

TEACHER TECHNOLOGY LITERACY: EFFECTS OF ALTERNATIVE DELIVERY MODES

By

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ABSTRACT

The task of preparing teachers to use technology in the classroom now extends beyond the walls of the university and into the classrooms of in-service teachers, as many states require technology competency for maintaining teaching credentials. In order to meet these needs, colleges and universities must seek alternative, but efficient modes for delivering this instruction. One such method is the hybrid or blended format technology literacy course. The hybrid format appears to have potential for this purpose. This method provides accommodation for in-service teachers who have difficulty coming to campus during the school day, while still providing the human interaction of the face-to-face classroom (Palloff & Pratt, 2003).

This study investigates the efficacy of three delivery modes of a technology literacy course (face-to-face, hybrid, fully-online) on pre-service and in-service teachers' technology integration and attitudes towards technology. Results suggest that online and hybrid delivery modes of technology literacy course may be reasonable alternatives to train in-service and pre-service teachers in computer skills and integration.

Keywords: Online Learning, Hybrid Learning, Teacher Technology Training, K-12 Education.

INTRODUCTION

There is universal agreement that teachers need to have the skills to effectively integrate technology into their teaching (Collier, Weinburgh, & Rivera, 2004). The task of preparing teachers to use technology in the classroom now extends beyond the walls of the university and into the classrooms of in-service teachers, as many states require technology competency for maintaining teaching credentials. In order to meet these needs, colleges and universities must seek alternative, but efficient modes for delivering this instruction. Many schools have turned to fully online and hybrid modes of delivery for this purpose. Both modes appear to have potential for accommodating in-service teachers who have difficulty coming to campus during the school day (Palloff & Pratt, 2003). It is now important to investigate if these alternative delivery modes provide the efficacy of face-to-face training (Delfino & Persico, 2007).

This study investigates the effects of three delivery modes of technology literacy course (face-to-face, hybrid, fully-

online) on pre-service and in-service teachers' self-reported attitudes towards technology, computer integration confidence and performance. Both confidence and performance have been used as indicators of training efficacy (Alfieri & Tutty, 2008; Anderson & Maninger, 2007; Fleming, Motamedi, & May, 2007; Tutty, Klein, & Sullivan, 2005).

Attitude and Competency

According to Woodrow (1992), a teacher's attitude toward technology is a strong indicator for effective technology integration. Ertmer (2005) suggests that one of the reasons teachers do not integrate technology into their classrooms is because of their attitude towards the value of technology. In order to achieve positive adoption of technology, training should consist of easy-to-learn technology tools.

Technology Training

Teachers today can gain their technology skills by attending trainings in a face-to-face or online environment. Each environment differs depending upon

the teacher's prior technology experience. Regardless of the way training is presented, it should include the development of technology skills and promoting the use of these skills to enhance instruction. In order for teachers to be effectively trained, it is important that the training models classroom practices (Willis & Cifuentes, 2005). Furthermore, according to Willis and Cifuentes (2005), when teachers were given a choice of whether to take a face-to-face or online technology training course, the teacher's prior technology experience was a factor in his or her decision. Teachers that volunteered for the online technology course had stronger technology skills prior to taking the course than the teachers that opted to take the face-to-face course.

Face-to-Face, Online and Hybrid Methods

There are benefits to taking a face-to-face course. Questions can be answered promptly during lecture, and the technology equipment used is similar to the classroom environment. Some examples of practical classroom application used in a face-to-face course are group work and demonstrations of integrated activities. Face-to-face training creates an easier environment in which to model actual classroom experiences (Willis & Cifuentes, 2005). In a study conducted by Singh and Stoloff (2007) comparing online to face-to-face instruction, fifty-two percent of participants believed that it was important for the teacher to be present to enhance learning.

In online training, questions are often asked in an asynchronous format, such as discussion boards and e-mail. Although online training can make it difficult to model classroom experiences, multimedia can enhance this interaction, including video case studies and online projects (Willis & Cifuentes, 2005). Online courses can be advantageous over face-to-face courses due to the fact that web resources can easily be integrated in the class; teachers can assign specific readings from websites or do research that requires the use of online databases (DeVries & Lim, 2003).

The hybrid format provides a combination of online activities with face-to-face meetings. This method

appears to have potential for the purpose of delivering instruction to pre-service and in-service teachers; it provides accommodation for in-service teachers who have difficulty in coming to campus during the school day, while still providing the human interaction of the face-to-face classroom (Palooff & Pratt, 2003). Ultimately, for teachers to have the knowledge and confidence to integrate technology into their curriculum, technology training, regardless of delivery mode, must increase their competency level (Yildirim, 2000).

Based upon the literature, the researchers hypothesized:

- participants in the online and hybrid formats would demonstrate greater confidence for technology than those in the face-to-face delivery mode
- performance would be greater for participants in the face-to-face delivery mode than those in either the online or hybrid delivery modes
- participants in the face-to-face delivery mode would report a higher satisfaction level with their delivery mode than participants in either the hybrid or online delivery modes.

Method

Participants

The participants for this study were 60 pre-service and in-service teachers enrolled in computer applications course at a state university in the northwestern United States. The course was required for pre-service students enrolled in one of five initial teacher certification programs. The course was also accepted by the state for technology credentialing of in-service teachers. The course was delivered in one of three different modes (face-to-face, online, hybrid). Participants were predominantly Caucasian female (73%). The mean reported computer use of the participants was 7-10 hours per week.

Course Description

Educational Technology Classroom Applications is a three-credit, teacher preparation course designed to introduce basic technology skills in word processing, spreadsheets, database, and presentation software. The course is also designed to facilitate integration of digital

technology into teaching and learning activities. Instruction features illustrated lectures, in-class discussions, on-line research and discussion, demonstrations, hands-on lab activities, and active student participation. Course assignments are related to the basic function of each software package, productivity and the application of each in meeting the National Educational Technology Standards for Teachers (NETS-T) (ISTE, 2002).

Procedures

Three groups used for comparisons were determined based upon enrollment in one of the three delivery modes of Educational Technology Classroom Applications: face-to-face (n = 20); hybrid (n = 20); and fully online (n = 20). Two instruments were administered to the participants. The Computer Integration and Basic Skills Instrument (CIBSI) was administered to students in all three delivery modes at the conclusion of the course. The researcher contacted each course instructor via email and personally arranged to deliver and collect the CIBSI from each instructor. Each instructor received a packet containing directions for administering the instrument and sufficient copies for the instructor's students. Course instructors administered the instrument to all students in their classes. An attitude questionnaire was administered to all participants one semester after completing the course. The researcher contacted each participant by email and the instrument was administered online.

Data Collection Instruments

CIBSI

The Computer Integration and Basic Skills Instrument (CIBSI) was developed in 2005 (Tutty, et al., 2005) and administered to students enrolled in the computer applications course during the fall of 2007. Items for the survey were developed through a review of the literature and the fundamental skills established by International Society for Technology in Education (ISTE, 2002; Knezek & Christensen, 1998; Selwyn 1997). The CIBSI contains 40 items comprising two 20-item subscales: confidence and performance. The reported Cronbach alpha reliability coefficient for the confidence subscale was .93,

and .78 for the performance subscale (Alfieri & Tutty, 2008; Tutty, et al., 2005).

The confidence subscale consists of 20, five-choice Likert-type items ranging from very confident (scored as 5) to not confident at all (scored as 1). The performance subscale consists of 20 multiple-choice questions distributed evenly among the two topic categories of skills and integration. Items from each topic category were distributed randomly on the survey. The overall reliability coefficient for this administration of the CIBSI was .86. The complete instrument is available on request from the first author.

Attitude Questionnaire

An attitude questionnaire was administered to study participants at the conclusion of the spring 2008 semester, one semester after participants completed the applications course. The questionnaire consisted of 30 items including five demographic items. Five items were included to measure attitude toward the mode of course delivery. Attitude items were positively oriented and rated strongly agree (scored as 5) to strongly disagree (scored as 1). Twenty, five-choice Likert-type items ranging from very confident (scored as 5) to not confident at all (scored as 1) were used to measure retained confidence. Confidence items for the survey were aligned to the CIBSI and are shown in Figure 1. Alpha reliability of the confidence items was .90.

Data Analysis

Mean scores were calculated for each item within each subscale for the three groups: face-to-face, hybrid, and fully online. Multivariate analysis of variance (MANOVA) was used to test for significant differences between groups by subscale for both instruments. These analyses were followed by univariate analyses and Dunnett C post hoc comparisons to identify significant differences between groups by individual item.

Results

CIBSI Confidence

The overall mean confidence score was 3.28. Mean scores by mode were 3.41 for fully online, 3.30 for face-to-face, and 3.12 for hybrid. The highest levels of confidence

1. Performing a cut or copy and paste between documents.
2. Attaching files to email.
3. Developing a presentation with graphics and sound.
4. Sorting data in a database.
5. Using functions in a spreadsheet to perform calculations.
6. Saving and retrieving files from a folder.
7. Accessing information on a CD-ROM, diskette or hard drive.
8. Accessing user settings: i.e. desktop wallpaper, screen saver, and sounds.
9. Connecting peripheral devices: i.e. printer, pda, and portable audio device.
10. Performing disk maintenance: i.e. disk defragmenter.
11. Communicating with peers via multiple electronic means: i.e. email, discussion board/forum...
12. Designing technology-enhanced lessons.
13. Evaluating instructional units that integrate technology.
14. Aligning objectives to national technology and content standards.
15. Discussing issues related to equitable access to technology in school.
16. Using the Internet for lesson plan ideas.
17. Delivering a lesson with presentation software: i.e. Power Point
18. Using a database in a discovery lesson for students.
19. Creating digital concept maps.
20. Writing a WebQuest.

Figure 1. Retained Confidence Items

were with tool-related items ($M = 3.48$), such as performing a cut and paste within a document. One-way multivariate analyses of variance (MANOVA) indicated significant differences for confidence, Wilks's $\Lambda = .24$, $F(40,76) = 1.95$, $p < .01$. Dunnett C post hoc analyses yielded significant differences on four of the 20 confidence items. All differences favored face-to-face and fully online participants over the hybrid mode participants.

CIBSI Performance

The overall mean performance score was 14.97 (75%). Mean scores by mode were 15.65 (78%) for hybrid, 15.10 (76%) for face-to-face, and 14.15 (71%) for fully online. No significant differences were found between delivery modes.

Attitude Questionnaire

The overall mean attitude score towards the delivery mode was 3.79 (5 = strongly agree to 1 = strongly disagree). Mean scores by mode were 3.93 for face-to-face, 3.90 for fully online, and 3.48 for hybrid. MANOVA indicated a significant difference for attitude toward the delivery mode, Wilks's $\Lambda = .742$, $F(10,152) = 2.50$, $p < .05$. Significant differences were discovered on two of the five

attitude items. Differences occurred on items related to the format of the course, and favored the face-to-face mode over the hybrid mode.

The overall mean retained confidence score was 4.32 (5=very confident to 1= not confident at all). Mean scores by mode were 4.38 for fully online, 4.31 for hybrid, and 4.30 for face-to-face. No significant differences were found between delivery modes.

Discussion

Current literature suggests that a hybrid mode of course delivery supports learning more effectively than any other format (Reasons, Valadares, & Slavkin, 2005). In contrast to our hypothesis, the result of no significant differences for performance between delivery modes in this study suggest that online and hybrid delivery modes of a technology literacy course may be reasonable alternatives to train in-service and pre-service teachers in computer skills and integration. This finding confirms the findings of several other studies that compare online and face-to-face environments (Meyer, 2002), but does not identify the hybrid mode as the most effective. Examining reported confidence also supports the efficacy of alternative delivery modes, but again does not set the hybrid mode apart.

Willis and Cifuentes (2005) found, individuals who self-select into an online course have higher initial skills than those who choose to enroll in a face-to-face course. It should not be overlooked that students in this study were able to self-select into a particular delivery mode. An implication of this finding is that alternative delivery modes do not need to be as effective due to their populations. The results for confidence in this study have interesting implications in light of this assertion. As hypothesized, initial confidence for students self-selecting the fully online mode was the highest among the three modes, yet contrary to hypotheses, confidence for both fully online and face-to-face modes were significantly higher than for students in the hybrid mode. But when retained confidence is examined, there is no difference between delivery modes. Students in the hybrid mode demonstrated the largest gain in

confidence, supporting (Reasons, et al., 2005). However, when asked, participants rated mode of delivery below factors such as time of day, number of days each week, and instructor as factors for selecting a particular course, thus leaving superiority of the hybrid delivery mode unclear.

Conclusion

Ultimately, this study addresses the question of the efficacy of alternative delivery modes for a technology literacy course. However, the study seems to generate more questions than answers. Perhaps as McDonald (2002) suggests, comparative studies investigating the efficacy of alternative delivery modes may no longer be relevant for educational purposes. It seems clear research should progress to examine the characteristics of each mode of delivery. If initial skill level is less of a factor than schedule in determining student enrollment in alternatively delivered courses, much can be gained from further examining the delivery modes of teacher technology courses and asking relevant questions such as, how might the most valued characteristics of each mode be exchanged between modalities while meeting the needs of all involved. Perhaps the hybrid mode is the laboratory for this examination to occur.

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