**Prospective Mathematics Teachers’ Gender-wise Perceived Effectiveness in Attending a Blogging Activity in a College Euclidean Geometry Course**

**Abstract:** This paper presents perceived effectiveness of using a 12-week blogging activity, as a supportive teaching-learning tool, in a college Euclidean geometry course, offered mainly for preservice mathematics teachers in the western United States. Data for this section were collected through a questionnaire survey with a number of demographic questions and 18 Likert-type scale items measured on a six-point scale; and were analyzed using the Wilcoxon-Mann-Whitney U test. The study compared participants’ perceived effectiveness scores toward the blogging activity with their gender; and found that the participants found the blogging activity effective and helpful without any significant difference based on their gender.

**Introduction**

Technology has been a powerful tool in the United States’ mathematics classrooms for several decades. Technology is one of the six principles included in the NCTM (2000) Principles and Standardsof School Mathematics. The NCTM (2000) Principles and Standards admits that “Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students’ learning” (p. 24). NCTM also advocates for the appropriate and integrated use of technology in every aspect of mathematics education from what is taught in mathematics; how mathematics is taught and learned; and how mathematics is assessed (Powers & Blubaugh, 2005).

However, information technology use is not satisfactory in the 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). Studies found that 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 own classrooms (Brush, Glazewski, & Hew, 2008).

The high costs of purchasing and updating mathematics teaching-learning software, and the problems and challenges associated with traditional and Web-based online courses call for the use of Web 2.0 technologies in the teaching and learning of mathematics. With the rapid growth of social network services, Internet, and mobile web usage, it is expected that Web 2.0 tools will be a popular alternative to traditional teaching-learning software and Web-based online courses. As a standard example of Web 2.0 applications, a blog that is fast, free, and relatively easy to use, requiring only basic computing knowledge (Solomon & Schrum, 2007) was considered to be an appropriate tool to examine possible usage of other Web 2.0 applications. Researchers expect that over the next few years blogs will be one of the fastest growing Web 2.0 applications (Kairer, 2009).

The continuing spread of Web 2.0-based free applications could provide an alternative means of supporting a large population of mathematics students, teachers, and classrooms who cannot afford to purchase licensed mathematics software or flexible online teaching-learning systems. This may be an especially effective avenue for fostering mathematics learning in today’s technologically advanced young students, who tend to use the Internet through wireless means.

This study was intended to examine the feasibility of using a Web 2.0 technology in the teaching and learning of secondary mathematics courses – by measuring preservice mathematics teachers’ perceptions regarding a blogging activity that was a standard component of a Euclidean Geometry course offered at a university in the western United States. Participants’ perceived effectiveness of the blogging activity was measured using an instrument developed by the researcher (see Appendix).

**Procedure**

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 investigated in this study. The blog can be visited at: <http://edsc353fall2011.wordpress.com/>

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

The study examined the following quantitative research question: Are there significant differences by gender with regard to preservice mathematics teachers’ perceived effectiveness of using the blogging activity in a college Euclidean Geometry course? To address the research question the study used participants’ gender as the independent variable. The independent variable was compared with a dependent variable, participants’ perceived effectiveness of using the blogging activity in the college Euclidean Geometry course, that was measured by calculating the median response of the 18 Likert-type scale items measured on a six-point scale.

Prior to collecting data, permission was sought from the Institutional Review Board (IRB) of the university where the study was conducted. Before administrating 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 in the fall 2011 semester. There were 28 students who enrolled in and completed the class and all of them participated in the study and survey. 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.

Participants’ perceived effectiveness of using the blogging activity was measured by calculating the median response of the 18 Likert-type scale items measured on a six-point scale. These eighteen 6-point Likert-type scale items were combined to attain an overall measure of perceived effectiveness of using the blogging activity in a college Euclidean Geometry course for each of the individual participants. The overall score for each participant was determined by coding the responses of the relevant items. Each item had a possible range of 1 to 6; where 1 indicated Very Strongly Disagree (VSD) and 6 indicated Very Strongly Agree (VSA) with a higher number representing a more positive perceived effectiveness of the blog for the learning of Euclidean Geometry.

An overview of the frequency statistics (Table 1) of the median perceived effectiveness scores yielded a mean, median, and mode of 4.13, 4.0, and 4.0, respectively, with a standard deviation of 0.93, indicating that the typical response of participants corresponds to slightly more than agreement that the blogging activity was an effective means of teaching and learning Euclidean Geometry.

| Table 1  *Descriptive Statistics of Median Perceived Effectiveness Scores* | |
| --- | --- |
|  | Median Perceived Effectiveness |
| Valid N | 28 |
| Mean | 4.1250 |
| Median | 4.0000 |
| Mode | 4.00 |
| Std. Deviation | .92921 |

**Findings**

The research question was: *Are there significant differences by gender with regard to preservice mathematics teachers’ perceived effectiveness of the blog for the learning of Euclidean Geometry?*

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

|  |  |
| --- | --- |
| Table 2  *Median Perceived Effectiveness Scores by Gender* | |
| Male Participants | Female Participants |
| 4 | 5 |
| 4 | 4 |
| 5 | 3 |
| 6 | 4 |
| 4 | 3 |
| 4 | 5 |
| 4 | 4 |
| 4 | 3 |
| 5 | 6 |
| 3.5 | 5 |
| 3.5 | 5 |
| 2 | 5 |
|  | 4 |
|  | 3 |
|  | 3.5 |
|  | 4 |
| N = 12 | N = 16 |

The Wilcoxon-Mann-Whitney U test result (Table 3) indicated a non-significant difference (*N* = 28, *U* = 94.50, *p* >.05) that failed to reject the null hypothesis that the median perceived effectiveness of the blog for the learning of Euclidean Geometry did not differ significantly in terms of the gender of the participants.

| Table 3  *Wilcoxon-Mann-Whitney U Test Statistics for Perceived Effectiveness Scores on Participants’ Gender* | |
| --- | --- |
|  | Median Perceived Effectiveness |
| Mann-Whitney U | 94.500 |
| Z | -.073 |
| Asymp. Sig. (2-tailed) | .942 |
| Exact Sig. [2\*(1-tailed Sig.)] | .945a |
| a. Not corrected for ties. | |

This means that the study did not find a significant difference in the median perceived effectiveness scores of the blog for the learning of Euclidean Geometry in terms of the gender of the participants. Again, based on the ranks of the median perceived effectiveness scores by gender (Table 4), it was determined that the male participants had a mean rank of 14.38 and the female participants had a mean rank of 14.59 in the perceived effectiveness of the blog for the learning of Euclidean Geometry. The difference in these means was not significant.

| Table 4  *Ranks of the Median Perceived Effectiveness Scores by Gender* | | | |
| --- | --- | --- | --- |
| Gender | N | Mean Rank | Sum of Ranks |
| Male | 12 | 14.38 | 172.50 |
| Female | 16 | 14.59 | 233.50 |
| Total | 28 |  |  |

**Discussion and Implication**

Descriptive statistics of the median perceived effectiveness scores yielded a mean, median, and mode of 4.13, 4.0, and 4.0, respectively, with a standard deviation of 0.93, indicating that the typical response of participants corresponds to slightly more than agreement that the blogging activity was an effective means of teaching and learning Euclidean Geometry.

The study found no significant difference (*N* = 28, *U* = 94.50, *p* >.05) in the median perceived effectiveness scores toward the blogging activity in terms of the gender of the participants. This result does 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 perception 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 perceived effectiveness scores in this study implied that both male and female participants experienced consistent perceptions that the blogging activity was appropriate and effective 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.

First, this study found that participants generally reported a positive perceived effectiveness of using a blog in teaching-learning Euclidean Geometry, 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 information 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 having to worry about unfairly advantaging male or female students.

Second, since undergraduate college students and preservice mathematics teachers perceived the use of a blog to be effective, there is a good chance that high school and middle school students and/or in-service mathematics teachers might, also, find the use of blogs to be positive and effective. Thus, middle or high school teachers should consider implementing activities similar to those used in this study in their own classrooms. Teacher educators should provide instruction to preservice teachers regarding the implementation of blogging activities and encourage these future teachers to use them in their future classrooms. Additionally, curriculum developers and policy makers should use their influence to encourage the inclusion of blogs and or/other Web 2.0 technologies in the middle school, high school, and teacher education mathematics curricula.

## **Conclusions**

This study has revealed some notable findings regarding the use of blogs in teaching-learning Euclidean 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’ perceived effectiveness of using a blog indicated that participants found the blogging activity to be positive and appropriate in a college Euclidean Geometry course. The study also revealed that gender did not have a significant relationship with preservice secondary mathematics teachers’ perceived effectiveness of using a blog as a supportive teaching-learning tool in a college Euclidean Geometry course. Thus, both male and female students should benefit from using a blog as a supportive teaching-learning tool.

Thus, the findings of this study suggest that blogs and other Web 2.0 technologies could provide an important avenue for fostering the teaching and learning of mathematics in today’s technologically advanced society. Most teachers from the middle school to the college level have enough computing knowledge to create and maintain academic or personal blogs on a suitable server free of cost. Those who don’t could be trained to do so in a few hours.

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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. Effectiveness of the Blogging Activity for Learning Euclidean Geometry**

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 V*SD* = Very Strongly Disagree

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Question** | **Response** | | | | | |
| 8. | The blog provided me with an interactive tool for online learning | VSA | SA | A | D | SD | VSD |
| 9. | The blogging activity encouraged me to share my ideas with other students in the course | VSA | SA | A | D | SD | VSD |
| 10. | The blogging activity helped me understand difficult problems in easier ways | VSA | SA | A | D | SD | VSD |
| 11. | The online discussion on the blog was more effective for learning Euclidean Geometry than in class discussion | VSA | SA | A | D | SD | VSD |
| 12. | The blogging activity helped me get better scores on the quizzes | VSA | SA | A | D | SD | VSD |
| 13. | My contributions to the blog increased the learning experience of other students in the course | VSA | SA | A | D | SD | VSD |
| 14. | Writing a substantive comment to someone’s solution on the blog encouraged me to think of an alternative solution to a problem | VSA | SA | A | D | SD | VSD |
| 15. | The blogging activity helped me figure out how a specific problem could be solved in different ways | VSA | SA | A | D | SD | VSD |
| 16. | Solving a problem on the blog was more effective for learning Euclidean Geometry than solving a problem face-to-face in class | VSA | SA | A | D | SD | VSD |
| 17. | The blogging activity encouraged me to try other Web 2.0 technologies for teaching and learning Euclidean Geometry | VSA | SA | A | D | SD | VSD |
| 18. | The contributions of my classmates to the blog helped me learn something new about Euclidean Geometry | VSA | SA | A | D | SD | VSD |
| 19. | The blogging activity helped me better understand some concepts of Euclidean Geometry | VSA | SA | A | D | SD | VSD |
| 20. | My contributions to the blog helped other students in the class learn something new about Euclidean Geometry | VSA | SA | A | D | SD | VSD |
| 21. | The blogging activity helped me better utilize my leisure time for learning purposes | VSA | SA | A | D | SD | VSD |
| 22. | The blogging activity encouraged me to collaborate with other students in the class | VSA | SA | A | D | SD | VSD |
| 23. | The blogging activity provided me with some lifelong understanding of Euclidean Geometry | VSA | SA | A | D | SD | VSD |
| 24. | The blogging activity created a collaborative learning environment in the Euclidean Geometry course | VSA | SA | A | D | SD | VSD |
| 25. | The blogging activity was more effective for learning Euclidean Geometry than writing reflection papers on class readings | VSA | SA | A | D | SD | VSD |