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Research Article

"Tech Support": Implementing Professional Development to Assist Higher Education Faculty to Teach with Technology

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Abstract

Technology is a current driving force in higher education. Universities are working to understand the myriad of complexities around how to evolve teaching practices to incorporate the use of technology to match student expectations and practices. The current study examined the impact of a technology-focused professional development strategy aimed to support faculty members with the integration of technology into their teaching practices. Results indicate significant increases in the inclusion of different types of technology into teaching, faculty confidence, comfort level, and perception of student benefit. Implications are discussed.

Keywords: Teaching with Technology; Professional Development

1. Introduction

Higher education is becoming increasingly infiltrated by technology as the number of American college students enrolled in at least one online course has reached the millions (Armstrong, 2011). In fact, online higher education enrollment is growing at ten times the rate of campus enrollment (Shea & Bidjerano, 2009). Additionally, students who are enrolled in face-to-face, campus classes have expectations that the courses will involve relevant technological instruction (Oblinger & Oblinger, 2005). With the continual increase in fully online, web-centric or hybrid courses, and with face-to-face courses incorporating innovative technological teaching practices, higher education is focused on how faculty are being trained to integrate technology into teaching pedagogy. The current study gained specific quantitative information about the impact of professional development on faculty's overall use of technology as well as psychological markers such as confidence, anxiety, comfort-level, and overall attitude by investigating a structured, technology-focused professional development opportunity for higher education faculty.

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2. Theoretical Framework

2.1 Call for Technology in Higher Education

Looking at the incoming college student's public school experiences, the fastest growing public, K-12 schools in the country are online (Watson, Murin, Vashaw, Gemin, & Rapp, 2013). Twenty-nine states and Washington, D.C. currently have full-time online public schools (Watson et al., 2013) and there was an estimate of almost two million K-12 student enrollments in at least one distance education course in 2009-2010 (Queen & Lewis, 2011). In addition, traditional brick and mortar K-12 schools are adapting and integrating technology into standard educational practices (Campbell, 2012; Pritchett, Wohleb & Pritchett, 2013; Rosefsky & Opfer, 2012; Sangani, 2013). This integration includes not only teachers utilizing technology in the classroom (Pritchett et al., 2013), but also district-wide encouragement of students to bring personal computers and devices to school (Sangani, 2013). Schools are using online learning management systems such as Instructor, Moodle and Edmodo to enhance the use of technology in educational practices (Campbell, 2012). As the K-12 technology practices continue to increase, so will student expectations for technology in higher education settings. An additive layer is the use of social media across generations. As of March 2010, there were 200 million blogs worldwide, 450 million people with Facebook accounts, 27 million tweets each day, and on average, one person is estimated to spend 20% of their day interacting through some type of social media (Popkin, 2010). Overall, these data show the incredible cultural and systemic shift that has taken place, demanding change in many areas including higher education.

Although the overarching initiatives for higher education to adapt the perceived technological demands of the millennial generation are not met without controversy (Bennett, Maton, & Kervin, 2008), these millennial students matriculate into higher education settings with preconceived notions and expectations regarding the integration of technology into the classroom environment (Oblinger & Oblinger, 2005). Data show that enrollment in online higher education is growing at ten times the rate of traditional classroom-based instruction (Shea & Bidjerano, 2009). To highlight this point, one study found that college students enrolled in traditional, face-to-face higher education believe that "classrooms without an abundance of electronic devices [may be] unrealistic and artificial" (Baker, Lusk, & Neuhauser, 2012, p. 277).

With the increase in technological use in numerous areas, much research has been dedicated to deciphering the utility of teaching with technology. Research suggests that courses that are designed to incorporate digital technology provide a learning environment that promotes active engagement by the students (Twigg, 2005; as cited by Nugent et al., 2008). Other data show that it positively impacts learning including in the following ways: increased learner confidence, increased interest in technology-based learning (Ertmer et al., 2011), and increased motivation and creativity (Hayes & Robinson, 2000). One study found that the students who participated in a technology-infused course showed significantly higher course content retention when compared to a traditional learning environment where technology was not used (Karper, Robinson, & Casado, 2013). Junco, Heilberger, and Loken (2011) found that using social media technology (e.g., Twitter) in the classroom had a positive impact on increasing both student and faculty engagement in course material and communication. Another study showed that classroom participation increased and students perceived increased levels of support from fellow classmates (Ebner, Lienhardt, Rohs, &

Meyer, 2009). Across disciplines, numerous studies have compared face-to-face courses and online courses with regard to student results and knowledge retention, which have consistently showed no significant difference in learning outcomes (Chang & Chen, 2014; Frimming, Bower, & Choi, 2013; Porter, Pitterle, & Hayney, 2013).

2.2 Faculty Professional Development

Investing in faculty professional development is becoming increasingly important in higher education (Holmes & Kozlowski, 2014; Richlin & Essington, 2004). A myriad of ways exist to support faculty growth and development including but not limited to formal learning communities (Richlin & Essington, 2004), faculty writing groups, and mentorship programs (Borders et al., 2011; Greene et al., 2004). The need for focus in the area of teaching with technology is even more pronounced during this technological shift of higher education (Baran & Correia, 2014) as "the quality of online programs in higher education is strongly correlated with how the professional development approaches respond to the needs of online teachers" (p. 96). Many faculty members continue to feel apprehensive about learning digital teaching skills (Baran & Correia, 2014) even though many are currently or will eventually be teaching in some type of online format, highlighting the importance of how to develop support for and quality of online teaching (Nugent et al., 2008; Seaman, 2009).

One important factor in an instructor's decision to integrate technology into their face-to-face teaching is their belief in whether or not the technology will be useful within the learning environment (Gu, Zhu, & Guo, 2013). Another important factor is the engagement of faculty in teaching with technology is the overall institutional culture (Gu et al., 2013; Venkatesh, Morris, Davis, & Davis, 2003), wherein faculty are more likely to perceive technology as being useful for teaching pedagogy if the social influences (e.g., administration, other professors) around them perceive that to be the case (Gu et al., 2013). Additionally, often faculty do not have the time, knowledge, or support needed to invest in learning and implementing innovating teaching techniques independently (Chang & Baldwin, 2008; Seaman, 2009). Structured professional development opportunities can be one way for the administration to show support for continued faculty development, encourage the devotion of time for faculty to enhance and change teaching methods and pedagogy, and increase structured mentorship opportunities for faculty to address specific concerns related to their needs.

Baran and Correia (2014) propose a professional development framework for supporting faculty to teach online or more fully integrate technology into their teaching. This framework includes the interaction of three levels of support: teaching level, community level, and organizational level. These three levels of support are beneficial for faculty as micro- and macro-level assistance are concurrently taking place, including direct one-on-one assistance, mentoring and collegial support, and incentives and encouragement from the administration. Baran and Correia state, "for online teaching to be integrated and embraced by faculty members, higher education institutions should provide various opportunities for faculty to find the support and ongoing help as and when required" (2014, p. 101).

In one such positive example, Kenney, Banerjee, and Newcombe (2010) found that intentional campus-wide faculty training regarding the inclusion of technology in teaching pedagogy

significantly impacted the faculty use of technology in the classroom. This impact extended over five years as the researchers tracked the longitudinal impact of the training. Additionally, over that time period, faculty continued to believe that the integration of technology had a positive impact on student learning (Kenney et al., 2010). At another institution, a faculty learning community was enacted to develop online courses (Long, Janas, Kay, & August, 2009). Through this experience, members of the learning community accomplished several tasks including the development of an online course design that would be implemented as a basic protocol by the entire campus. The learning community provided inter-disciplinary collaboration and support between faculty, dedicated time for faculty to devote to the development of online coursework, and future mentorship opportunities (Long et al., 2009).

At a large, urban university a faculty learning community was developed to enhance teaching and learning with technology (Nugent et al., 2008). Through bi-weekly meetings, trainings, peer-support, and discussions the learning community was able to provide a positive experience for faculty in which they worked toward the inclusion of technology in their classrooms. Through qualitative exploration, Nugent et al., (2008) found that participants found value in the experience, expressed a deepened understanding of issues surrounding the topic, and increased integration of technology into teaching. Finally, Lu, Todd, and Miller (2011), found that a technology-focused learning community was beneficial for faculty who were learning to teach with technology. In the learning community, faculty members shared a wide array of experiences including how to begin online teaching, how they instituted course changes, how to address student issues and concerns, and how to improve student engagement through a technological modality (Lu et al., 2011). The learning community met once a month over one semester and was able to provide an outlet for discussion and collaboration, in turn, supporting overall faculty development.

Professional development opportunities directly related to support faculty in teaching with technology have been shown to be useful in directly impacting changes in pedagogy and teaching methods (Baran & Correia, 2014; Nugent et al., 2008). In order to gain more specific quantitative information about the impact of professional development on faculty's overall use of technology as well as psychological markers such as confidence, anxiety, comfort-level, and overall attitude, the current study investigated a structured, technology-focused professional development opportunity for higher education faculty.

3. Methods

3.1 Participants

This study took place over eight months at a public Midwestern University. All participants were full-time faculty in the College of Education and Human Development and represented six of the eight schools within the College. A total of thirteen participants (N=13) completed the professional development opportunity and the demographic information is as follows: (a) ages ranged from 30-67; (b) years of experience in higher education ranged from 2 to 23; (c) the race of all participants was White; (d) ranks included two full-time, non-tenure-track; eight tenure-track; two tenured; and one full professor; and (d) ten participants were women, three were men.

3.2 Measures

Demographic Information. General demographic information was collected from the participants, which included: years of experience in higher education, age, gender, race, and institutional rank (e.g., full-time non-tenure-track, tenure-track, tenured, and full professor.).

Technology Questionnaire. The researchers adapted several scales to fit the needs of the current study (e.g., Atkins & Vasu, 2000; Bebell, Russell, & O'Dwyer, 2004). The scales were updated and adapted to reflect the advances in technological capabilities. The current instrument included five subscales. The *Comfort* subscale reflected the participants' perceptions of their comfort level with using technology in the classroom. Questions included: "How comfortable are you using technology in your professional life?" and "How comfortable are you using technology in the classroom?" The *Confidence* subscale included the participants' perceptions of their confidence in using technology in the classroom. Questions included: "How confident are you in your ability to find new digital applications to use in the classroom?" and "How confident are you in your ability to learn to use new technology?" The *Anxiety* subscale included the scaling question: "On a scale from 1-10, how anxious are you about using technology in the classroom?" The *Beneficial* subscale included the scaling question: "On a scale from 1-10, how beneficial do you believe technology is to the learning environment?" The *Technology Use Total* subscale reflected the amount of time that faculty spend using technology to plan and implement course material and how often faculty require students to use technology in their courses. Questions included: "How often do you do the following: adapt an assignment to include technology, adapt classroom lessons to include technology, etc." and "How often do you require students to use the following: table applications, Web 2.0 or other online applications, social media, etc.)?

3.3 Procedures

In the spring of 2013, the College of Education and Human Development developed a technology-focused professional development opportunity developed to provide a, "mentor [who] will help the faculty member identify appropriate technologies for the faculty's course(s), and provide sufficient training for the faculty to integrate that technology into courses to be taught during the 2013-2014 academic year (B. Campbell, personal communication, April 9, 2013)". All faculty in the College were recruited via email and compelled to submit a short proposal outlining their desire and plan to incorporate technology into their teaching. Participants in the learning community were selected by the college technology community based on clear and obtainable goals, degree of need in department for technological training, and potential for high impact on student learning. A total of thirteen faculty were selected for participation in the learning community. The program met several components as described by Baran and Correia (2014) including one-on-one instruction, mentorship, collegial and community support, and finally, financial incentive and direct encouragement from the administration.

Seven faculty who regularly use technology in their teaching, teach online courses, and research in the area of technology in teaching, were chosen to serve as mentors. The mentor and mentee pairs were chosen based on complimentary interests and specific needs of the mentee. Mentors met with the mentees independently for five to ten weeks for a total of ten hours and worked on the specific goals set by the mentee at the outset of the experience. Often, mentees met together to offer ideas,

suggestions, and support. Identified participant goals included: the transition of face-to-face courses into web-centric or fully online courses, and the increased use of online applications and Web 2.0 tools (e.g., Padlet, Voicethread, and Mind42) in face-to-face courses (B. Campbell, personal communication, 2014). Members came to training sessions with specific questions for mentors; these questions included information regarding how to integrate technology into face-to-face lectures or assignments, to how to use technology to flip the classroom, or how to convert traditional courses to online. Between meetings, mentees were responsible for implementing what they learned and thus incorporate technology into current lectures and assignments, or take steps to convert courses to online for the next semester. This process repeated itself for 5-10 weeks until the 10 hours of training was accomplished. The learning community took place over the summer of 2013 and the implementation of technological changes was completed in the fall of 2013.

In order to fully complete the requirements of the learning community participants were to successfully redesign "a course to include substantial transition from its current state towards a 21st century learning environment (B. Campbell, personal communication, 2013)". Additionally, each member was required to present his or her newly designed course to the faculty in his/her school. This stipulation provided the opportunity for faculty to share their implemented changes and overall process with other faculty in the department to promote interest and the sharing of ideas. After these requirements were met, participants earned $500 toward professional development and $500 toward the purchase of technological equipment to assist in their new teaching methods. All mentors earned $1,500 toward professional development for participation.
Data was collected prior to the beginning of the learning community and eight months later after the fall 2013 semester. This allowed participants an entire semester of coursework to implement changes and strategies discussed in the summer learning community. Each participant was recruited via email and asked to anonymously fill out the questionnaire through an online modality (e.g., Qualtrics). The survey took between ten and fifteen minutes to complete. At the end of fall 2013, participants were solicited via email a second time for the post-test.

4. Results

Data was collected from participants twice to allow for pre- and post-test data collection, eight months apart. A paired-samples *t*-test was conducted to compare the integration of technology before and after the learning community. The effect size of all significant subscale findings was found using Cohen's *d*. The internal consistency of the subscales was found using Chronbach's alpha.

Several significant differences between the pre- and post-test were found. Data show a significant increase in comfort level (*Comfort* subscale) between pre-test (M=8.75, SD=3.39) and post-test (M=12.42, SD=3.29) conditions; $t(11)=-3.32$, $p<.05$, Cohen's $d=-1.09$, effect size=.48. Data show a significant increase in confidence level (*Confidence* subscale) between pre-test (M=7.00, SD=2.66) and post-test (M=10.08, SD=1.51) conditions; $t(11)=-3.89$, $p<.05$, Cohen's $d=-1.42$, effect size=.58. No significant difference was found regarding the level of anxiety participants felt in using technology in the classroom (*Anxiety* subscale) between pre-test (M=5.43, SD=3.55) and post-test (M=3.29, SD=1.38) conditions; $t(6)=-2.60$, $p>.05$. A significant increase was found regarding how beneficial participants believed teaching with technology was (*Beneficial* subscale) between pre-test (M=5.67, SD=2.79) and post-test (M=8.56, SD=1.67) conditions; $t(8)=-2.60$, $p<.05$, Cohen's $d=-$

1.26, effect size=.53. Finally, a significant increase was found in the overall use of technology that participants used in their teaching methods (*Technology Use Total* subscale) between pre-test (M=67.90, SD=30.27) and post-test (M=98.30, SD=25.73); $t(9)$, p<.05, Cohen's d=-1.08, effect size=.46. These results can be found in Table 1.

Table 1 Pre/Post differences on Subscales

	Pre		Post			
Subscale	M	SD	M	SD	t(6-11)	p
Comfort	8.75	3.39	12.42	3.29	-3.32	.007*
Confidence	7.00	2.66	10.08	1.51	-3.89	.003*
Anxiety	5.43	3.55	3.29	2.43	1.38	.216
Beneficial	5.67	2.79	8.56	1.67	-2.60	.032*
Technology Use Total	67.90	30.27	98.30	25.73	-2.56	.031*

N=13
*p<.05

The internal consistency was found for each of the above subscales using Chronbach's alpha. The internal consistency of the *Comfort* subscale was found to be .896. The internal consistency of the *Confidence* subscale was found to be .897. The *Anxiety* and *Beneficial* subscales only consisted of one question each so the internal consistency was not computed. The internal consistency of the *Technology Use Total* subscale was found to be .95.

Several individual questions contained with the *Technology Use Total* subscale were found to be significant and are described below. A significant increase was found regarding how often teachers used a computer to deliver classroom instruction between pre-test (M=5.00, SD=2.31) and post-test (M=6.46, SD=1.39) conditions; $t(12)$=-2.69, p<.05. A significant increase was found regarding how often teachers used online applications as part of classroom instruction between pre-test (M=2.77, SD=2.20) and post-test (M=4.9, SD=1.66) conditions; $t(12)$=-2.55, p<.05. A significant increase was found regarding how often teachers adapted an assignment to require technology between pre-test (M=2.33, SD=1.78) and post-test (M=4.67, SD=2.19) conditions; $t(11)$=-2.76, p<.05. A significant increase was found regarding how often teachers adapted class lessons to incorporate technology between pre-test (M=2.77, SD=2.20) and post-test (M=5.54, SD=1.76) conditions; $t(12)$=-3.52, p<.05. Significant increases between pre- and post-test were found regarding how often teachers used and/or required students to use the following types of technology: online applications (e.g., Dipity.com, Glogster), social media, Facebook, blogs, Google applications, Youtubes, and podcasts.

5. Discussion

The current study examined the utility of a structured professional development program focused on the inclusion of technology into teaching pedagogy. Several meaningful results were found showing inherent benefit in the intentional focus on supporting faculty toward incorporating technology into current teaching practices. Professional development has been shown by other

studies to increase participants overall understanding of the complexities surrounding teaching with technology (Lu et al., 2011; Nugent et al., 2008) as well as directly increasing the use of technology in teaching (Kenney et al., 2010). The current study adds depth to previous research as the data show both quantitative increases in overall use of technology, but also psychological characteristic shifts including increased confidence, and lowered anxiety.

Overall, participants' use of technology in the classroom increased significantly after participation in the structured professional development program This increase included the increased adaptation of assignments to include online applications and technology, increased use of computer and multimedia instruction to deliver course material, and the increased use online applications for course delivery. Kenney et al. (2010), also found that after a campus-wide technology training, faculty showed significant, long-term increases in the integration of technology as well as the positive perception of how technology benefits student learning and engagement. These findings are in alignment with the findings of this smaller scale professional development opportunity, and crucial as higher education continues to move toward the integration of technology on many teaching levels including web-centric and fully online courses. In fact, one recommendation calls for "educators [to] make instructional use of the social nature of Web 2.0 in order to create optimal, natural environments for learning to take place" (Hung & Yuen, 2010, p. 703). Implementing a one-on-one program, such as the one outlined in this study, has the potential to support the achievement of this systemic, enduring change.

The current study data showed significant increases in participant confidence and comfort level with regard to teaching with technology. These results are particularly important as faculty confidence has been shown to be correlated with the motivation to integrate new changes into teaching practices (Evans, Mazmanian, Dow, Lockeman, & Yanchick, 2014). Also, data have shown that teachers are more considerate of how to engage students in the learning process when they feel more confident about their teaching abilities (Sadler, 2013). Confidence is an important component of teaching, especially when faculty are learning new information and skills. The current results in conjunction with other studies (Kenney et al., 2010; Long et al., 2009; Nugent et al., 2008) show that participation in structured professional development opportunities can have a multilayered positive impact on higher education in that teacher confidence and knowledge trickles down to benefit student learning. These results can counteract what Greer and Sweeney (2012) found that some students felt held back in their use of technology in the classroom because their teachers were uncomfortable with or unknowledgeable about technological modalities.

Furthermore, after participation in the professional development experience, participants significantly changed their opinions concerning the benefits to student learning when incorporating technology into teaching pedagogy. This result was supported by several other studies in which the topic of teaching with technology was formally addressed by a learning community or other professional development opportunity (Kenney et al., 2010; Long et al., 2010; Lu et al., 2011; Nugent et al., 2008). In conjunction, it seems as though the experience of working directly with other faculty to discuss an array of issues related to the integration of technology has the positive outcome of shifting viewpoints. If faculty have the opportunity to dialogue and work through challenges together in a supportive environment, it seems as if opinions of the beneficial nature of technology can positively shift.

Additionally, data show that faculty are more likely to believe in the benefit of teaching with technology if the administration and institutional culture do as well (Gu et al., 2013). In the current study and others (Nugent et al., 2008), faculty were incentivized to participate in the professional development opportunities. Perhaps faculty perceived a greater amount of support from the administration by the formal support of the technology learning community. These formalized programs show administrative support for the focus on the specified topic, which portray a direct message about expectations for faculty involvement.

5.1 Strengths, Limitations, and Recommendations

This study adds important information to the current literature in that it provides data showing significant benefit in formal professional development opportunities for faculty to include technology into their teaching practices. Baran & Correia (2014) discuss, at length, the crucial nature of direct support for faculty when transitioning to the role of online teacher and the data from the current study support this benefit. The effect sizes of the differences from pre- to post-test were shown to be moderate to large indicating that the participants made significant and real changes in their inclusion of technology. Additionally, faculty had a full semester of course instruction after the structured professional development program before the post-test data was collected. This allowed for instructor observation of student learning and engagement throughout entire courses, in which they may have experienced student-learning benefits over the semester.

Certain limitations were inherent in the current study. The small sample size limits generalizability to larger populations. Future studies should work to increasing the number of higher education teachers included in such interventions. Additionally, the convenience sample provides certain limitations in that the volunteer nature of participants may have positively impacted their desire to fully adhere to the learning community requirements and overall attitude toward learning new skills. The volunteers may have had less internal bias or resistance to learning new skills and incorporating technology, which may have positively skewed the results. Future studies should attempt to engage a more representative number and group of faculty in this type of professional development in order to gain information that is demonstrative of the myriad levels of personal investment in the topic.

Future projects could include studying longer professional development interventions to get a more in-depth understanding of specific teaching and learning outcomes. Additionally, the current study did not obtain information on student perception or course satisfaction. In order to better understanding of how the technology-infused courses met student needs, future studies should collect student outcome data and course evaluations.

6. Conclusion

This study showed support for implementing structured professional development opportunities in higher education to support faculty in the incorporation of technology into their teaching pedagogy. These findings are especially meaningful in light of the continued movement toward web-centric and online teaching. Overall, deliberate and focused training of the integration of technology into teaching pedagogy has been shown to be effective in increasing faculty use of technological teaching methods, which in turn, benefit student learning. Higher education administrations can use this

information to be intentional in supporting faculty development regarding the inclusion of technology into teaching.

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