

Prospective Secondary Mathematics Teachers' Gender-wise Attitudes on Using a Web 2.0 Technology in Teaching-Learning Euclidean Geometry

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Abstract: This paper presents the results of a study that sought to determine if preservice mathematics teachers' attitudes toward a 12-week blogging activity, used as a supportive teaching-learning tool in a college Euclidean Geometry course, differed based on their gender. The study was conducted at a university in the western United States. Data was collected using a questionnaire survey comprised of demographic questions and 16 Likert-type scale items designed to measure attitude toward the blogging activity. The study determined that participants found the blogging activity to be appropriate and enjoyable, but no differences based on gender were found.

Introduction

The National Council of Teachers of Mathematics' (NCTM) Principles and Standards for School Mathematics (2000) has been a guiding vision of mathematics education at the school level in the United States. Technology is one of the six principles included in this document. Specifically, NCTM's (2000) Principles and Standards advocates for appropriate and integrated use of technology in every aspect of mathematics education (Powers & Blubaugh, 2005).

Unfortunately, however, information technology use is not being satisfactorily implemented in mathematics education programs nationwide in the U.S. (Gunter, 2001; Kurz & Middleton, 2006). Studies show that many teacher education programs in the U.S. have not integrated technology appropriately (Mistretta, 2005; Watts-Taffe, Gwinn, Johnson, & Horn, 2003). The preparation of preservice teachers to use technology is one of the critical challenges teacher education programs face (Powers & Blubaugh, 2005). Brush, Glazewski, & Hew (2008) report that many teacher education programs prepare preservice teachers with low level or outdated technology skills that do not provide preservice teachers with adequate knowledge to provide sufficient technology-based instruction in their classroom. Many teacher education programs use the computer as a teacher-centered tool rather than as a student-centered tool (Wang, 2002). Without adequate knowledge, these teachers get little opportunity to integrate technology into their actual classrooms (Brush, Glazewski, & Hew, 2008).

Fortunately, the emergence of Web 2.0 technologies is receiving intense and growing interest across many sectors of the education industry for addressing the needs of today's diverse students (Alexander, 2006; Allen, 2008; Lee & Ge, 2010; McLoughlin & Lee, 2008). As Web 2.0 tools allow users to create Web content from text based web pages and online journals to visual format, Web 2.0 could provide appropriate technologies to create multiuser virtual teaching-learning systems. There is a possibility of using the interactive features of Web 2.0 technologies to motivate today's technologically advanced students to create and participate in virtual platforms where they can share their thinking in solving and creating mathematical problems. This study was intended to measure preservice mathematics teachers' attitudes on using a blogging activity in a college Euclidean geometry course, both as students while taking the course and as future teachers thinking about how to utilize a similar activity in the near future when they will be teaching in their own classrooms.

Procedure

The study examined the following research question: Are there significant differences by gender with regard to preservice mathematics teachers' attitudes toward the blogging activity in a college Euclidean Geometry course? To investigate this question, the effect of a 12-week blogging activity that was a standard component of a college Euclidean Geometry course offered for preservice secondary mathematics teachers was examined. The blog can be visited at: <http://edsc353fall2011.wordpress.com/>

At the end of the 12-week activity, preservice mathematics teachers' attitudes toward the blogging activity were measured using an instrument developed by the researcher. Validity and reliability of the instrument were measured through appropriate procedures and were found to be authentic and consistent.

Prior to collecting data, permission was sought from the Institutional Review Board (IRB) of the university where the study was conducted. Before administering the survey, participants were given a participant assent form. Additionally, an information script describing the purpose of the survey was read aloud to the students. The students were given a choice to participate or not participate in the study without any penalty or loss of rights to which they were entitled in the class. All individuals who agreed to participate were given the survey to complete in the absence of the researcher. Quantitative data were gathered through a survey developed by the researcher.

Participants and Data

The study was conducted in a college Euclidean Geometry course offered at a university in the western United States during the fall 2011 semester. There were 28 students in the class; and all of them participated in the study and survey. Descriptive statistics on the demographic information of study participants showed that twelve (42.86%) of the participants were male, and 16 (57.14%) were female. The participants ranged in age from 20 to 61 years old with a mean, median, and range of 26.43, 22.0, and 41 years, respectively, and a standard deviation of 10.15 years.

The overall score for each participant was determined by calculating the median score of the 16 Likert-type scale items designed to measure participants' attitude toward the blogging activity. Each item had a possible range of 1 to 6; where for positively worded items, 1 indicated Very Strongly Disagree (VSD) and 6 indicated Very Strongly Agree (VSA). There were 6 negatively worded Likert-type scale items in this section, items 9, 11, 13, 16, 19, and 23 (see Appendix). The same Likert scale options were given for the negatively worded Likert-type scale items; however, scores for these items were coded in reverse order with a possible range of 1 to 6; where 1 indicated Very Strongly Agree (VSA) and 6 indicated Very Strongly Disagree (VSD).

An overview of the frequency statistics (Table 1) of median attitude scores showed a mean, median, mode of 4.18, 4.0, and 4.0, respectively with a standard deviation of 0.95, indicating that the participants essentially strongly agreed that the blogging activity was a positive experience for them and served as a supportive teaching-learning tool in the Euclidean Geometry course.

Table 1
Descriptive Statistics of Median Attitude Scores

Median Attitude Scores	
Valid N	28
Mean	4.1786
Median	4.0000
Mode	4.00
Std. Deviation	.95466

Results

The research question was: *Are there significant differences by gender with regard to preservice mathematics teachers' attitudes toward the blogging activity in a college Euclidean Geometry course?*

The data (shown in Table 2) for this research question were analyzed using a non-parametric Wilcoxon-Mann-Whitney U test on the median attitudes scores by gender.

Table 2
Median Attitude Scores by Gender

Male Participants	Female Participants
6	4
6	4
5	3
5	4
4	3
5	4
4	3
4	3
4.5	6
4	5
3.5	4
2	5
	4
	4
	4
	4
	4
N = 12	N = 16

The Wilcoxon-Mann-Whitney U test result (shown in Table 3) indicated a non-significant difference ($N = 28$, $U = 68.0$, $p > .05$) that failed to reject the null hypothesis that the median attitudes of the participants did not differ in terms of their gender in using the blogging activity as a supportive teaching-learning tool in a College Euclidean Geometry course.

Table 3
Wilcoxon-Mann-Whitney U Test Statistics for Attitude Scores on Participants' Gender

	Median Attitudes
Mann-Whitney U	68.000
Z	-1.377
Asymp. Sig. (2-tailed)	.169
Exact Sig. [2*(1-tailed Sig.)]	.205 ^a

a. Not corrected for ties.

This means that the study did not find any significant difference in the median attitude scores of the participants in terms of their gender with regard to using the blogging activity as a supportive teaching-learning tool in a College Euclidean Geometry course.

Again, based on the ranks result (shown in Table 4), it was determined that male participants had a Mean Rank 16.83 and the female participants had a Mean Rank 12.75 for their attitudes toward the use of a blogging activity as a supportive teaching-learning tool in a college Euclidean Geometry course. The difference in these means was not significant.

Table 4
Median Attitude Ranks by Gender

Gender	N	Mean Rank	Sum of Ranks
Male	12	16.83	202.00
Female	16	12.75	204.00
Total	28		

Discussion and Implication

The scores of attitude toward the blogging activity showed a mean, median, and mode of 4.18, 4.0, and 4.0, respectively, with a standard deviation of 0.95. These numbers suggest that participants' typical response indicated strong agreement, meaning that they had a positive attitude toward the blogging activity.

The study indicated a non-significant difference ($N = 28$, $U = 68.0$, $p > .05$) in the median attitude scores of the participants toward the blogging activity in terms of their gender. This result did not support some other studies that found that men and women use the Internet very differently, with women sending and receiving emails in a richer and more engaging way and that women appear to have overtaken men in online shopping, while more men perform online financial transactions and pursue and consume information online more aggressively than women (Bimber, 2000; Fallows, 2005; Grove, 2010). However, the gender-based result of this study does support another doctoral dissertation that found "gender did not have a significant relationship with Web 2.0 usage" (Cash, 2010, p. 81).

The result of the present study may be due to the fact that it was conducted in a single class with a small number of participants; Moreover, the median attitude scores in this study implied that both male and female participants experienced consistent perceptions that the blogging activity was appropriate and enjoyable in the Euclidean Geometry course.

The results of this study have possible implications not only to researchers in the field of mathematics education, but also for mathematics students, teachers, educators, curriculum developers, instruction designers, and policy makers regarding the use of a blog and other Web 2.0 applications as a supportive or comprehensive tool for teaching, learning, and planning purposes.

This study found that participants generally reported positive attitudes toward the blogging activity without any significant differences based on their gender. One implication of these results might be that, professors and teachers who wrongly believe that males are being given an unfair advantage when computers and technology are incorporated into a class should reconsider this thought. This study suggests that implementing a blogging activity should not provide any advantage to either males or females as some educators may wrongly believe to be the case. Therefore, professors and teachers should feel confident about implementing this type of activity without being excessively concerned about unfairly advantaging male or female students.

Conclusions

This study has revealed some important and notable results regarding the use of blogs in teaching-learning Geometry and other mathematics courses. As most of the participants of this study were in-service or preservice mathematics teachers, their perceptions were related to both teaching and learning perspectives. Quantitative measures of participants' attitude toward the use of a blog found enjoyable in a college Euclidean Geometry course. The study also revealed that gender did not have a significant relationship with preservice secondary mathematics teachers' attitudes toward using a blog as a supportive teaching-learning tool in a college Euclidean Geometry course. Thus, it seems that both male and female students and teachers would enjoy participating in and potentially benefit from using a blog as a supportive teaching-learning tool.

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Appendix: Survey Instrument

Please fill out this questionnaire based on your perceptions of the blogging activity in the course, EDSC 353: Teaching Secondary Geometry, in the fall semester of 2011.

I. Demographic Information

1. Please indicate your gender: ☐ Male ☐ Female
2. Please state your age: _____ years.

II. Experience in using Internet and Web 2.0 Application

3. Do you use a Smartphone or Internet connected cell handheld device to get access to the Internet?
☐ Yes ☐ No ☐ I do not use a cell phone
4. How much total time do you spend per week on the Internet for all purposes? _____ hours.
5. How do you rate your skills in using the Internet in terms of sending or receiving emails, browsing webpages, searching information, reading news on the Internet, etc.?
☐ Excellent ☐ Good ☐ Fair
6. How do you rate your interest/engagement in Web 2.0 applications such as: blog, Facebook, podcast, twitter, wikis, etc.?
☐ Very Much ☐ Average ☐ Very Little
7. Before participating in this activity how much experience in blogging did you have?
☐ Very Much ☐ Average ☐ Very Little

III. Attitudes toward the Blogging Activity

In this section, please express your response in **only one** of the following options:

VSA = Very Strongly Agree

SA = Strongly Agree

A = Agree

D = Disagree

SD = Strongly Disagree

VSD = Very Strongly Disagree

#	Question	Response					
8.	Participating in this blogging activity peaked my interest to learn how to conduct such an activity	VSA	SA	A	D	SD	VSD
9.	The blogging activity made me irritable	VSA	SA	A	D	SD	VSD
10.	After participating in this blogging activity I hope to see blogging activities in other mathematics courses I take in future	VSA	SA	A	D	SD	VSD
11.	I did not like participating in the blogging activity	VSA	SA	A	D	SD	VSD
12.	I enjoyed spending time online for this blogging activity	VSA	SA	A	D	SD	VSD
13.	The blogging activity was not worth the time and effort it involved	VSA	SA	A	D	SD	VSD
14.	I enjoyed reading solutions that my classmates posted on the blog	VSA	SA	A	D	SD	VSD
15.	I enjoyed posting topics or issues on the discussion board of the blog	VSA	SA	A	D	SD	VSD
16.	I felt uncomfortable participating in the blogging activity	VSA	SA	A	D	SD	VSD
17.	I enjoyed commenting on my classmates' contributions to the blog	VSA	SA	A	D	SD	VSD
18.	The blogging activity was interesting	VSA	SA	A	D	SD	VSD
19.	The blogging activity did not fulfill my initial expectations about it	VSA	SA	A	D	SD	VSD
20.	Blogging activities should be incorporated into other courses in the teacher education program	VSA	SA	A	D	SD	VSD
21.	I enjoyed posting solutions to the blog	VSA	SA	A	D	SD	VSD
22.	I felt comfortable with the blogging activity	VSA	SA	A	D	SD	VSD
23.	The blogging activity was boring	VSA	SA	A	D	SD	VSD