Identifying Issues
IMPEDING TEACHER EDUCATION FACULTY'S ABILITY TO INTEGRATE TECHNOLOGY IN THEIR TEACHING

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RESUMEN

Las investigaciones sugieren que los maestros principiantes no están preparados, de manera efectiva, para usar la tecnología en el salón de clases. Mientras que muchos de los esfuerzos se han centrado en la preparación de los maestros en formación para integrar la tecnología a su práctica, pocos se han centrado en identificar los problemas internos que obstaculizan la capacidad de los docentes de las facultades de educación para integrar la tecnología en sus propios métodos de enseñanza. Por ello, el propósito de este estudio fue identificar dichos problemas internos. Al reconocer estos asuntos, surgieron discusiones que nos ayudaron a determinar estrategias que pueden apoyar, de forma sistemática, a los profesores al incluir la tecnología en sus clases. Se utilizó un cuestionario para recopilar los datos. Los resultados del estudio revelan que algunos profesores utilizaron la tecnología en sus clases de manera limitada a pesar de que deseaban hacerlo más consistentemente. Procesos internos, la necesidad de educación continua y la carencia de tiempo fueron algunas de las barreras que impidieron el proceso de integración de la tecnología en las clases.

Palabras clave: educación, diseño de instrucción, integración tecnológica, preparación de maestros, desarrollo profesional facultad, entrenamientos de educación tecnológica

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ABSTRACT

Research suggests that beginning teachers are not prepared to effectively use technology in their classrooms. While many efforts have focused on preparing pre-service teachers to integrate technology in their teaching, little research has focused on identifying internal issues impeding teacher education faculty's ability to integrate technology in their teaching. Therefore, the purpose of this study was to identify internal issues that teacher education faculty have when integrating technology in their teaching. Moreover, by identifying these points, discussions emerged, leading to strategies that can be used to systemically support instructors to integrate technology in their teaching. A questionnaire was used to collect data. Some results revealed that faculty limitedly used technologies in their teaching, with the desire to integrate technology at a higher level. In addition, internal processes, continuous education and time were just a few of the barriers that impeded the integration process.

Keywords: education, educational technology trainings, faculty professional development, instructional design, teacher education, technology integration

Introduction

Technology integration in K-12 schools has been a necessity and popular topic in this digital age. Research continues to reveal that beginning teachers indicate that they are not well prepared to effectively use technology in their classrooms (Sang, Valcke, van Braak, Tondeur, & Zhu, 2010; Tearle & Golder, 2008). This stems from their lack of confidence in doing so (Koehler & Mishra, 2009). Moreover, research suggests technology is significantly under-used by pre-service teachers and beginning teachers (Dawson, 2008; Kirschner & Selinger, 2003). Thus, it is suggested that teacher education programs need to assist pre-service teachers on how to integrate technology into their teaching (Koehler & Mishra, 2009). If one agrees that educators teach as they have been taught during college, more attention needs to be paid to university faculty's use of technology in their own teaching. Therefore, many college and university pre-service teachers are required to take additional educational technology courses in order to meet their licensure program requirements and be equipped to integrate technology into their courses as a future licensed teacher.

Much of the existing literature on technology adoption has focused on external factors impacting faculty, such as

administrative or financial support, which fails to recognize the additional internal and individual factors facing academics (Georgina & Olson, 2008). However, there has been limited research performed on internal issues that teacher education faculty, specifically in a university located in the Midwest, have in regards to integrating educational technology into their courses. Conducting this research may provide education leadership with strategies to customize the support of technology integration training programs to increase the technological integration use to be modeled by teacher education faculty.

During the last decade, the field of education has invested much money, resources and energy to democratize technology in higher education, especially on technological infrastructures (Georgina & Olson, 2008). Although there have been some successes, in terms of access to hardware and Internet networking, the application of education technology has not been systemically integrated in today's teaching. Systemic integration is an important indicator of success.

When an instructor uses technology in his or her teaching, the goal is to integrate via pedagogical and curricular transformation. Georgina and Olson (2008) examined how faculty technology literacy and technology training impact their pedagogy and found that there is a significant correlation between the former and pedagogical practice when integrating technology. Blackwood (2001) criticized higher education in its inability to recognize the full potential of technology about a decade ago. However, there are still the same concerns that educators interested in integrating technology into their teaching still suffer from barriers that make the process difficult.

Although some schools may have ample access to technology, and hardware and have a positive disposition toward using educational technology in the classroom, many faculty members have been reluctant to adopt computers and revise their pedagogy (Cornell, 1999). They felt that some of the barriers concerning computers holds true in regards to integrating technology in their teaching.

Research suggests that barriers to technology adoption in schools create a complex balance and counter-balance of several

components. Faculty members found it difficult to integrate technology because of the fear of technology, lack of basic skills, a lack of expertise in technology integration in teaching, and doubts about the pedagogical validity of using some of the newer technologies (Anderson, Varnhagen, & Campbell, 1998; Goktas, Yildirim, & Yildirim, 2009). The barriers keeping faculty from using technology are: limited availability of equipment; lack of faculty training, funds, time to develop instruction using technology, or support; absence of clear programmatic goals for the teacher education program, and a shortage of incentives from the institution to integrate technology (Semary, 2011). These difficulties have had an adverse effect on instructor's ability and desire to integrate technology in their teaching.

The aforementioned barriers have caused an individual adoption of integrating technology in teaching by some faculty and not a systemic integration by all faculty. This has moved toward differences in the adoption of technology by subject area, type of institution, culture of the institution, and individual motivation. Teaching, service and research responsibilities vary and each faculty member has opportunities and experiences that are based on their own unique context. Furthermore, faculty members at the university level feel pressured to use technology to keep up with the current flow of technological innovation and to choose the technology that can be used in their teaching. This is often difficult because they are inexperienced with technology or less experienced than their students. Therefore, it is not surprising that these factors have caused disparities when integrating technology among faculty members.

A strategy that many schools and colleges across the United States have adopted is the implementation of a development model that provides method faculty with workshops, materials, and other resources in order to familiarize them with instructional technology. However, these support activities are criticized because they are based on the needs of others, such as instructional designers and technicians, rather than on an understanding of methods faculty's needs (Miller, Pope & Steinman, 2005; Prensky, 2001). Therefore, many current faculty-support programs admit their failure to consider faculty's instructional needs,

when they design and implement the programs. Another concern is that few needs analyses are completed, or when they are, they fail to show in what educational climate the faculty work, what they want to do with educational technology and how they perceive it. This promotes a one-size-fits all philosophy, which can increase the learning curve and lead to less effective instructional delivery.

Faculty have many opportunities to attend educational technology workshops and trainings, however, many still show low use of integrating new and relative technology, to include hardware and software, in their classrooms. This is an important issue because pre-service teachers typically model their instructor's pedagogical styles and instruction delivery techniques, as well as their use of technology while in the teacher preparation program. It is ironic that many teacher education faculty members do not use educational technology in the courses while, at the same time, they emphasize the importance of technology integration in the K-12 classrooms. This is sending a mixed message to pre-service teachers by displaying little modeling of technology integration in their teaching.

Therefore, the purpose of the study was to investigate and identify the issues that Teacher Education faculty may have when integrating technology in their teaching. Moreover, by identifying these issues, discussions can emerge, leading to identified strategies that institutions can use to support instructors in their quest to integrate technology and model its use in their own teaching.

Methods

This study focused on internal issues that teacher education faculty had related to integrating technology in their teaching. Implementation of this study included the administering of a questionnaire to collect quantitative data to be analyzed to identify and clarify the issues and concerns that teacher education faculty may have in this regard. Furthermore, the results from this study would lead to further discussions to develop new strategies and systemic practices to increase the integration of technology in teacher education faculty's teaching. To achieve the purpose of the study, the following research questions were investigated:

1. In what ways did faculty members integrate educational technology into their courses?
2. What did faculty members perceive as barriers to integrating educational technology?
3. What type of educational technology support, such as workshops/trainings, did faculty members need?

The participants of this study included 19 tenured and tenure-track faculty members, temporary full-time and adjunct faculty members in the teacher education department of a large urban university located in the Midwest. Among the 19 participants, nine were assistant professors, six were associate professors, one was a full professor, and three were temporary full-time/adjunct faculty. Three were male and 16 were female. As for age, 15% of the participants were under 40, 15% of the participants were 60 and over, and the rest of the participants were between 40 and 59 years old. The average years of teaching among the 19 participants was seven.

The teacher education department has approximately 1,800 students. It is one of the largest teacher preparation programs in Colorado. The teacher education department has seven professional programs: early childhood education, elementary education, secondary/K-12 education, special education, linguistically diverse, reading, and educational technology. All the tenured and tenure-track faculty members have earned doctoral degrees in their professional fields. With regard to the classroom facilities, each teacher education classroom is a "Smart" classroom equipped with Internet access, projector/screen, audio and video players, speakers, doc cam, SMART Board, Promethean Board, and one Eno Board. The teacher education department also has 29 stations within the department's computer lab, which has high speed Internet, interactive whiteboards, doc cam, microphones, and speakers, among other resources. In addition, faculty members may also borrow laptops, web cams, clickers, video cameras, and other tools from the department. The university's Information Technology and Educational Technology Centers also provide assistance regarding the use of computers and educational technologies.

A survey on teacher education faculty's integration of educational technology was distributed during a faculty meeting. In addition to basic information, the survey included 67 questions, that asked about faculty members' educational technology proficiency, current use, and preference for future use in terms of word processing, presentation, spreadsheet, web development, graphics, scanning, importing images from digital cameras, burning CD/DVD, audio/video editing, synchronous online meeting, instructional gaming, use of Smart Board, Promethean Board, and Eno Board, use of mobile devices, Web 2.0 tools, and Blackboard learning management system. The survey also asked about beliefs in educational technology in terms of effectiveness, awareness, confidence, interest, support, time, access, sources of encouragement and information; feedback on the overall campus educational technology workshops/trainings; preferred types and time commitment of workshops/trainings, and the current needs of faculty for educational technology workshops and trainings.

To answer questions regarding educational technology preferences, the participants needed to choose out of 5 with 1 (none) and 5 (advanced). Regarding present usage of educational technology, the participants needed to choose out of 5 with 1 (never) and 5 (very often). As for potential for future usage, the participants needed to choose out of 5 with 1 (none) and 5 (high). To answer questions regarding beliefs in educational technology, the participants needed to select one among strongly disagree, disagree, neutral, agree, strongly agree, and N/A. To answer other questions, the participants needed to choose one out of all the provided options. Of course, the participants were given an option to specify their own answers (open-ended questions).

Survey data was entered into SPSS and descriptive statistics was run for data analysis. For open-ended questions, each participant's responses were carefully read and organized into themes.

Results and Discussions

The results with regards to research question one —In what ways did faculty members integrate educational technology into their courses?— showed that participants were using "old educational technologies" in their classroom, such as word processing,

presentation software and putting course materials on websites. This study also showed that they wanted to use "new educational technologies," such as interactive whiteboards, video conferencing tools for online classes, as well as movie editing tools for multimedia projects.

Another interesting finding was that the participants' use of educational technology was based to their current technical proficiency. For example, as we see in Table 1, the first type of technology, Word Processing, has 100% for all three indicators: "Current Technical Proficiency," "Present Use," and "Potential for Future Use," obviously, meaning that when faculty feel proficient in their current use, they will utilize it and will continue to utilize it in the future. However, for another type of technology, Instructional Games and Simulations, the data show 15.8% for "Current Technical Proficiency," 5.36% for "Present Use," and 46.9% for "Potential for Future Use." Thus, faculty members would likely use emerging technologies more if they had "good" to "very good" technological skills when rating their own "Current Technical Proficiency" for the specified technology.

To briefly summarize Table 1, the respondents are primarily using (present use) word processing (100%); mobile devices, including lap top computers and tablets (73.7%); learning management system (73.7%); scanning images (68.4%), and presentation software (63.2%) in their classroom. The technologies being used mostly are called presentation support type technologies to enhance course contents and materials.

The results of the study also show that technologies such as graphic programs (0%), Web development (5.3%), and burning CD/DVD (16.7%) are being phased out. The reason might be that faculty members no longer need to use these technologies since current Learning Management Systems and web based platforms (i.e., blogs and wiki sites) have embedded these features within them. Moreover, emerging Web 2.0 tools that are web based and free resources offer these capabilities as well. The newer technologies provide faculty with plenty of templates and easy-to-use interfaces so they can produce graphics and develop class website material very easily.

Regarding faculty use of technology, this study indicated that methods faculty members were using specific types of technologies. One might define them as "old technologies" such as word processing, laptop computers, presentation software, technologies with the intent to support their teaching. This is consistent with other studies. However, since technology is rapidly changing, we are being introduced to new technologies and "new" technologies, which are quickly becoming "old" technologies soon. This short technological lifespan confirms that integrating technology into teaching is a continuous developmental process.

The results of research question two —What do faculty members perceive as barriers to integrating educational technology?— indicated that, overall, participants had strong beliefs in using educational technology in their classrooms, especially when they were aware of the importance of technology integration in today's classrooms (94.7%), when the department chairs were supportive of it (77.7%), and when the university provided sufficient hardware and software (77.7%). While it seemed the entire department was well equipped for faculty members to enhance their educational technology proficiency and to promote technology integration in the classrooms, 11 out of 19 survey participants pointed out that one major barrier in learning educational technology and implementing it was time constraints. This inhibited or prohibited them from going to trainings and workshops to enhance their educational technology proficiency and technology integration. Therefore, it can be inferred that more faculty members will be able to participate in learning new technologies when there are fewer barriers in place.

The survey also documented the lack of time to create new courses that integrate technology (78.9%) and to update instructional materials (72.2%). While faculty members on campus have heavy teaching loads (24 credit hours per academic year) and other obligations, such as curriculum design, service, advising, and research, it is difficult for them to find additional time for professional development, such as workshops and trainings. Time constraints have been a long-standing issue for higher education faculty with regards to professional development (Caffarella & Zinn, 1999; Hearne, Henkin, & Dee, 2011; Peluchette & Rust,

Table 1

Faculty Response for Technology Use

Technology	Current Technical Proficiency	Present Use	Potential for Future Use
Word Processing (e.g. MS Word, WordPerfect, other word processing program)	100.0%	100.0%	100.0%
Presentation (e.g. MS PowerPoint, MS Publisher, Adobe Page Maker)	68.5%	63.2%	88.9%
Database & Spreadsheets (e.g. MS Excel, MS Access, SPSS/SAS)	44.4%	33.4%	38.9%
Web Development (e.g. Dreamweaver, HTML/other web editors)	5.3%	5.3%	15.8%
Graphic Program (e.g. Adobe Photoshop, Adobe Illustrator, or others)	5.3%	0%	10.5%
Scanning Images	68.4%	68.4%	78.4%
Digital Camera	63.1%	47.4%	55.5%
Burning CD/DVD	47.4%	16.7%	2.8%
Movie Editor (Windows Movie Maker Live or iMovie to create a digital storytelling project)	26.3%	16.7%	55.6%
Audio Editor (Audacity for podcasting, sound mixing)	15.8%	16.4%	26.3%
Live Online Meetings/Seminars (Skype, Adobe Connect, Wimba, or others)	36.9%	26.3%	57.9%
Instructional Games/Simulations	15.8%	5.6%	46.9%
Smart Board	42.1%	36.9%	78.9%
Promethean	31.6%	26.3%	79.0%
Eno Board	5.3%	5.3%	38.9%
Mobile Devices (e.g. smart phones/laptop computer/tablets)	73.7%	73.7%	88.9%
Posting Videos/Photos to Sharing Service (Flickr, YouTube, Teacher Tube, etc.)	26.3%	15.8%	47.4%
Using Social Networking Service (e.g. Facebook, Google Plus, LinkedIn)	52.6%	16.3%	50%
Managing a Blog, Wiki, or other Class Website	26.4%	26.4%	47.4%
Using Learning Management System (e.g., Blackboard to post course syllabus, manage discussion groups and grades as well as communicate with students)	73.6%	73.7%	89.5%

2005). It is not surprising that participants considered time constraints as the main barrier for learning educational technology and implementing technology integration. Providing appropriate incentives to faculty members might be the only way to encourage faculty members to participate in technology-related workshops. Of course, continued advertising and encouraging might also work to some degree.

Another interesting point was that five out of the 19 participants mentioned the lack of support for Macintosh (Mac) computer usage on campus. This frustrates faculty members who use that product line regarding participating in technology-related workshops/trainings since they are all PC based. This has been a campus wide issue for a long time because the whole campus is still PC dominated and IT does not have a designated Mac support team. With the rapid growth of Mac users on campus, we believe support for that platform will get better. Therefore, the researchers hope faculty members will be more willing to participate in technology-related workshops and trainings regardless of PC or Mac usage.

The results of research question three —What type of educational technology support such as workshops/trainings do faculty members need?— showed that 57.9% of respondents have attended technology faculty development programs at least three to five times (see Table 2). However, faculty did not actively participate and use the faculty development opportunities. When we conducted the survey, 11% of participants reported that they had never attended faculty development training programs. Also, 26.3% of participants indicated that they have attended only one or two sessions.

Regarding their experience with technology trainings offered by the university, more than half of the total respondents (67.9%) agreed that the trainings were helpful in improving their technical skills, and another half (57.9%) of respondents indicated that they were helpful in solving pedagogical concerns or issues. As for preferred type of professional development opportunities, faculty responded one on one tutoring and small group tutoring, large group tutorial and self-paced online tutoring was desired, respectively. Tables 3 and 4 verify this data.

Table 2

Frequency of Attendance of On-campus Technology Workshops

	Frequency	Percent
Never	2	10.5%
1-2 Sessions	5	26.3%
3-5 Sessions	11	57.9%
More than 10	1	5.3%
Total	19	100.0

Table 3

Training (s) Was/Were Helpful in Improving Technology Skills

	Frequency	Percent
Strongly Disagree	1	5.3%
Neutral	5	26.3%
Agree	10	52.6%
Strongly Agree	1	5.9%
Missing	2	10.5%
Total	19	100.0

Table 4

Training (s) Was/Were Helpful in Solving Pedagogical Concerns/Issues

	Frequency	Percent
Disagree	2	10.5%
Neutral	3	15.8%
Agree	10	52.6%
Strongly Agree	1	5.3%
Missing	3	15.8%
Total	19	100.0

Results from the survey's open-ended questions gave insights into why faculty did not participate in workshops and trainings and how they felt about the ones they did attend. Respondents answered that they did not participate in the trainings because of the lack of time and motivation. Some faculty also mentioned that they did not know there was any technology workshop offered to adjunct faculty.

In the past two decades, workshops and trainings have grown in number and scope to include the use of presentation and multimedia authoring software. Davis (1999) underlined the importance of providing technology training in a context that directly paralleled the individual's discipline or used subject matter that allowed the participant to see and experience the use of technology specifically in his or her professional field. Casmar (2001) also stated that we should provide divergent technology training for faculty with different learning styles and academic backgrounds. Thus, it seems important to organize and design workshops focusing on subject content to encourage methods faculty to participate in technology training sessions. It is also important to provide different types of training opportunities considering diverse learning styles and cater to the time schedule of methods faculty.

Conclusion

While pre-service teachers are expected to be proficient in technology integration, it is important that teacher education faculty serve as role models when integrating technology in their teaching. The study revealed that faculty members are using educational technologies in the classroom on a limited basis and are interested in learning more about emerging technologies, such as SMART Boards, Promethean Boards, and Eno Boards. In order to prepare them for high-level technology integration, appropriate and effective supports should be provided in the department. The faculty's concerns and needs should be heard so as to offer helpful trainings. Trainings should focus on the educational technology practice in faculty members' content areas instead of one-size fits all trainings. Also, they should be conducted on a continuous basis instead of the "one-shot" approach so faculty members have

enough time for practice and feel more comfortable with the technologies. Because time constraints are a major barrier, incentives could be provided and multiple types of trainings with options of different days and times should be considered to encourage participation. In addition, building a learning community and a smooth communication support channel will make the whole process more effective and efficient. When faculty members increase their use of technology in their teaching this leads to pre-service teachers using technology more in their future teaching in the K-12 schools as well.

The significance of this study was to first, determine faculty issues regarding technology, coupled with identifying barriers that keep them from using educational technology in their teaching. Furthermore, by identifying what technology they used, and to what extent they used it, will lead to a greater understanding of how to facilitate teacher education faculty's integration of technology into their teaching. Second, the research served as the first step in designing a faculty support program grounded on teacher education faculty's needs with regards to technology integration, and third, provide quantitative data to inform the development of new strategies to introduce technology and associated pedagogy to faculty to assist them in this quest.

REFERENCES

Anderson, T., Varnhagen, S., & Campbell, K. (1998). Faculty adoption of teaching and learning technologies: Contrasting earlier adopter and mainstream faculty. *The Canadian Journal of Higher Education, 28*(2,3), 71-98.

Blackwood, N. A. (2001). *A study of the relationship between characteristics of faculty members in West Virginia Colleges and their level of implementation of information technology*. (Unpublished doctoral dissertation). West Virginia University, West Virginia.

Caffarella, R. S., & Zinn, L. F. (1999). Professional development for faculty: A conceptual framework of barriers and supports. *Innovative Higher Education*, *23*(4), 241-254.

Casmar, S. P. (2001). *The adoption of computer technology by faculty in a college of education: An analysis of administrative planning issues*

(Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3025011).

Cornell, R. (1999). The onrush of technology and education: The professor's new dilemma, *Educational Technology, 39*(3), 60-64.

Davis, N. (1999). Why should IT in teacher education have a global dimension? In J. Price, J. Willis, D. A. Willis, M. Jost, S. Boger-Mehall (Eds.), *Technology and teacher training annual – 1995* (pp. 795-800). Charlottesville, VA: Association for the Advancement of Computing in Education.

Dawson, V. (2008). Use of information communication technology by early career science teachers in Western Australia. *International Journal of Science Education, 30*(2), 203-219.

Georgina, A. D., & Olson, R. M. (2008). Integration of technology in higher education: A review of faculty self-perceptions. *Internet and Higher Education, 11*, 1-8.

Goktas, Y., Yildirim, S., & Yildirim, Z. (2009). Main barriers and possible enablers of ICTs integration into pre-service teacher education programs. *Educational Technology & Society*, *12*(1), 193-204.

Hearne, J. L., Henkin, A. B., & Dee, J. R. (2011). Enabling initiative and enterprise: Faculty-led course redesign in a STEM discipline. *Educational Research Quarterly*, *35*(1), 33-62.

Kirschner, P., & Selinger, M. (2003). The state of affairs of teacher education with respect to information and communications. *Technology, Pedagogy and Education, 12*(1), 5-17.

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60-70.

Miller, M. T., Pope, M. L., & Steinmann, T. D. (2005). Dealing with the challenges and stressors faced by community college students: The old try. *Community College Journal of Research and Practice, 29(1),* 63-74.

Peluchette, J. V., & Rust, K. A. (2005). Technology use in the classroom: Preferences of Management faculty members. *Journal of Education for Business*, *80*(4), 200-205.

Prenksy, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1-6.

Sang, G., Valcke M., van Braak, J., Tondeur, J., & Zhu, C. (2010). Factors associated with the integration of ICT into Chinese primary school classrooms: An interplay of teacher-related variables. *Journal of Computer Assisted Learning, 27*(2), 160-172.

Semary, H. (2011). Barriers to the effective use of technology in education: Case study of UAE University. *Asian Transaction on Science & Technology, 1*(5), 22-32.

Tearle, P., & Golder, G. (2008). The use of ICT in the teaching and learning of Physical Education in compulsory education: How do we prepare the workforce of the future? *European Journal of Teacher Education, 31*(1), 55-72.