

Pre-service teachers' attitudes toward using technology in schools

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Abstract

The purpose of this study was to examine pre-service teachers' attitudes toward the use of technology. There were 62 participants who answered an attitude technology survey, containing 29 questions about usefulness, competence and attitudes toward technology. Since the data contained older and younger students, the researcher investigated whether there were any significant differences between the two groups with respect to their attitudes toward technology. The researcher found that the mean of students' attitudes for the older students was slightly higher on almost all questions, but significant on only three questions of the survey. The study ranked the means for all questions in the survey and found five questions with the highest mean, indicating better attitudes, and five questions with the lowest five means, indicating the lower attitudes toward technology.

Introduction

The National Council of Mathematics Teachers (NCTM) in its Principles and Standards for School Mathematics has stated six important principles needed in teaching mathematics effectively, and one of them is the technology principle advocating the use of computers and calculators in the classroom (2000). However, Forgasz (2006) has stated several factors that discourage teachers from using technology in the classrooms: 1. Lack of teachers' knowledge in using technology 2. Requiring teachers to spend more time preparing their lesson plans. Forgasz has also found students need to have experience using technology effectively in the classroom; therefore, there is a need to utilize a proper model of using technology in a variety of teaching strategies. Leatham (2007) has stated that teacher preparation colleges need to provide adequate knowledge in the use of technology in teaching a concept in a classroom. The use of technology in classrooms helps teachers create a constructivist learning environment. A research study has shown that students tend to be more motivated to participate in classrooms with constructivist learning (Shirvani, 2007). Rovi and Childress (2003) have stated that technology has become essential in the lives of students, and has shown to improve children academically and enhance their learning; however, its use has been limited in schools due to teachers' refusal to incorporate them in their teaching. In a research study of 10,000 schools in high risk areas, researchers have discovered that teachers either infrequently used technology or used it for non-critical events such as drills in contrast to critical thinking problems (Ross, et al., 2004).

The purpose of this study is to investigate pre-service teachers' attitudes toward the use of technology in classrooms. Teachers' attitudes are comprised of their beliefs, the usefulness of technology in classrooms, and self-confidence in learning and using technology. The investigator

will also examine whether older pre-service teachers have significantly different attitudes toward technology than younger pre-service teachers.

The importance of teachers' attitudes

Huang and Liaw (2005) have found that the determining factor in selecting technology should be based on its usefulness. Researchers have also found two instrumental factors in selecting technology; the degree of its usage in a given situation (Sadik, 2006) and teacher's anxiety (Yildirim, 2000) toward the particular technology. A study examined whether secondary and elementary preservice teachers differ in their attitudes toward the use of technology, and it found that in regards to technology, preservice teachers at the secondary level had a higher self-efficacy compared with elementary teachers. Moreover, their study showed that secondary teachers were more willing to try challenging computer-related tasks (Shapka & Ferrari, 2003). Spaulding (2007) compared the knowledge level of technology of preservice and in-service teachers with respect to their attitude toward technology. The study found that preservice and in-service teachers with higher knowledge in the use of technology had better attitudes toward it compared to those with lower knowledge in technology. Carlson and Gadio (2003) have found that instructors' acceptance of the use of technology is very critical if they want to implement technology in their classrooms; otherwise, spending a significant amount of the budget that schools allocate in buying this equipment could be a waste of money that administrators should avoid.

Effect of technology on achievement

Meta-analyses research studies during the past decade have found that the use of computer technology has improved students' attitudes toward technology and understanding of the subject matter (Kay, 2007). The use of a collaborative computer experience for elementary-school science teaching also resulted in improved academic achievement (So, Seah, & Toh-Heng, 2010). When computer-based instruction was implemented in teaching elementary-school children about diffusion, it resulted in significantly higher test scores for students with technology compared to children taught with traditional instruction (Tekos & Solomonidou, 2009). Moreover, in another study, which included 2000 students using computers to do their work, results showed higher academic achievement, but there was no significant impact of technology for students with technology on the performance of the word problems (House, 2011). Muir-Herzig (2004) showed that computer usage for at-risk students had no positive impact on their achievement. Furthermore, a research study of TIMSS 2003 assessment showed the use of technology for eighth grade students in mathematics was positively correlated with their algebra scores in the United States, but negatively correlated with students in Japan (House & Telese, 2008). In addition, Yang and Tsai (2010) found that students scored higher in sixth grade math classes in understanding number sense when technology was implemented in the classrooms.

Another study discovered that students in Japan who showed high levels of science achievement also indicated that they used computers at school (House, 2012). Finally, Ng (2009) found that the use of the pocket computer did not have a positive impact on elementary and secondary

teachers, but they reported that technology was motivational and a facilitator in learning concepts.

Effective use of technology

Even though technology use has become popular for the past several years, its implementation has been limited because many teachers are refusing to include them in their classrooms (Rovai & Childress 2003). Researchers have shown that when preservice teachers are trained in the use of technology, based on a set of criteria, teachers were less willing to use technology in a classroom. However, when teachers were trained in general use of technology, they were more willing to use it as an effective tool in the classroom (Scheeler, et al., 2009). Palak and Walls (2009) have stated that university teacher trainings should prepare students with a focus on technology use in student-centered classrooms rather than concentrating on isolated technology use. Furthermore, they found that training in the use of technology should not be based on a specific model that is applicable for all situations. The use of technology must be based on a contextual situation that is specific to a problem.

Technology Barriers

Ertmer (1999) has stated that there are two types of barriers in the use of technology. The researcher stated the barriers are intrinsic and extrinsic. Extrinsic barriers refer to having insufficient time to use technology in a classroom, having insufficient training in the use of technology, and lack of access to it. The intrinsic motivations include teachers' beliefs and attitudes. This researcher also mentioned that even if the first barrier is overcome, the use of technology will not be effective. Gibbone (2009) in a study, which included 616 public school

teachers, found that no instructors felt proficient in the use of technology; however, they did not use computers in the classrooms due to other factors such as size of the class, budget, and training. Eichenold (2009) found the reasons for teachers' unwillingness to use computer technology are due to lack of time, unavailability and unreliability of technology. This study also supports Ertmer' findings that teachers tend to hesitate when using technology in the classrooms due to lack of time, inadequate training and support from the school administration.

Teachers' beliefs

Teachers' beliefs in effectiveness of technology are a decisive motivator in integrating it in their classrooms. Ropp (1999) has found that many student teachers have shown competencies in the use of technology; however, they most probably will not use technology in their classrooms because they believe that it is not beneficial in teaching a subject matter. Watson (2006) examined whether the use of technology increased teachers' self- efficacy, even several years after getting intensive training in a technology course. The study found that teachers who had positive attitudes toward technology had used technology more effectively. The research also showed that computer self-efficacy was an important factor in implementing technology in their classes. This investigator discovered teacher's gender to be a significant factor in the use of technology (Sang, et al., 2010). Furthermore, a study has found those teachers' beliefs to be very influential in their judgment, perception, and its usefulness of selecting an instructional tool in a classroom (Pajares, 1992). Moreover, teachers' beliefs guide the decisions that teachers make and the actions they take in the classroom (Fullan, 2003).

Technology anxiety

Technology anxiety is a major factor that determines a person's usage of technology in education (Gurcan-Namlu & Ceyhan, 2003). Studies have discovered that teachers' computer anxiety was related to teachers' avoidance of it, which resulted in having negative feelings, worry, and fear toward using these tools (Mcilroy & Bunting, 2003). Teachers who used computers in their homes and had computer experience tended to have lower anxiety and more positive attitudes toward technology than those who had less experience with computers. Moreover, their study showed that female teachers had a higher degree of anxiety toward use of technology than male teachers (Kian-Sam & Chee-Kiat, 2002). Gurcan-Namlu (2002) found that there is a correlation between personality type of a person and technology anxiety. The researcher found that introvert students had a higher level of anxiety toward the use of technology compared with extrovert students. Moreover, anxiety in using computers has been found to be a significant problem for in-service teachers. This anxiety causes lower confidence in the use of technology, which results in the ineffectiveness of the implementation of it in the classrooms (Hallam, 2008).

Methods

For this study, the researcher selected senior students from two pre-service elementary education classes. In one class, the average of students' ages was around 22 (group 1), and in the other class (group 2), the average of students' ages was around 30. Students in group 2 are currently teacher aids and most have been working for several years in their respective elementary schools so group 2 could be called older students and group 1, and students without experience could be called the younger group. These two groups were taught by the researcher

in a university located in the southern part of the United States. There were a total of 62 students with 32 in group 1 and 30 students in group 2. The number of female student was 60, while the number of male student was 2. The researcher used a teacher attitude survey with 29 questions, which was based on 5-Likert Scale, 1. Strongly disagree, 2. Disagree, 3. Not applicable, 4. Agree, and 5 strongly agree. The searcher used SPSS to find an average score on each question for all students. Some of the questions were negatively worded so the researcher used the formula $6-n$ in SPSS to find the proper scores for them. The researcher used SPSS to find descriptive means on each question for each student in both groups. Moreover, an ANOVA test was performed to find whether there were any significant differences in attitudes toward technology between the two groups. The results showed that there was a significant difference between two groups so the researcher used an Independent t-test with .05 significant level for both groups to examine on which questions the two groups responded significantly differently.

Results

Table 1 and Table 2, which are descriptive analysis of the SPSS, show the means for two groups of students on 29 questions of the survey. The range of the mean is from 2.8 to 4.47, indicating students showed positive attitudes toward technology.

Table 1. Students' average means for both groups question 1-14 of the attitude survey

Questions	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
1-14										0	1	2	3	4
Mean	4.1	2.8	4.0	3.3	3.6	3.7	3.6	4.1	3.9	3.9	3.3	3.5	3.5	3.7

	0	2	8	0	5	3	3	2	8	2	2	0	5	5
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Table 2. Students' average means for both groups in questions 1-14 of the attitude survey

Question	Q	Q1	Q1	Q1	Q1	Q2									
15-29	1 5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
Mean	4 .2 8	3.1 3	4.4 7	3.4 3	3.8 2	4.1 2	4.0 7	4.2 8	4.1 7	3.7 7	4.0 5	4.0 7	4.1 5	3.9 0	4.0 5

Table 1 and Table 2 show five questions with the highest means (number inside the parenthesis indicates the mean), and these are as follows: Q17 (4.47), Q15 (4.3), Q22 (4.30), Q23 (4.2), Q27 (4.15):

Q17: Technology is useful in managing student data such as attendance and grades

Q15: Technology is a good tool for collaboration with other teachers when building unit plans

Q22: I like searching the internet for teaching resources

Q23: Computers can be a good supplement to support teaching and learning

Q27: If I have training, I would like to try out instructional computer technology innovations in my teaching

The findings above show that pre-service teachers agree that technology is an important tool in a classroom; it also suggests that teachers believe training is essential in the use of technology.

The questions with five lowest means are Q2 (2.82), Q16 (3.13), Q4 (3.3), Q11 (3.22), Q18 (3.43)

Q2: There are more discipline problems

Q16: I learn new technologies best by figuring them out myself

Q4: Students go to inappropriate sites

Q11: Students are more knowledgeable than I am when it comes to technology

Q18: Technology is unreliable

From the questions above, (Q2, Q16, Q4, Q11, Q18), one can surmise that some teachers are essentially between agreeing and disagreeing with these questions, or that they are undecided about these questions.

The research also showed that on only one question, Question 2, younger students had a higher mean than older students and on questions 7 and 24; the means for both groups were the same. Moreover, this study showed that the means for all other questions were higher for the older students than the younger

The SPSS used the AOVA test to examine whether the two groups (group1, the younger group, with no experience, and group 2, the older group, with teaching experience) were significantly different with respect to their attitudes toward technology. The SPSS showed that the two groups were significantly different with respect to attitudes toward technology; thereby, the researcher used ANOVA test to examine on which questions of the survey the groups were significantly different. The SPSS ANOVA showed the groups were reported significantly different on three questions, which were Q12, Q13, and Q14. The levels of significance for these questions were Q12 (.004), Q13 (.001), and Q14 (.02). All these levels are below 0.05, which indicate significant differences on these questions between two groups.

In Q12 (School systems expect us to learn new technologies without formal training), the mean for the younger class was 3.10 while the mean for the older class was 3.96, indicating that older students had stronger beliefs that school systems should provide sufficient training for teachers when compared with younger students.

In Q13 (there is too much technological change coming too fast without enough support for teacher), the mean for the younger group was 3.12, and the mean for the older group was 4.04. This indicates that older students had stronger beliefs that technological changes are happening at a faster rate than they can become familiar with. In Q14 (Technology has left many teachers behind), the mean for the younger class was 3.47, and for the older group was 4.10. This indicates that older students had stronger beliefs about technology leaving teachers behind.

Conclusions

This study investigated attitudes of pre-service teachers toward technology. It also examined whether two groups of participants, the younger pre-service teachers and the older pre-service teachers significantly exhibited different attitudes toward the use of technology. This study found that on almost all questions, the mean of older students was higher than the younger students, indicating better attitudes of older pre-service teachers toward technology. Moreover, Spaulding (2007) has found that preservice and in-service teachers with higher knowledge in the use of technology had better attitudes toward technology compared to those with lower knowledge in technology. This may explain the reason why older students had higher mean attitudes for each question in the survey. Furthermore, the analysis of data showed the five questions with the highest means for the survey, indicating teachers' higher attitudes and five questions with the lowest mean, suggesting the questions on which pre-service teachers had the least positive attitudes toward technology. One such question was teachers stating the need for being trained in the use of technology. The analysis also showed the five questions with the lowest mean, indicating the least important attitudes. One such question was reliability of technology; students did not feel that technology was reliable. Moreover, the study found that on three questions, there were significant differences between older pre-service teachers and younger ones. These questions were about the need for training of teachers and lack of technology influence in schools. This researcher understands the reason that the older teachers had such a response because they had more experience in schools and have observed the weaknesses and strengths in using technology in classrooms. The limitations of this study were that over 90% of the students identified themselves as Hispanic; thereby, there is a lack of representation of diverse groups of students. Therefore, this could jeopardize generalization of this study to other preservice teachers. Another limitation of the study is having a smaller

number of participants in which could affect the results. However, the findings from this study supports researchers (Spaulding, 2007; Leatham, 2007) that between preservice teachers, those with experience in using technology showed better attitudes toward technology than inexperienced ones.

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Attitude Toward Technology Survey

For the following items, please **circle** the answer that best shows your opinion
 1=strongly disagree 2=disagree 3= undecided 4=agree 5=strongly disagree

When using technology.....					
1. Student create products that show higher level of learning	1	2	3	4	5
2. There are more discipline problems	1	2	3	4	5
3. Students are more motivated	1	2	3	4	5
4. Student go to inappropriate sites	1	2	3	4	5
5. There is more student collaboration	1	2	3	4	5
6. Plagiarism becomes more bigger problem	1	2	3	4	5
7. The abundance of unreliable sources is disturbing	1	2	3	4	5
I believe					
8. Electronic media will replace printed text within five years	1	2	3	4	5
9. Most technology would do little to improve my ability to teach	1	2	3	4	5
10. Technology has changed the way that I teach	1	2	3	4	5
11. Students are more knowledgeable than I'm when it comes to technology	1	2	3	4	5
12. School systems expect us to learn new technologies without formal training	1	2	3	4	5
13. There is too much technological change coming too fast without enough support for teacher	1	2	3	4	5
14. Technology has left many teachers behind	1	2	3	4	5
15. Technology is a good tool for collaboration with other teachers when building unit plans	1	2	3	4	5
16. I learn new technologies best by figuring them out myself	1	2	3	4	5
17. Technology is useful in managing student data such as attendance and grades	1	2	3	4	5
18. Technology is unreliable	1	2	3	4	5

19. I perceive computers as pedagogical tools	1	2	3	4	5
20. I generally have positive attitude towards using computer technology in teaching	1	2	3	4	5
21. I like using computers for teaching purposes	1	2	3	4	5
22. I like searching the internet for teaching resources	1	2	3	4	5
23. Computers can be a good supplement to support teaching and learning	1	2	3	4	5
24. I believe I can take risks in teaching with computer technology	1	2	3	4	5
25. If I have time I would like to try out instructional computer technology innovations in my Teachings	1	2	3	4	5
26. If I have access to resources I would like to try out instructional computer technology Innovations in my teachings	1	2	3	4	5
27. If I have training, I would like to try out instructional computer technology innovations in My teaching	1	2	3	4	5
28. I am not the type to do well with computerized teaching tools	1	2	3	4	5
29. I am not prepared to integrate instructional computer technology in my teachings	1	2	3	4	5