needs and targeting professional development programs to their concerns, motivations, and contexts enhance the effective adoption of technologies into their classrooms. Active learning, aligning pedagogy with content, collaboration via team teaching and mentoring, just-in-time learning and on-site support, recognition, and sustained learning over time are strategies that create substantive change in the ways a faculty member teaches with technology (Grant 2004). The significant body of research on strategies for successful technology adoption of faculty in higher education has presented evidence on the limitations of one-size-fits-all training approaches such as limited transfer to faculty practice, limited time commitment, lack of motivation, and lack of sustained involvement (Johnson et al. 2015). These impeding factors call for research on practical and relevant professional development models that customize support and training programs according to the needs and contexts of faculty members, such as mentoring programs.

Faculty technology mentoring as a professional development approach

The history of mentoring in higher education has involved a variety of definitions, conceptualizations, and approaches (Crisp and Cruz 2009). The existing literature does not offer a common, operational definition of mentoring (Dawson 2014), but there seems to be general agreement that mentoring is a nurturing process that builds relationships (Gabriel and Kaufield 2008). While early definitions emphasized the relationship between an experienced person and a less experienced person (Cotugna and Vickery 1998), recent approaches have focused more on partnership, co-mentoring, or reciprocal mentoring (Chuang et al. 2003; Gabriel and Kaufield 2008). Mutual trust, collaboration, and professional learning have also been included in conceptualizations of effective mentoring processes (Rhodes et al. 2004).

Recently, mentoring has been explored for its potential to support a faculty member's learning about and practice of technology integration. In higher education, varied technology mentoring models have been used, such as one-on-one mentoring between technology students and faculty members (Beisser 2000), reciprocal mentoring between graduate students and online instructors (Gabriel and Kaufield 2008), online course design teams of faculty members and graduate students (Koehler et al. 2004), and the matching of experienced faculty members with their peers (Larson 2009). Pairing technology-proficient graduate students with teacher education faculty members is the most common FTM approach found in the literature (Leh 2005). The pedagogical methods investigated have included the use of computer-mediated communication, learning by design, and service learning (Bierema and Merriam 2002; Koehler et al. 2004; Leh 2005). FTM programs have been reported to advance faculty members' adoption of technology into their teaching (Silva et al. 2010; Thompson 2008). Other reported benefits include increased confidence in using technology, transformed classroom practices, and established learning communities (Chuang et al. 2003; Gabriel and Kaufield 2008). Adequate resources, time, and ongoing support have been noted as critical success factors. Thompson (2008) considered learning community, compatible match, rewards, sustainability, celebration of accomplishments, and technology support as critical elements of mentoring programs. But the research into FTM programs has also revealed challenges that limit faculty adoption of technology with regard to these programs, such as lack of time, planning, funding, and support; poorly matched mentors and mentees; insufficient understanding of the mentoring process and role expectations, and limited time invested by faculty into testing solutions with mentors (Chuang et al. 2003; Franklin et al. 2001; Leh 2005). Mentoring models have also been criticized for placing excessive demand on school resources (Chuang et al. 2003; Kopcha 2008).

Mentoring programs have been suggested as effective professional development models that address common barriers to technology integration and communicate the effectiveness of technology integration to teachers (Kopcha 2008). They have been implemented in a number of contexts, such as for K-12 in-service teachers and teacher education faculty members, but the literature lacks research on the use of FTM as a university-wide professional development program with evidence-based discussion on the strategies and success factors. Without a whole-institutional approach to faculty professional development, it would be difficult to understand the effectiveness of mentoring programs in terms of their positive outcomes, challenges, and strategies (Ng 2015). FTM literature needs further evidence on the identification of successful strategies and conceptual frameworks to help plan future implementations.

This research therefore aimed to contribute to the existing knowledge base on FTM programs with an empirical investigation of a unique program design that paired education graduate students with faculty members from different departments to reveal critical conditions for technology adoption in a mentoring context. This research investigated perspectives of both faculty members and their graduate student mentors on using FTM as a one-on-one professional development model designed to overcome the barriers to classroom technology integration. The following research questions were examined:

1. What critical strategies emerged during the mentoring process that support the adoption of technology integration into faculty teaching practices?
2. What success factors supported the adoption of technology integration into faculty teaching practices?

Methodology

This study followed a qualitative case study methodology that guided an in-depth analysis of the success factors and critical strategies of a FTM program implemented in a graduate technology course in teacher education. The case reported in this paper focused on the technology adoption of 12 faculty members from different colleges at a research university who participated in an FTM program. Using a case study approach helped investigate complex mentoring processes in rich detail within different mentor–mentee contexts (Yin 2009). Gaining both faculty members' and their mentors' perspectives and collecting data from different sources helped to reveal multiple facets of adopting technology in higher education classrooms. Each case consisted of one pair, including one mentor and one mentee.

Participants

The participants of the study were from various departments at a large public university and included 12 graduate students (3 male, 9 female) enrolled in the course and 12 faculty members (8 female, 4 male). Students were seeking master's ($n = 7$) or doctoral degrees ($n = 5$) from the faculty of education, representing CEIT or Computer Education and Instructional Technology ($n = 3$), CI or Curriculum and Instruction ($n = 3$), ECE or Early Childhood Education ($n = 3$), and ELE or Elementary Education ($n = 3$). While two students had no previous teaching experience, 10 of them had 1–10 years of teaching experience. At the time of the mentoring program, four students were working as teaching assistants for undergraduate courses in their departments. Faculty members were from Economics ($n = 3$), Electrical and Electronics Engineering ($n = 2$), Business Administration ($n = 1$), Psychology ($n = 2$), International Relations ($n = 2$), Bioinformatics ($n = 1$), and Physics ($n = 1$). The majority of the faculty members were assistant professors with 1–5 years of teaching experience ($n = 9$), followed by one associate professor and one professor with 5–10 years of teaching experience. All faculty members indicated in interviews that they used Internet and communication technologies on a daily basis. Before they participated in the FTM program, most faculty members ($n = 9$) noted their use of technology in the classroom was limited to PowerPoint during lectures. Three faculty members reported using technologies in their classrooms such as learning management systems (LMSs), student response systems (SRSs), and discussion boards. Half of the faculty members stated that they had attended technology seminars presented by the university's technology support office.

The FTM program

The FTM program was implemented in the Technology in Teacher Education graduate course offered by the Department of Educational Sciences at a large public university. The course instructor was the researcher and author of this paper as well the designer of the FTM program. Motivated to enhance effective technology integration practices at her university and examine the impact of the FTM program within an interdisciplinary context, she incorporated the FTM program into a graduate course that she designed and taught in Educational Sciences. During the program, her role entailed designing and implementing the FTM, organizing weekly graduate course activities, pairing mentors and mentees, addressing mentor and mentee needs, monitoring FTM progress through regular checks with mentors, establishing a connection between ITS and the mentor–mentee pairs, establishing a community of practice, sharing resources and artifacts, and evaluating the graduate students' progress. The course teaching assistant, a graduate student in curriculum and instruction, assisted with the organization and facilitation of mentoring activities. In addition to weekly in-class hours, mentors' weekly posts were reviewed and analyzed.

After a review of three decades of mentoring research, Dawson (2014) identified design elements to guide educators who plan to design mentoring programs and activities. The FTM program was created considering the design elements established by Dawson (2014): objectives; roles; cardinality; tie strength; relative seniority; selection; matching; time; activities; training; resources; tools; role of technology; rewards; policy; monitoring; termination.

Objectives

Objectives of mentoring models describe what the programs aim or intend to achieve (Dawson 2014). The FTM, developed as a semester-long project in the context of the Technology in Teacher Education graduate course, aimed to facilitate and monitor technology integration activities within faculty members' contexts as they worked with mentoring graduate students throughout the semester.

The course aimed (a) to analyze contemporary issues in technology and teacher education and (b) to examine approaches, models, and theories on teachers' knowledge about effective technology integration. Weekly course topics included the investigation of theories and frameworks about technology in teacher education such as technological pedagogical content knowledge (TPACK), the diffusion of innovation, and platforms for online communities of practice, game-based learning, and mobile learning.

Roles, cardinality, tie strengths, relative seniority, selection, and matching

Roles describe specific responsibilities and functions of mentors and mentees involved in the mentoring programs; cardinality defines the number of each sort of role; tie strength explains the closeness of the mentoring relationship; relative seniority describes the experience and status of participants; selection defines the selection processes of mentors and mentees; and matching identifies the composition of the mentoring relationship (Dawson 2014).

This FTM program was designed to help early career faculty acclimate to the university by engaging them in training and orientation activities related to teaching, research, and community service. At the beginning of the 2014 spring semester, an invitation email was sent to the university's academic development program email list. Early career faculty were invited to participate in the FTM to ease their integration process while introducing the university's technology support system and infrastructure. Nine faculty members responded to the email invitation expressing their desire to participate, while three additional faculty members were nominated by the head of the Instructional Technology Support (ITS) office and invited separately.

In the first class meeting, graduate students discussed their backgrounds and interest in technology in teacher education. The course instructor shared the mentee profiles with the graduate students, including faculty expectations for the project as stated in email conversations, before pairing mentees and mentors according to similar backgrounds and interests. The course instructor then introduced the mentors to their mentees via an email outlining the process. Table 1 presents each mentor–mentee profile.

Time, activities, and training

The amount of time allocated to mentoring actions, the activities that mentors and mentees are expected to perform, and the training opportunities provided to mentors

Table 1 Mentor–mentee pair profiles

Mentor profile	Mentee profile
Lana, CI masters student	Dr. Davis, assistant professor of mechanical engineering
Alan, CI masters student	Dr. Fay, assistant professor of bioinformatics
Anne, CI masters student	Dr. Miles, instructor of international relations
Dan, CEIT Ph.D. student	Dr. Gray, assistant professor of international relations
Nisa, CI masters student	Dr. Lear, professor of physics
Erin, CI masters student	Dr. Sang, associate professor of psychology
Sui, CEIT masters student	Dr. Page, assistant professor of electrical and electronics engineering
Clay, CEIT Ph.D. student	Dr. Lee, assistant professor of psychology
Pat, CEIT masters student	Dr. Tai, assistant professor of economics
Susan, ECE Ph.D.	Dr. Ray, assistant professor of electrical and electronics Engineering
Jean, ECE Ph.D. student	Dr. Clark, assistant professor of economics
Dana, ELE Ph.D. student	Dr. Sea, assistant professor of business administration

Pseudonyms are used throughout

and mentees should be communicated to the participants (Dawson 2014). The FTM program lasted 14 weeks over the course of one semester. As a requirement for successfully completing the FTM, mentors were expected to: (a) conduct needs analysis to determine mentees' needs at the beginning of the semester, (b) engage in technology integration activities with their mentees throughout the semester by holding weekly or bi-weekly meetings and observing the mentees' classes, (c) present technological and pedagogical solutions to problems laid out by mentees, (d) explore solutions through a collaborative discourse with mentees and other mentors, (e) evaluate the results of implemented solutions, and (e) present and share the process and results with the community to disseminate the knowledge of innovations within the course and the campus. Table 2 presents the activities that mentors followed during the FTM program.

Resources, tools, and the role of technology

The availability of resources that assist mentors and mentees, and the role of technology in the mentoring relationship should be clarified while designing mentoring programs (Dawson 2014). The FTM program was implemented at a large research university with significant technology infrastructure such as computer labs, a campus-wide wireless network, and smart classrooms. The ITS office is primarily responsible for educational technology support at the university. Their services include supporting technological infrastructure such as an LMS and conducting training for faculty members and staff at the university on topics such as designing and teaching a course with an LMS, preparing syllabi, and using an SRS in the classroom. At the time of the FTM program, the university had just implemented a new LMS. Faculty members were required to transfer to the new system and adopt new strategies for the classroom the following semester. These

Table 2 FTM activities

Activities	Content
Meetings with the faculty	Mentors meet with their mentees (faculty members) periodically throughout the semester
Exploring and implementing solutions with the faculty	Mentors explore and implement technology and pedagogy solutions to the mentees' teaching contexts. The activities include using at least one form of technology to integrate into class activities [e.g., online communication tools, a learning management system (LMS), social media, student response systems (SRS), etc.]
Mentoring blog	Mentors share updates about their experiences periodically on the course blog during the semester. These posts include reflections on the challenges, problems, possible solutions, activities, future plans, etc.
Mentoring showcase page	Mentors complete a showcase page on the class FTM website. This showcase includes information about mentor and mentee profiles and activities conducted during the mentoring program along with supporting pictures and artifacts
Mentoring Ignite	Mentors present their work during the final meeting following the Ignite presentation format
Case report	Mentors complete a report about their FTM experiences and work with mentees

changes called for ongoing and just-in-time support to encourage faculty adoption of these technologies. During the semester, the FTM participants had close contact with ITS in order to acquire immediate support. ITS was also invited to present the technologies, services, and support provided by the office to participants. At the end of the semester, the findings of the FTM program were shared with ITS, and feedback was provided on the use of several technologies, particularly the LMS.

Rewards, policy, monitoring, and termination

Intrinsic and extrinsic rewards provided to mentors and mentees, rules or guidelines that outline the mentoring policy, the actions for monitoring the progress, and the way mentoring program is ended are other critical points to consider while designing mentoring programs (Dawson 2014).

This program was the first technology mentoring initiative for the university. No external or monetary rewards or incentives were provided to participants. The mentoring guideline that outlined the expected mentoring steps and rules is provided to mentors and mentees at the beginning of the semester. The program terminated at the end of the semester with faculty interviews and mentor case report submissions. Finally, mentors presented their work and activities on the FTM website and conducted 5 min presentations celebrating their accomplishments and experiences during the program.

Data sources

Three data sources were used in the study: (a) mentors' weekly blog posts, (b) mentors' case reports, and (c) interviews with faculty members. To monitor and guide the mentoring process, mentors were asked to record their activities in their blogs on the course LMS. They also periodically shared the artifacts they developed with their mentees on these blogs, such as course syllabi or screenshots of course webpages. A total of 103 blog posts were collected. As a major requirement of the course, mentors were also asked to write case reports about their experiences and activities at the end of the semester. These reports illuminated mentoring contexts, activities, artifacts, and reflections. A total of 12 case reports were collected, one for each mentor. The final data source was semi-structured interviews conducted with the faculty members at the end of the semester to gather their insights on the mentoring process and the impact of the FTM program on their practices. Interview guidelines included questions about mentees' professional and educational backgrounds, technology use in their daily and professional lives, views on learning and teaching, problems and challenges faced while integrating technology into their classrooms, motivations for joining the program, contributions of the program to their teaching practices, and recommendations for improving the FTM for future implementations. The 12 interviews lasted between 30 and 90 min and were transcribed for further analysis.

Data analysis

The grounded theory method helped to assess how mentors and mentees experienced the technology integration adoption process (Corbin and Holt 2005). In the first phase, within-case analysis was conducted to generate initial codes from each mentor–mentee case data set, including case reports, mentor blog posts, and faculty interviews. The research foci and the strategies and success factors of FTM processes drove this analysis. The data were reviewed line by line, with close attention to sentences or paragraphs that represented major ideas. Each within-case analysis followed a recursive and spiral pattern, where after each open coding within the case, analysis resumed of the previous case(s) to compare emerging codes. This cycle was repeated until the final case was analyzed and all codes were compared with previous cases. In the second phase, the identified strategies and success factors were categorized. For example, for critical strategies, the following codes were placed into the category of determining needs: weekly meetings, student questionnaires, and classroom observations. For success factors, lack of time and increased workload were categorized under meeting challenges. During cross-case analysis, these codes were examined in terms of their presence or absence, helping to identify similarities and differences across cases as well as common themes (Miles and Huberman 1994). Table 3 presents the themes with related categories and example codes.

Data analysis was mainly conducted by this article's author with the assistance of one other researcher, especially during the final stage of coding. The initial themes

Table 3 Emerging codes and example quotes

Codes	Example quotes
Mentoring strategies	
Determining needs	As I observed Dr. Lear's class previous week and took some notes, I checked them to see what could be improved (Nisa, mentoring blog)
Exploring technologies' affordances and limitations	She, also, expects some different features from these systems. Students can change their answers. The time should be limited to answer… (Clay, mentoring blog)
Scaffolding	Based on the observation results, the mentee was guided about classroom management, teacher behavior, student interaction in class, directing and controlling assignments in the frame of course objectives (Lana, mentoring blog)
Sharing feedback	We talked about Dr. Sea's presentations and I suggested her to use more images and less writings on the slides. Although she uses videos, it did not take much interest in students (Dana, mentoring blog)
Connecting technology, pedagogy, and content	I use e-choice. I have three hours class, for example, first half goes to the technical aspect. I spend the rest of the time to check whether students understand the concepts or not (Dr. Lear, interview)
Evaluating	Indicating the same theme, the majority of the students who took the questionnaire, with a percentage of 78 %, thought that LMS helped them to learn better in the course when it was compared to other methods and tools (Alan, case report)
Success factors	
Motivation	I am using the technology to the point where a student comes and tells me that I don't know this technology. That's the professor I don't want. That's why I use technologies like dropbox, gmail, evernote, etc. (Dr. Page, interview)
Meeting the challenges	Technology can make lives easier, but also may create a lot of workload, such as answering student emails online. But if you can manage it, then it makes things easier. I use LMS to answer student emails, so I don't need to answer same questions separately; everybody sees the answer to the questions (Dr. Miles, interview)
Nature of mentoring relationship	I can clearly define our mentorship relation as a close and strongly tied. Dr. Gray and I also decided to continue our mentorship at least to the end of summer. (Dan, case report)
Communication channels	Today we talked about Diigo first. She said that they actively used it with students in the past weeks. She is also planning to share that site with the whole Bioinformatics Department in order to speed up the flow of information in their field (Alan, mentoring blog)
Support	Therefore she expects policies from the university administration in the future. The only apparent rewards were the possible change in the student evaluations and her joy while learning new things and the reactions she get during implementation. (Dan, case report)

generated by the author were reviewed by the other researcher. Any disagreements or additional emerging themes were discussed, consensus was reached, and adjustments were made accordingly.

Trustworthiness

To ensure the trustworthiness of the research, three criteria were followed: credibility, transferability, and confirmability (Lincoln and Guba 1985). Prolonged engagement, persistent observation, triangulation, and peer debriefing also ensured the credibility of the findings. This study took place in the context of an FTM program implemented within a graduate course, allowing for an insider view of the participating graduate students and faculty members, especially by the course instructor, who was also the researcher of the study. Data were collected from interviews, case reports, and blog posts concerning different aspects of the experience. Both faculty members' and graduate students' perspectives were analyzed to create a rich, comprehensive account. The graduate students were trained on interview guidelines and conducted faculty interviews after the FTM program and semester ended. Faculty members were provided with transcripts of the interviews for verification. Peer debriefing was used to provide an external check on the inquiry process and to consider "aspects of the inquiry that might otherwise remain only implicit within the inquirer's mind" (Lincoln and Guba 1985, p. 308). As mentioned above, the data set and codebook were examined with another researcher; this colleague had experience in research and mentoring processes and assisted in confirming emerging codes and categories from the raw data. Both researchers independently analyzed the data set in order to corroborate conclusions drawn from analyses, inconsistencies, and contradictions, thus making it possible to "reveal elements of the phenomenon that would not necessarily be seen by just one researcher" (Lincoln and Guba 1985, p. 245). Disagreement was managed through seeking consensus on as many levels of evidence as possible.

Case studies are responsible for providing "sufficient information about the context in which an inquiry is carried out so that anyone else interested in transferability has a base of information appropriate to the judgment" (Lincoln and Guba 1985, p. 124). To increase transferability of the results, the context and program design have been described in detail. Confirmability consists of evidence that the findings and interpretations of a study are legitimate and not constructed by the researcher, which was supported by a reflective journal maintained during the course. The journal served mainly as a personal diary where the researcher recorded assumptions and biases about the FTM program as well as insights about success factors and critical strategies. Finally, ethical clearance was obtained, guidelines were followed, and participants gave consent for data collection. Pseudonyms are used throughout this paper to protect the privacy of the participants.

Results

Critical strategies

The analysis of mentor blog posts, case reports, and interviews revealed six strategies followed while integrating technology into mentees' contexts: (a) determining needs, (b) exploring technologies' affordances and limitations, (c) scaffolding, (d) sharing feedback, (e) connecting technology, pedagogy, and content, and (f) evaluating.

Determining needs

This process was ongoing throughout the project, as mentor–mentee pairs searched for technology integration solutions for faculty members' teaching contexts. Three approaches were employed to explore these needs: weekly meetings, student questionnaires, and classroom observations.

Weekly face-to-face meetings helped members inform each other about the program, establish a common language, and communicate expectations. During these meetings, mentors and mentees periodically discussed potential technology integration activities, planned classroom applications, and shared feedback about student engagement with these tools. One of the mentors, Lana, wrote:

> These meetings were very useful for the mentee to feel secure and not get lost on the way to success… During these meetings, new applications were introduced, the mentee could ask questions, and the procedure was evaluated. (Lana, mentoring blog)

Mentees found these meetings to be a valued opportunity to dedicate time each week to technology exploration. For example, Dr. Fay, stated:

> I liked the idea that every week someone would visit me and teach me a different technology. This would also bring me some discipline to learn more. In the end, I learned and started to use the LMS very quickly. (Dr. Fay, interview)

A second common approach for determining needs was student questionnaires that aimed to understand learning needs, technology usage, and attitudes towards classroom technologies. Five mentor–mentee pairs administered different questionnaires. The questionnaire implemented in Dr. Miles's class revealed that students wanted classroom technologies to help visualize concepts presented in class. A questionnaire employed by Lana and her mentee Dr. Davis indicated that most students had regular access to social media tools. Susan, who mentored a professor in Electrical and Electronics Engineering, implemented a survey on the perceived attributes of the LMS because the mentee wanted student feedback on course technologies. Findings from student questionnaires were integrated into the selection of appropriate technologies as well as the design of technology integration activities.

A third approach for determining needs was observing mentees' classes. Mentors recognized the importance of visiting their mentees' classrooms, even though it wasn't a requirement. During these observations, mentors gained a better understanding of teaching contexts, monitored technology integration practices, and noted feedback on classroom applications to shape future goals. One mentor, Lana, indicated:

> Class observations are the prominent tools to collect feedback both from students and the instructional technologies that were applied. Class observation was also used for pedagogical feedback for the mentee based on her demand. (Lana, case report)

Mentees paid particular attention to student attitudes and behaviors and later shared their insights with their mentors. Needs were analyzed constantly throughout the semester as new technologies were explored, feedback was gathered, and classroom implementations were evaluated.

Exploring technologies' affordances and limitations

A common strategy before introducing a technology to a class was the consideration of its affordances and limitations. Explorations were conducted by the course community during tech demo hours, by mentors individually on their own time and by mentors and mentees during weekly meetings. One of the mentors, Nancy, explained in her blog how she and her mentee selected the student response system that best met their needs:

> We talked about the E-Choice system. We find this system more usable, because there is no need to have a smartphone or Internet… I searched Poll Everywhere, and I found that this system allows us to embed the questions in slides. So this is more usable in class. (Nancy, mentoring blog)

After collecting the necessary resources, mentors demonstrated technologies to their mentees with presentations on the tools' features, affordances, limitations, and potential classroom integration activities. In some cases, these demonstrations were collaborative. Anne commented:

> Dr. Miles and I made demos of the products together and tried to find the best one which could answer our needs at that time. We made demos of LMS, Piazza, Socrative, Poll Everywhere, Friendfeed, and Diigo together. In addition to its appropriateness, we also expected the technology to be user-friendly and easy to use and to have an attractive interface. (Anne, case report)

As noted, during these explorations, features such as usability, pedagogical value, and ease of use were the main criteria for technology selections.

Scaffolding

During the technology explorations, scaffolding was used to develop mentees' technology integration skills as mentors oversaw the learning process. Lana wrote:

> For a week period, the mentee explored how to use Prezi in instruction and I monitored and guided the process. When the mentee had a question, I interjected. After mentee engaged Prezi in class sessions, she started to use it continuously. (Lana, mentoring blog)

Because the purpose of the FTM was to develop faculty members' skills and knowledge about technology integration, mentors frequently noted supporting their mentees' development until they could complete tasks and activities independently.

Sharing feedback

Providing feedback regarding mentees' teaching and implementation of technology was another common strategy. Mentors, during observations in faculty members' classes, took notes about their teaching as well as students' reactions. They shared these notes with their mentees during weekly meetings. Lana, for example, expressed in her case report that she gave feedback regarding her mentee's classroom management, student interaction, and the alignment between course objectives and assignments. Another mentor, Dana, gave recommendations to her mentee about the design of her presentation materials using observations she made about student engagement in class. Mentees noted in interviews that they liked having a person observe their teaching and give feedback, an opportunity they don't have on a regular basis.

Connecting technology, pedagogy, and content

Analysis revealed that technology selections and the design of learning activities resulted from mentor–mentee conversations about the connections between content, pedagogy, and technology. For example, Dr. Miles, a faculty member in International Relations, started using Twitter to connect students with international organizations such as the UN, and he integrated tweets into course topics. He explained:

> I want to use a wikibook project in my graduate course that has a heavy writing load. I would like to create an international politics sociology dictionary to define some of the concepts we cover in the class. (Dr. Miles, interview)

Another mentee, Dr. Page, a faculty member in Mechanical Engineering, wanted to make connections to real-life physics by using video and getting student feedback with SRS tools. The variety of technologies explored in the mentoring cases represented the unique context of faculty disciplines, pedagogical methods, and student needs.

Evaluating

Once mentors and mentees integrated technologies into their classes, several participants felt the need to evaluate their effectiveness as well as to seek feedback from students. To that end, three mentor–mentee pairs implemented end-of-semester questionnaires. Alan highlighted the questionnaire results:

> 78 % of the students believed that LMS increased their motivation for the course… Students also provided their recommendations about better and more effective technology integration in the course. (Alan, case report)

Another evaluation tool was class observation. Erin reported in her blog the results of her observations regarding SRS:

> After the lesson, most of the students didn't understand how the time passed… Comparing on my observations with previous lessons and I could see the differences… In this lesson we have 32 students and all of them tried to answer the questions via SMS using the SRS. (Erin, mentoring blog)

The strategies followed by the mentor–mentee pairs improved faculty adoption of technology integration practices within authentic contexts.

Success factors

The analysis identified five factors playing critical roles in the success of faculty technology integration within the FTM program: (a) motivation, (b) meeting challenges, (c) the nature of the mentoring relationship, (d) communication channels, and (e) support.

Motivation

When asked in interviews about their motivation for joining the FTM program, faculty members mainly noted that they wanted to keep up with new and innovative technologies, to make a difference in their teaching, to make learning interesting for the new generation of students, and to improve their pedagogical knowledge. All mentees also noted that mentoring would give them the opportunity to get one-on-one help and become more disciplined during the learning process. Because none of the faculty members had training on teaching methods, they frequently noted during interviews that they expected FTM to contribute toward improving their teaching in general. A faculty member in Mechanical Engineering, Dr. Davis, expressed:

> As a new instructor, I really value teaching. After I started teaching I realized how important it was. I don't have any experience in teaching. We don't have pedagogical formation, and it was helpful to get help from somebody who knew about this. I think this should be disseminated especially for professors who just started teaching. (Dr. Davis, interview)

Meeting the challenges

The most commonly coded challenges were lack of time, increased workload, and students' adoption of technology. When asked in interviews about the challenges and limitations of the FTM program, faculty members observed that learning to integrate technology required significant effort and time. The FTM program started at the beginning of the semester, and half of the faculty members felt that integrating technology at the same time was a challenge. Dr. Lee emphasized that she would have preferred planning technology integration activities for the next semester so she would feel better prepared. She explained in her interview: "Exploring technologies and implementing them in the same semester made it difficult to adopt at the beginning. It created cognitive overload and increased my workload. I didn't realize it was going to take this much time." Another faculty member noted that while he spent considerable time on the program at first, as he grew more confident, his time investment decreased. A new faculty member of International Relations, Dr. Miles commented:

> My workload increased. We are the young generation faculty with high motivation to connect to the students. In addition to the preparation for the lectures, we also prepared questions on Socrates and spent time on how to integrate them… While the workload increased, I got feedback from students,

> and I established a different relationship. I believe it's worth it. I can also reuse these questions next time. (Dr. Miles, interview)

Another faculty member, Dr. Gray, felt mentoring helped solve the issue of time and workload:

> During my busy weeks, when my mentor came, we worked together and learned something now. I got excited. One cannot keep learning about this by herself like we do here as programmed and planned. I could use the workload as an excuse and not do it. Even in the busiest times, the work with my mentee became a one hour window. (Dr. Gray, interview)

Faculty members also considered students' resistance to adopting classroom technologies a challenge during the FTM program. Because the technologies were explored and implemented as the semester progressed, some students had difficulty adapting. For example, Dr. Davis, assistant professor of Mechanical Engineering, noted that students did not check the LMS as often as she expected. However, Dr. Miles, an instructor of International Relations, felt that as professors continue to use technologies in the classroom, students will adopt them over time.

Nature of the mentoring relationship

Another success factor that emerged was the nature of the mentoring relationship, which was based on shared responsibility, accountability, reciprocal learning, and shared vision. Over time, the relationship evolved to a partnership model. One of the mentors, Anne, stated in her case report that she and her mentee built a strong working relationship within the context of the program. She felt that the mentor and mentee roles being indistinct was a strength of the program. Her mentee, Dr. Miles, stressed that mentoring should transcend the master-apprentice relationship and instead focus more on two-way communication between people devoted to a process. He explained:

> Both sides should be ready to spend their time and energy for the mentoring process. Otherwise, the process would fail. Besides, mentor and mentee match is the key point to accomplish the goals of the mentoring process. (Dr. Miles, interview)

Mutual benefits within the mentoring relationship were also stressed as an important component of a trustworthy relationship. Alan, one of the mentors, explained the importance of mutual benefits:

> Mutual benefits were gained in the mentoring partnership due to the fact that both the mentor and the mentee learned from each other in a fruitful learning atmosphere. This means not only the mentee has learned while being mentored, but also the mentor has learned while mentoring as a part of the FTM program. (Alan, case report)

Communication channels

Analysis revealed that communication channels played an important role in the spread of information about technology integration practices. Four communication channels were identified that enhanced information flow between mentors, mentees, colleagues, and instructional support office.

The first channel was mentor to mentor. Analysis revealed that the mentoring community within the course served as an information hub. For example, all mentors noted in their case reports that course debriefing hours helped them share mentoring experiences, including technologies explored, feedback received, challenges experienced, and potential solutions applied. Lana noted:

> The mentoring program benefited from community of practice. The first community was mentors in the program. The mentors among each other shared different technological applications for instructional purposes throughout the mentoring. The first practice was also performed among mentors to get familiar with the applications and to discuss their affordances and constraints in educational settings. Continuous information share in the community was turned into practice with mentees as well. (Lana, case report)

The technology demonstrations conducted each week by mentors helped the classroom community become aware of available classroom technologies, as well as their affordances, limitations, and potential pedagogical implications.

The next communication channel flowed from the mentees to the mentoring course community, helping generate ideas about technology integration. On several occasions, mentors shared mentees' existing work with technologies and pedagogical approaches, sparking ideas for other contexts. For example, one tool, Piazza, was already being used by one professor. The mentor brought the example to the course, some mentors shared the tool with their mentees, and another mentee integrated the tool in his own classroom.

The third channel involved close connections throughout the semester between course participants and ITS, the university's instructional support office. The FTM program aimed to connect faculty members with technologies and services offered by the center, acting as a bridge. At the beginning of the semester, ITS introduced available technologies and support mechanisms on campus during a course seminar. Mentors later shared these resources with mentees. For example, mentors used the program to introduce a new campus-wide LMS to faculty members and explore features and applications together. Feedback on improving the LMS was shared with ITS.

The final channel of communication occurred between mentees and colleagues. As mentees integrated technologies into their classes, they shared with their colleagues. For example, two mentees in the same department noted in interviews that they had discussed their experiences and exchanged ideas about what they explored with their mentors. One of those mentees, Dr. Gray, mentioned that his colleagues initiated conversation about his mentor, asking what they did together and what he had learned. One of the mentors, Alan, noted in her blog that her mentee planned to share the tools they explored with the whole department to increase information flow. According to the mentees, exchanges between colleagues played an important role in their technology selections. When asked how or why they adopted certain technologies, they frequently referenced colleagues or advisors. Each of these communication channels connecting mentors, mentees, the mentoring community, ITS, and university faculty helped to disseminate information about available campus technologies as well as exemplary integration practices.

Support

When asked about their insights on methods for supporting the adoption of technology integration practices and improving FTM experiences, faculty members suggested offering workshops, rewards, and hotline services for technology problems; reducing course loads; and increasing interaction with colleagues. Faculty members particularly referenced the importance of the introductory workshops offered by ITS at the beginning of the semester. One common suggestion was to create a community for faculty members to share their experiences with colleagues and to ensure the continuation of integration practices. One mentor, Dan, explained:

> As a mentee, Dr. Gray expressed her concerns about the lack of rewards for this kind of program. On several occasions, she said that renewing a course or her teaching approach and developing new teaching skills requires extra time for academicians. Therefore she expects policies from the university administration in the future. The only apparent rewards were the possible change in the student evaluations and her joy while learning new things and the reactions she got during implementation. (Dan, case report)

Another common idea was to extend the FTM to a year-long program, giving faculty more time to prepare the courses. Dr. Miles also suggested measures for extending the FTM:

> Mentors should keep in touch with their mentees. These kinds of projects should be treated as a means instead of an end. In fact, experiences gained throughout the whole mentoring project should be shared with other faculty members to keep the sustainability of the mentoring projects. (Dr. Miles, interview)

Sustaining faculty learning and practice with technology emerged as another component to success. Mentors and mentees frequently noted their plans for ensuring continuity. Alan said:

> My mentee has already planned next term's courses in which she would put LMS to use as an instructional technology and changed her curriculum so that students could be more active participants through different activities on the LMS in an interactive learning atmosphere. Her sound and rigorous actions coming without any delay also indicates her motivation to utilize this technology in the future in a more influential way. (Alan, case report)

Supporting the FTM as a university-wide professional development program was revealed as another important factor for its success. Faculty members recommended

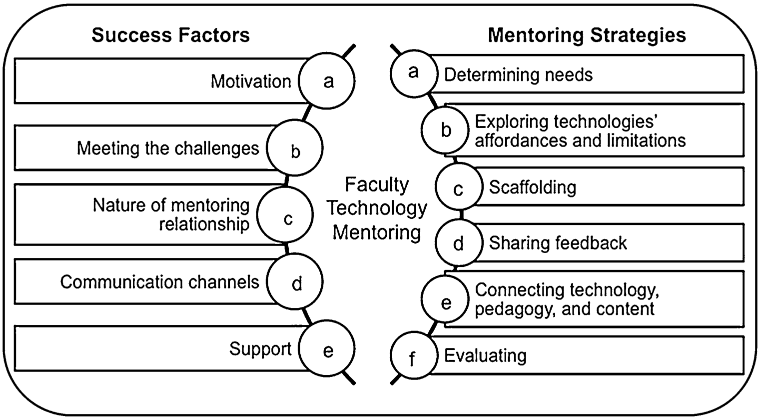

Fig. 1 FTM strategies and success factors

that the program should be sustained by university policies and financial resources. One faculty member, Dr. Lee, suggested:

> Each discipline has a unique need and ways of doing things such as discipline-specific pedagogies, exams, and content. Mentoring should be provided as discipline-specific professional development. For example, how do I learn about how to integrate technology in my area, psychology? The university-wide mentoring program could have an office in each department specialized on technology integration in the psychology discipline such as pedagogical methods, videos, surveys.

Using multiple data sources illustrating both mentee and mentor perspectives and implementing the FTM as a university-wide faculty development strategy was unique to this research context. Nonetheless, the success factors revealed by analysis present ways to support and sustain FTM as a method for promoting technology integration into faculty teaching practices. Critical strategies and success factors for this FTM context are illustrated in Fig. 1. These success factors and critical strategies highlight conditions and methods for implementing effective FTM programs in higher education.

Discussion

This study aimed to advance the literature by presenting a FTM program as a university-wide professional development model, highlighting success factors and strategies that support the adoption of technology into faculty teaching practices. Findings suggest that mentoring helped to meet the challenges presented by traditional standalone technology workshops, which are disconnected from faculty members' authentic teaching contexts. It is frequently noted in the literature that effective professional development programs should connect technology integration to faculty's pedagogical goals (Ertmer and Ottenbreit-Leftwich 2013), aim to solve emerging problems in authentic teaching contexts (Kealy and Mullen 2003), and provide content-sensitive solutions (Mishra et al. 2007). Addressing faculty members' individual needs and concerns, eliciting their existing knowledge, and maximizing their students' learning are known features of successful professional development programs (Ng 2015). The strategies identified in this study—determining needs, scaffolding, sharing feedback, providing just-in-time support, and engaging in a learning community—further contribute to the current body of literature by presenting conditions for using FTM as an effective professional development approach.

Research has suggested that individuals' cognitive, emotional, and contextual concerns should be considered for successful technology adoption because it is a "complex, inherently social, developmental process" (Straub 2009, p. 641). Learning to teach with technology is further affected by the situated and contextual nature of technology integration (Mishra and Koehler 2006). Findings in the current study revealed that central to the mentor and mentee work were discussions about connecting the faculty member's content, specific pedagogical approaches, and appropriate technologies. Immersing faculty and mentors in learning experiences within FTM helped them progress beyond traditional show-and-tell models by focusing on applying technology-enhanced pedagogies (Ng 2015). Findings also support the power of peer learning centered on shared expertise, ongoing conversation, and pedagogical dialogue.

Because of their complexity, organizations aiming to help faculty to adopt educational technologies should consider factors that mediate successful integration and develop professional development models that "handle multiple personal aspects—cognitive, affective, and contextual" (Straub 2009, p. 642). One of the most important factors in the success of mentoring programs is creating a shared vision with customized solutions at both the individual and system levels (Chuang and Schmidt 2008; Kopcha 2008). Because this was the first implementation of an FTM program within the university, neither graduate students nor faculty members held preconceived notions of mentoring. While some faculty had expectations based on their experiences and technology needs, others simply wanted to be a part of the program to explore the process. All faculty emphasized the need to connect to the new generation of college students with classroom technologies. Some wanted immediate feedback on their existing technological practices, while others wanted feedback regarding pedagogical approaches such as classroom management. Different levels of courses (e.g., graduate, undergraduate) and disciplines (e.g., engineering, economics) created varying needs and motives for technology integration. Therefore, instead of imposing a strict mentoring agenda, each mentor–mentee pair was guided to generate their own goals and action plans under the umbrella of the shared goal of exploring classroom technologies. Study results suggest the continued use of such unique, adaptable, and customized approaches to encourage mentors and mentees to negotiate relevant personal goals.

The value of creating a learning community or a community of practice around mentoring has been frequently cited in the literature (Chuang and Schmidt 2008; Kopcha 2008). This study also revealed the importance of communication channels and learning communities in the adoption of technology integration practices.

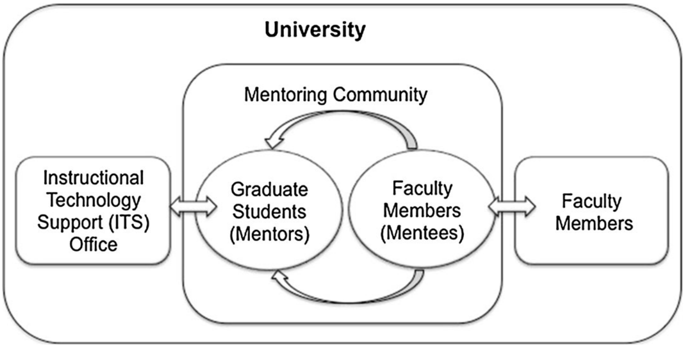

Fig. 2 FTM information flow

Similarly, Rogers (2003) described the importance of the peer-to-peer relationships and interpersonal channels that play fundamental roles in spreading innovation. Campus technologies and technology integration can still be considered innovation in higher education learning environments. Figure 2 illustrated the information flow between mentors, mentees, ITS, and colleagues in this FTM context. These communication channels played an important role in communicating best practices and the advantages of classroom technologies. The graduate course served as a hub for disseminating the information about effective technology integration. The mentoring community as a space for sharing experiences and creating a sense of belonging, as also found in other mentoring cases (Chuang et al. 2003), secured and sustained dialogue and technology integration in this mentoring context.

Faculty concerns regarding the effort and time needed for technology integration is frequently presented in the literature (Bennett and Bennett 2003). Despite their motivation to reach out to the younger generation, faculty often raised concerns about their lack of knowledge about potential uses of available technology in their courses (Georgina and Olson 2008). The findings of this study revealed that mentee and mentor motivation, the nature of the mentoring relationship, communication channels, and support helped participants overcome these challenges. Working one-on-one with a mentor provided faculty a regular time frame reserved for technology explorations and practice. Implementing several mentoring strategies and establishing a collaborative relationship built on mutual benefits has the clear potential to increase the effectiveness of the FTM process (Chuang et al. 2003).

Support, not only during programs but after their completion to provide continuity and sustainability, is another critical component of FTM programs regularly listed in the literature (Kopcha 2008). In parallel, this study also revealed the importance of taking measures to continue the support of technology integration practices beyond the mentoring program. Professional development programs that spread over a period of time have been found to be more effective (Ng 2015). This research examined the implementation of the FTM approach in the context of a graduate course. Yet, the literature still lacks evidence on how extended mentoring programs impact faculty members' skills, self-efficacy, and attitudes towards technology integration. It is imperative that faculty members receive support and help beyond the mentoring programs to sustain their interest and motivation towards integrating novel technology solutions in their classrooms. The results of this study warrant further research on extended mentoring models to fully understand faculty's adoption of technology integration practices.

One of the aims of the FTM program implemented in this study was to establish a connection between the university's instructional technology support office and faculty members. Faculty members are unlikely to use technology in their classrooms if they are not presented with and informed about available resources (Adamy and Heinecke 2005). Findings also revealed that faculty members were not adequately informed about available technologies supported by the university or best practices before they attended the FTM program. Their work with mentors helped establish communication channels, providing them access to resources and help after the conclusion of the FTM program.

Without rigorous planning, preparation, and conceptualization, the impact of FTM programs on faculty members' adoption of technology integration into their teaching practices would be limited. An often-raised critique of mentoring research is that, inadequate attention is paid to the conceptualization of the programs (Crisp and Cruz 2009). The same concern applies to the design and implementation of FTM programs. Literature on FTM includes limited empirical research on models and frameworks that were tested within authentic contexts. Researchers need FTM frameworks and models as communication structures. Dawson (2014) noted: "Without such a structure, existing mentoring research often provides variable and incomplete information on the mentoring that is under consideration" (p. 143). Rather than working around assumptions, this research followed Dawson's (2014) design elements that identified important decision points when designing mentoring programs. This research further contributed to the existing knowledge base by concisely specifying mentoring design elements adopted to the FTM context.

Conclusion

FTM programs have the potential to promote the adoption and dissemination of technology integration practices throughout higher education. Research has been conducted on the barriers of effective technology integration in higher education, with the most frequent obstacles being faculty beliefs, lack of knowledge, limited institutional support, and lack of self-efficacy (Kopcha 2008). While these findings are vital for understanding faculty needs, research should now focus on investigating new models for addressing concerns and providing solutions. This study revealed critical mentoring strategies and success factors that should be considered when designing faculty learning experiences and professional development programs in higher education institutions. Unlike traditional models that mostly provide one-size-fits-all solutions to faculty members, technology mentoring programs provide unique solutions by developing common goals, mutual trust and benefits, shared expertise, reciprocal learning, and communities of practice (Chuang et al. 2003; Gabriel and Kaufield 2008; Thompson 2008). Sustaining a vision of technology integration requires the involvement of multiple actors (such as administrators, faculty, students) in higher education settings. FTM models may further catalyze the innovation process by establishing a community around technology-enriched, higher education classrooms.

Recommendations for future research

This study contributes to the line of inquiry on faculty adoption of technology into their teaching practices in the context of an FTM program, and the conclusions reveal areas for future research. Implementing FTM as a university-wide faculty professional development program requires establishing support structures as well as providing policies, rewards, and incentives to encourage and sustain participation. The FTM model presented in this study was implemented as part of a graduate course. While the results indicated a positive impact on faculty practice, participants suggested extending the mentoring program beyond the course to ensure continuous support. The findings of this study warrant further investigations into scaling FTM to a larger professional development context and identifying necessary university support structures, including rewards, personnel, policies, and resources. This research presented success factors and strategies that emerged from the context of a public research university. Further research may investigate how different contextual variables such as institution type, student profile, and faculty load facilitate or hinder the success factors and strategies identified in this study.

This study implemented FTM as a semester-long professional development program and presented results on participating faculty's adoption of technology over 5 months. Longitudinal studies that examine changes in faculty practices would provide a better understanding of the long-term impact of mentoring programs. Studying the benefits to the mentoring graduate students would help examine academic, professional, and technical benefits they gain as a result of participating to mentoring activities. Investigating the effect of technology integration activities on university students' learning and participation would also help understand the impact of mentoring activities on students' outcomes in classrooms.

Implications for practice

This research revealed that continuous support provided by mentors over a period of one semester helped faculty members keep up to date with current campus technologies and implement new technology practices. However, after considering the continuous demand for faculty support, the need emerged for structuring, systematizing, and sustaining their learning experiences beyond an FTM program. Schools considering FTM may integrate it into institution-based professional development models that include learning new classroom technologies, practicing pedagogical implementations, sharing best practices, providing new mentors to the faculty as needed, supporting communities of practice, and presenting incentives to both faculty members and mentors. A whole institutional approach to integrating FTM as a professional development model is needed with close connections to departmental and central technology support centers. The role of technologies for supporting mentoring processes may also be explored. For example, virtual mentoring models with online communication and collaboration tools (such as wikis, blogs) may help overcome the barriers such as limited time and resources often mentioned by the faculty members in this study.

This research revealed the importance of developing effective communication channels in the context of FTM. Forming and sustaining effective communication channels enhances the sharing of exemplary practices, maintains constant pedagogical dialogue between mentor and mentee, and disseminates ideas and skills pertaining to technology integration. Leadership support also play a vital role in fostering a culture of implementing novel methods in higher education classrooms. Including FTM in universities' action plans and policy development for professional development may encourage faculty participation.

Institutions planning to implement FTM programs may try alternative models, such as pairing undergraduate students with faculty members through internship programs. In all cases, it is critical to prioritize mutual benefits to both mentors and mentees. In this study, a mentor–mentee relationship based on shared responsibility, accountability, reciprocal learning, and shared vision contributed to the success of mentoring processes. Before a program begins, the features of an effective mentoring relationship should be communicated to participants. Strategies identified in the current study such as determining needs, sharing feedback, and scaffolding should also be central components of any FTM program.

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