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Pre-Service Mathematics Teachers' Perceptions of Using Web 2.0 Technology for Instruction and Achievement in a College Euclidean Geometry Course

Md Mokter Hossain and Robert J. Quinn

Abstract

The purpose of this study was to investigate the nature of pre-service mathematics teachers' attitudes toward and perceived effectiveness of a blogging activity included as a regular component of a college Euclidean Geometry course. Descriptive statistics regarding participants' attitudes toward and perceived effectiveness of the blogging activity were gathered using a researcher developed instrument. Additionally, an inferential statistical test was performed to determine if a relationship exists between pre-service teachers' attitude toward the blogging activity and their performance in the course as measured by the eight in-class quizzes administered throughout the semester. Similarly, an inferential statistical test was performed to determine if a relationship exists between pre-service teachers' perceived effectiveness of the blogging activity and their performance in the course as measured by the eight in-class quizzes. The study was conducted in a Euclidean Geometry class designed for preservice mathematics teachers enrolled in a land grant university located in the western part of the United States. The results revealed that preservice mathematics teachers tended to enjoy participating in the blogging activity and perceived that the blogging activity was effective. Additionally, the results indicated that no relationships existed between performance in the course and either attitude toward the blogging activity or the perceived effectiveness of the blogging activity. These non-significant results suggest that mathematics teachers who want to incorporate a blogging activity in their courses should not be concerned about whether the students have a strong or weak background in mathematics, as both strong and weak students seem to enjoy and potentially benefit from the use of a blogging activity as a supportive teaching and learning tool.

Keywords- Blog; collaborative model; Euclidean geometry; mathematics education; pre-service teachers; Web 2.0 technology

Introduction

Technology has been a powerful tool in mathematics classrooms for several decades, and is one of six principles stated by the National Council of Teachers of Mathematics (NCTM) in Principles and Standards for School Mathematics (NCTM, 2000). In this document, NCTM (2000) suggests that "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (p. 24). NCTM further 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, current progress in science, technology, and mathematics education is not considered to be satisfactory by educators and legislators (Hossain & Robinson, 2011; Leshner, 2009). Although, many U. S. students excel in mathematics, as a whole, their performance on international mathematics tests consistently remains between the second and third quartile (Leshner, 2009). Far too many students and parents think that mathematics is a difficult and uninteresting subject. Such beliefs result in a wide disparity in mathematics achievement among various ethnic groups. According to Leshner (2009) mathematics education is failing to instruct students sufficiently in the skills and knowledge necessary to meet the leadership and economic challenges of the 21st century.

It is essential to address 21st century skills, because information technology has not reached its full potential in mathematics education programs (Gunter, 2001; Kurz & Middleton, 2006). Many mathematics teachers view the current role of information technology in mathematics education as unsatisfactory (Habre & Grunmeier, 2007). Habre and Grunmeier (2007) found that prospective mathematics teachers believe that they should use information technology to help teach mathematics to students; but that mathematics and not information technology should remain the focus of instruction in mathematics classrooms. However, many pre-service teachers believe that in mathematics classrooms, information technology is used improperly in ways that focus more on the technology than on mathematical understanding or calculation (Habre & Grunmeier, 2007). For instance, in an experiment, if students are shown tessellations of a plane, using a web-based Java applet, many participants may skip the mathematical knowledge behind the tessellation, since a Java applet may not show the actual mathematical calculation (Habre & Grunmeier, 2007).

Studies also show that information technology is integrated inappropriately in many teacher education programs (Mistretta, 2005; Watts-Taffe, Gwinn, Johnson, & Horn, 2003). In regards to the preparation of pre-service teachers, it is important that they be exposed to communication technology, as this is one of the critical challenges teacher education programs face (Powers & Blubaugh, 2005). Another study found that many teacher education programs use the computer as a teacher-centered tool rather than as a student-centered tool (Wang, 2002). Many teacher preparation programs utilizing information technology tend to emphasize learning with technology rather than integrating technology into their classroom teaching (Lederman & Neiss, 2000). Another study measuring pre-service teachers' technology beliefs, skills, and barriers to the use of information technology, reports that many teacher education programs use outdated information and lack adequate communication and technology skills to impact instruction in the classroom (Brush, Glazewski, & Hew, 2008). Without adequate knowledge, pre-service teachers are not given the opportunity of learning how to integrate information technology into their actual classrooms (Brush et al., 2008).

Although Blogs, Podcasts, YouTube, wikis, Facebook, and similar interactive Web 2.0 tools are currently used in the fields of information technology, engineering, business, language, journalism, and the medical sciences (Lemley & Burnham, 2009; Malhiwsky, 2010; Thomas & Li, 2008), the utilization of these tools are rarely infused in the teaching and learning of mathematics. Moreover, research on the effectiveness of Blogs and other standard Web 2.0 technologies in the teaching and learning of mathematics is limited. Therefore, the researchers aimed to investigate whether there was a significant relationship between pre-service teachers' perceptions of the use of a Blog, a simple Web 2.0 technology, and their achievement in a college Euclidean Geometry class.

The rationale for conducting the present study in this specific college Euclidean Geometry class was that the majority of the students enrolled were pre-service secondary mathematics teachers. This provided the researchers with an opportunity to gather and investigate the participants' perceptions of using the Blogging activity both as students and as teachers.

Current State of Mathematics Education in the United States

According to the report of the National Assessment of Educational Progress in 2007, 70% of U. S. eighth-grade students performed at or above the basic level in mathematics and 31% performed at or above the proficient level (National Center for Educational Statistics, 2008). Even the eighth graders in the highest-performing states such as Massachusetts rank significantly lower than the average eighth graders in the highest-achieving countries such as South Korea, Singapore, and Taiwan (Kuenzi, 2008). Compared to other industrialized nations, mathematics achievement of U. S. students appears inconsistent with a nation considered to be the world leader in scientific innovation (Hossain & Robinson, 2011).

Trends in International Mathematics and Science Study (TIMSS) results show that U. S. students' progress and performance in mathematics is not satisfactory. The TIMSS report showed that in 1995 fourth-grade and eighth-grade students in the U. S. achieved an average score of 518 and 492 points respectively (TIMSS, 1995a, 1995b). In 1999, only eighth graders were tested, the average mathematics scores of U. S. eighth-graders was 502 (TIMSS, 1999); in 2003, the average mathematics scores of U. S. fourth-graders and eighth-graders were 518 and 504 respectively (TIMSS, 2003); and in 2007, these scores were 529 and 508 points respectively (TIMSS, 2007). In each year for each grade level those scores can be compared with an international average that was normed at 500 points with a standard deviation of 100 points. It should be noted that TIMSS study is conducted in 4-year time spans. A closer look at the results of past TIMSS studies is shown in Table 1.

Table 1

UNITED STATES Students' Mathematics Performance Recorded in TIMSS 1995 – 2007

Assessment Year	Participating Countries	UNITED STATES Fourth-graders Score	Average Score		UNITED STATES Eighth-graders Score
			M	SD	
1995	41	518	500	100	492
1999*	38	–	500	100	502
2003	46	518	500	100	504
2007	48	529	500	100	508

*In TIMSS 1999 only eighth graders were tested.

A superficial look at this table might mislead the reader into believing that the United States is doing well in mathematics. However, this would be a mistake as the improvement from 1995 to 2007 was not measureable. Although, both U. S. fourth- and eighth-graders improved in mathematics in 2007 compared to 1995, no measurable change was found in the percentage of either U. S. fourth- or eighth-graders performing at or above the advanced international benchmark in mathematics between 1995 and 2007 (grade four: 9 vs. 10 percent; grade eight: 4 vs. 6 percent) (TIMSS, 2007). Compared with the average score of 500 points in each grade with a standard deviation of 100 points, the U. S. fourth-graders' average mathematics achievement on these tests was slightly higher; however, eighth-graders' average achievement was close to the average level. In 2007, compared to the mathematics achievement of fourth-graders among the 36 participating

countries, the average mathematics score of U. S. fourth-graders was higher than 23 out of the 35 other countries, lower than eight countries, and not measurably different from the average scores of students in the remaining four countries; the average mathematics score of U. S. eighth-graders was higher than 37 of the 47 other countries, lower than five countries, and not measurably different from the average scores of students in the remaining five countries (TIMSS, 2007).

Moreover, according to the Program for International Student Assessment (PISA), which is a system of international assessments that focus on 15-year-old students' scholastic performance in mathematics, science, and reading among the 35 Organization for Economic Co-operation and Development (OECD) member nations and some other non-member nations, in 2003, 2006, and 2009, U. S. 15-year-old students' combined mathematics scores were below the overall average score of 500 with a standard deviation of 100 in each of the assessments. A closer look at U. S. 15-year-old students' mathematics performance in past PISA studies is shown in Table 2.

Table 2

UNITED STATES 15-year-old Students' Mathematics Performance in PISA 2003 – 2009

Assessment Year	UNITED STATES Score	Average Score		Participating Countries	UNITED STATES Position
		M	SD		
2003	483	500	100	41	24th
2006	474	500	100	57	32nd
2009	496	500	100	67	24th

In PISA 2003, the average mathematics score of 15-year-old U. S. students was 483 compared to the overall average score of 500 with a standard deviation of 100. The students in the United States ranked 24 in average mathematics score, among 41 participating countries (Lemke et al., 2004). In PISA 2006, 15-year-old U. S. students' average mathematics score was 474 compared to the OECD average mathematics score of 498, placing them in 32nd position among 57 participating countries (Baldi et al., 2007). In PISA 2009, U. S. 15-year-old students' average mathematics score was 487 compared to the OECD average score of 496 ranking them in 24th position among 67 participating countries (Fleischman, Hopstock, Pelczar, & Shelley, 2010).

Although U. S. 15-year-old students' average mathematics score in 2009 was higher than their average mathematics score in 2006, it was not measurably different from their average mathematics score in 2003. The U. S. 15-year-old students' average mathematics scores were lower than the OECD average scores in each of the assessment years from 2003 to 2009. Only 27% scored at or above proficiency level four in mathematics – that was lower than the 32% of 15-year-old students in the OECD countries on average that scored at or above level four (Fleischman et al., 2010).

Objectives and Method

The premise of this study was to discuss how mathematics education in the United States not only needs improvement but also often fails to take advantage of new technologies that could serve to enhance mathematics instruction and ultimately student learning. To initiate this line of investigation, this study sought to determine if relationships exist between student performance in mathematics and their perceptions of a blogging activity included as a regular component of the class. Specifically, the two research questions were:

(1) Is there a relationship between the cumulative quiz scores attained by pre-service mathematics teachers enrolled in a college Euclidean Geometry class and their attitudes toward the blogging activity in a college Euclidean Geometry class?

(2) Is there a relationship between the cumulative quiz scores attained by pre-service mathematics teachers enrolled in a college Euclidean Geometry class and their perceptions of the effectiveness of the blogging activity for the learning of Euclidean Geometry?

To answer these research questions, a 12-week blogging activity was conducted as a standard component of a college Euclidean Geometry course offered for pre-service secondary mathematics students at a land grant university located in the western part of the United States. The blog can be visited at: http://edsc353fall2011.wordpress.com/.

Survey Instrument

At the end of the 12-week activity, pre-service mathematics teachers' attitudes toward the blogging activity and their perceived effectiveness of the blogging activity, were measured using an instrument (Appendix A) developed by the researchers. An electronic copy of the survey instrument can be downloaded from:
http://edsc353fall2011.files.wordpress.com/2012/10/survey_instrument.pdf

The validity and reliability of the instrument were measured through appropriate procedures and were found to be authentic and consistent. Validity was achieved by having five experts in the field of mathematics education review a preliminary version of the instrument to determine if each item covered the area it was purported to cover. Items which did not achieve significant agreement among these reviewers were eliminated. With regard to reliability, the Reliability Calculator developed by Siegle (2002) was used. This measure indicated a value of 0.97 for Cronbach's alpha, while a split-half reliability was calculated as 0.97. In both cases, the reliability coefficients were found to be consistent; and thus, the value of Cronbach's alpha was considered to be greater than 0.9, suggesting the reliability of this instrument was excellent.

Nature of Euclidean Geometry Course

The Secondary Education class EDSC 353 - Teaching Secondary Geometry course in which the blogging activity was conducted is an undergraduate level course designed to help prepare secondary mathematics education majors for the teaching of Euclidean Geometry at the high school level. This class is typically taken by junior or senior mathematics education majors. Most of the students in this class had already decided that they want to be high school mathematics teachers, while a couple took this course to help them decide if they want to pursue the goal of becoming a high school mathematics teacher.

Some specific goals of the course were to: (1) solve problems appropriate to a Euclidean Geometry course using multiple strategies; (2) rigorously prove theorems typically included in Euclidean Geometry; (3) explain the nature of proof and consider its role in a Euclidean Geometry course; (4) explain the role of technology in the teaching of Euclidean Geometry; (5) describe the different experiences that must occur to facilitate the learning of High School Geometry; (6) explain instructional strategies appropriate for teaching Euclidean Geometry; (7) communicate geometric concepts effectively, both orally and in writing; and (8) define and discuss the teacher's role in the Geometry classroom, including responsibility to the diversity of students and their various learning styles.

The first research question sought to determine if a relationship exists between participants' attitude toward the blogging activity and their cumulative quiz total attained on the

eight in-class quizzes. The second research question sought to determine if a relationship exists between participants' perceived effectiveness of the blogging activity and their cumulative quiz total. Participants' attitude toward the blogging activity was measured by calculating the median response to 16 Likert-type scale items measured on a six-point scale, while participants' perceived effectiveness of the blogging activity for the learning of Euclidean Geometry was measured by calculating the median response on another 18 Likert-type scale items measured on a six-point scale. Due to the ordinal nature of the Likert-type scale data, a Spearman correlation *r* was used for these analyses.

Participants

The study was conducted in a college Euclidean Geometry course offered at a land grant institution located in the western part of the United States in the fall 2011 semester. There were 28 students who enrolled in and completed the class, all of whom 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 Participant data indicated that their approximate average time spent on the Internet per week in hours for all purposes had a mean, median, and range of 22.43, 20.50, and 55 hours, respectively, with a standard deviation of 10.823 hours.

Participants were asked to respond to 16 specific questions (#s 8 to 23, see Appendix-A) designed to measure their attitudes toward the blogging activity in a college Euclidean Geometry course. These questions included a 6-point Likert-type scale allowing participants to indicate whether they Very Strongly Agree (VSA), Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD), or Very Strongly Disagree (VSD) to each item. These sixteen 6-point Likert-type scale items were combined to attain a median attitude score toward the blogging activity in the college Euclidean Geometry course for each participant. The possible attitude score for each item was 1 to 6 with a higher number representing a more positive attitude toward the blogging activity for the learning of college Euclidean Geometry. 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 (items numbers 9, 11, 13, 16, 19, and 23) in this section. The same Likert scale options were given for the six negatively worded Likert-type scale items; however, those items were coded in reverse order. The median score on the 16-question attitude survey was determined for each participant.

The participants also responded to 18 specific questions (#s 24 to 41, see Appendix-A) pertaining to the perceived effectiveness of the blog for the learning of Euclidean Geometry. These questions included a 6-point Likert-type scale allowing participants to indicate whether they Very Strongly Agree (VSA), Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD), or Very Strongly Disagree (VSD) to each item. These eighteen 6-point Likert-type scale items were combined to attain a median perceived effectiveness score of using the blog for the learning of Euclidean Geometry for each participant. Each item had a possible range of 1 to 6; where 1 indicated Very Strongly Disagree (VSD) and 6 indicated Very Strongly Agree (VSA). All items in this section were worded positively; therefore larger numbers correspond to a higher perceived effectiveness of the blog for the learning of Euclidean Geometry. The median score on the 18-question perceived effectiveness survey was determined for each participant.

An overview of participants' scores for attitude toward and perceived effectiveness of the blogging activity showed an overall measure of the median attitude and median perceived effectiveness scores. Descriptive statistics of the median attitude scores yielded a mean, median, and mode of 4.18, 4.0, and 4.0, respectively, with a standard deviation of 0.95. This indicates that the typical response of participants corresponds to slightly more than agreement that they held a positive attitude toward the blogging activity in the College Euclidean Geometry course. Similarly, 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.

Results

The first research question was: *Is there a relationship between the cumulative quiz scores attained by pre-service mathematics teachers enrolled in a college Euclidean Geometry class and their attitudes toward the blogging activity in a college Euclidean Geometry class?* The data for this research question were analyzed by calculating a non-parametric Spearman correlation r on cumulative quiz scores and median attitude scores.

The Spearman correlation test result indicated a non-significant correlation ($N = 28$, $r_s = -0.145$, $p > .05$) that failed to reject the null hypothesis that there is no relationship between the cumulative quiz scores attained by pre-service mathematics teachers enrolled in a college Euclidean Geometry class and their attitudes toward the blogging activity. This means that the study did not find a significant correlation between attitudes toward the blog and total quiz score measured by the eight in-class quizzes.

The second research question was: *Is there a relationship between the cumulative quiz scores attained by pre-service mathematics teachers enrolled in a college Euclidean Geometry class and their perceptions of the effectiveness of the blogging activity for the learning of Euclidean Geometry?* The data for this research question were analyzed by calculating a non-parametric Spearman correlation r on cumulative quiz scores and median perceived effectiveness scores.

The Spearman correlation test result indicated a non-significant correlation ($N = 28$, $r_s = -0.232$, $p > .05$) that failed to reject the null hypothesis that there is no relationship between the cumulative quiz scores attained by pre-service mathematics teachers enrolled in a college Euclidean Geometry class and their perceptions of the effectiveness of the blog for the learning of Euclidean Geometry. This means that the study did not find a significant correlation between perceived effectiveness of the blog and total quiz score measured by the eight in-class quizzes.

Discussion and Implications

Analysis of the first research question: *Is there a relationship between the cumulative quiz scores attained by pre-service mathematics teachers enrolled in a college Euclidean Geometry class and their attitudes toward the blogging activity in a college Euclidean Geometry class?*, did not indicate a significant correlation ($N = 28$, $r_s = -0.145$, $p > .05$) between the participants' cumulative quiz scores and their median attitude scores toward the blogging activity. Similarly, analysis of the second research question: *Is there a relationship between the cumulative quiz scores attained by pre-service mathematics teachers enrolled in a college Euclidean Geometry class and their perceptions of the effectiveness of the blogging activity for the learning of Euclidean Geometry?*, did not indicate a significant correlation ($N = 28$, $r_s =$

–0.232, $p > .05$) between the participants cumulative quiz scores and their median perceived effectiveness scores toward the blogging activity. These finding coincide with Cash's (2010) doctoral dissertation research that found that Web 2.0 usage level did not have a significant relationship with high school students' letter grade (performance) in mathematics, science, and social studies.

Although in many instances, non-significant results aren't particularly useful with regard to informing practice, in this study, combining the non-significant results with the descriptive statistics is quite revealing. The descriptive statistics gathered in this study indicate that participants considered the blogging activity to be enjoyable and perceived it to be effective with regard to the teaching and learning of Geometry. Combining these strong descriptive findings with the non-significant results to the two research questions suggest that all participants, regardless of their relative performance on the quizzes, enjoyed and perceived benefits from participating in the blogging activity. Thus, we can conclude that relative strength in mathematical problem-solving, reasoning, and understanding skills should not be considered as a determining factor with regard to the benefits of using a blogging activity as a supportive tool for teaching and learning in a Euclidean Geometry course as well as other typical mathematics courses.

One implication of these results might be that mathematical content knowledge and problem-solving skills are not determining factors of whether or not a blogging activity should be included in a particular course. The results also suggest that teachers should implement blogging activities in their low level courses as well as their upper level courses. Unfortunately, we have probably all heard stories of upper level courses being provided with interesting activities, while lower level courses are often relegated to completing boring worksheets under the guise that these students couldn't handle the more interesting activities. This study directly refutes this idea and provides a strong justification for implementing blogging activities with courses of all levels.

Another implication of these results might be that, since undergraduate college students and pre-service mathematics teachers responded positively to this activity and perceived it to be effective, there is a good chance that middle school and high school students and/or in-service mathematics teachers might, also, find it positive and effective. Thus, middle or high school teachers should consider implementing activities similar to those used in this study in their own classrooms. Further teacher educators could provide instruction to pre-service teachers regarding the implementation of blogging activities and encourage these pre-service teachers to use these strategies in the future. Additionally, curriculum developers and policy makers could 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 empirical study has revealed some important and notable results regarding the use of blogs in the teaching and learning of Euclidean Geometry and other mathematics courses. As most of the participants in this study were pre-service mathematics teachers, their perceptions were related to both teaching and learning perspectives. Quantitative analysis of the data collected in this study indicate that these pre-service teachers enjoyed participating in the blogging activity and perceived that it was effective for the teaching and learning of Euclidean Geometry.

While the study did not find a significant correlation between the participants' achievement in the college Euclidean Geometry course and either their attitude toward or the perceived effectiveness of the blogging activity, this non-result in and of itself can be considered noteworthy. In particular, teachers should take this as a sign that blogging activities like the one implemented in this course can be enjoyed by and perceived effective by mathematics students at all levels of ability. This means that mathematics teachers who want to incorporate a blogging activity in their courses should not be concerned about whether the participants have a strong or weak background in mathematics. Through active collaboration and increased engagement both strong and weak students seem to enjoy and potentially benefit from the use of a blogging activity as a supportive teaching and learning tool.

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Appendix A: Survey Instrument

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? _____

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 V*SD* = 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

IV. 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					
24.	The blog provided me with an interactive tool for online learning	VSA	SA	A	D	SD	VSD
25.	The blogging activity encouraged me to share my ideas with other students in the course	VSA	SA	A	D	SD	VSD
26.	The blogging activity helped me understand difficult problems in easier ways	VSA	SA	A	D	SD	VSD
27.	The online discussion on the blog was more effective for learning Euclidean Geometry than in class discussion	VSA	SA	A	D	SD	VSD
28.	The blogging activity helped me get better scores on the quizzes	VSA	SA	A	D	SD	VSD
29.	My contributions to the blog increased the learning experience of other students in the course	VSA	SA	A	D	SD	VSD
30.	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
31.	The blogging activity helped me figure out how a specific problem could be solved in different ways	VSA	SA	A	D	SD	VSD
32.	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
33.	The blogging activity encouraged me to try other Web 2.0 technologies for teaching and learning Euclidean Geometry	VSA	SA	A	D	SD	VSD
34.	The contributions of my classmates to the blog helped me learn something new about Euclidean Geometry	VSA	SA	A	D	SD	VSD
35.	The blogging activity helped me better understand some concepts of Euclidean Geometry	VSA	SA	A	D	SD	VSD
36.	My contributions to the blog helped other students in the class learn something new about Euclidean Geometry	VSA	SA	A	D	SD	VSD
37.	The blogging activity helped me better utilize my leisure time for learning purposes	VSA	SA	A	D	SD	VSD

38.	The blogging activity encouraged me to collaborate with other students in the class	VSA	SA	A	D	SD	VSD
39.	The blogging activity provided me with some lifelong understanding of Euclidean Geometry	VSA	SA	A	D	SD	VSD
40.	The blogging activity created a collaborative learning environment in the Euclidean Geometry course	VSA	SA	A	D	SD	VSD
41.	The blogging activity was more effective for learning Euclidean Geometry than writing reflection papers on class readings	VSA	SA	A	D	SD	VSD

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