4. Results

4.1 Overview

This study looked at five key research questions:

1. What are grade nine students' attitudes toward using blogging in mathematics class?
2. What is the impact of blogging on grade nine students' confidence in mathematics?
3. What is the impact of blogging on grade nine students' communication of mathematical thinking?
4. What is the impact of blogging on grade nine students' mathematics knowledge?
5. What is the impact of ability level (applied vs. academic) on the use of blogging in the mathematics classroom?

The results for each of these questions will be discussed in turn.

4.2 Attitudes Toward Using Blogging

4.2.1 Students in the Applied Classroom

4.2.1.1 Likert Questions

Table 5 displays a summary of students overall attitudes toward blogging in the applied mathematics class based on the post-survey (Appendix G). Over 50% of the students agreed or strongly agreed that they were confident sharing their ideas on the blog. Approximately 60% of students agreed or strongly agreed that they enjoyed blogging in mathematics class and that the blogging site was easy to access and navigate. Students were relatively neutral about whether they found the blogging site useful with a mean score of 3.1 on the 5-point Likert scale and 30% agreeing or strongly agreeing that blogging

was a useful learning resource. Only 5% of the students agreed or strongly agreed that they used the blogging site on their own time.

Table 5 – Student Attitudes Toward Blogging Results in the Applied Classroom (*n*=15)

Items	Mean (*SD*)	Disagree/ Strongly Disagree	Neutral	Agree/ Strongly Agree
I enjoyed using the blogging site in mathematics class.	3.9 (0.7)	5%	24%	57%
The blogging site was easy to access.	3.8 (0.7)	5%	24%	62%
The blogging site was easy to navigate.	3.7 (0.9)	10%	24%	57%
I was confident sharing my ideas on the blogging site.	3.7 (0.7)	10%	29%	52%
I found the blogging site a useful learning resource.	3.1 (1.0)	33%	29%	29%
I used the blogging site regularly on my own time.	2.1 (1.0)	57%	24%	5%

4.2.1.2 Open-Ended Questions

Based on the open-ended qualitative responses, the general attitude toward blogging in the classroom was positive. Students (*n*=9 out of 15) commented that they liked collaborating with their peers and teacher. One student wrote, "I like how we could share our own ideas with you [teacher] and my group." Another student added, "I like the blogging in mathematics because it helps me interact with my classmates more." Several students (*n*=3) also liked how the blogging was different from other class work. One student noted that, "It was fun because I didn't have to sit in a desk the whole class. Instead I got to use a computer which is much better." Another student remarked, "I like how it's a different way of learning." One student (*n*=1) noted that the site should have been used

more commenting, "The thing that I dislike was that I didn't get enough time to blog." Only three students reported technology difficulties, primarily with navigation (e.g. "It was not so easy to navigate.").

4.2.2 Students in the Academic Classroom

4.2.2.1 Likert Questions

Table 6 displays overall attitudes toward blogging in the academic classroom at the end of the study based on the survey responses (Appendix G). Approximately 60% of students in the academic classroom agreed or strongly agreed that the blogging site was easy to access and easy to navigate. They also felt confident sharing their ideas on the blogging site, and enjoyed using the blogging site with approximately 60% of students indicating agree or strongly agree. One third of the students agreed or strongly agreed that the blogging site was a useful resource. Only 7% of students used the blogging site regularly on their own time.

Table 6 – Student Attitudes Toward Blogging Results in the Academic Classroom (*n*=22)

Items	Mean (*SD*)	Disagree/ Strongly Disagree	Neutral	Agree/ Strongly Agree
The blogging site was easy to access.	3.8 (0.9)	4%	33%	59%
The blogging site was easy to navigate.	3.8 (1.0)	11%	22%	63%
I was confident sharing my ideas on the blogging site.	3.7 (1.1)	11%	22%	63%
I enjoyed using the blogging site in mathematics class.	3.50 (1.3)	19%	33%	59%
I found the blogging site a useful learning resource.	3.2 (1.2)	22%	41%	33%
I used the blogging site regularly on my own time.	2.1 (1.1)	70%	19%	7%

4.2.2.2 Open-Ended Questions

The open-ended qualitative responses indicated that students in the academic classroom had a positive attitude toward blogging in mathematics class. Students (*n*=13 out of 22) commented that they enjoyed collaborating with their peers and the teacher. One student wrote, "I really enjoyed the fact that I could see through my own eyes how my fellow classmates think." Another student added, "I liked seeing other people's ideas to compare what they thought was right to my ideas."

A number of students (*n*=7) also liked how blogging was different from other class work. For example, one student wrote, "I like going on the computer instead of doing textbook work." Six students reported that blogging took too long, often due to issues with technology or the blogging site (e.g., "It's just the computer is really slow." and "My internet did not work all the time.").

Through collaboration two students felt they could receive the help they needed to solve a question. One student noted that, "If we were wrong then we could look at our peers answers, and find our mistakes." Although students enjoyed working with others on the blog, two students noted that it was difficult to show their mathematical work and thinking on the blog (e.g., "It was difficult to show my work." and "It was harder cause you had to do it in your head.").

4.3 Impact of Blogging on Mathematical Confidence

4.3.1 Students in the Applied Classroom

4.3.1.1 Likert-Questions

Table 7 displays students' confidence in the applied mathematics classroom prior to beginning the study based on the Confidence in Mathematics Survey (Appendix F). Over 60% of students agreed or strongly agreed that they always try their best in mathematics class. About half of students agreed or strongly agreed that they spoke up and asked for assistance in mathematics class. Only one third of students agreed or strongly agreed that they were confident in their mathematics skills or good at mathematics. Only 29% of students agreed or strongly agreed that they liked mathematics. Finally, about one quarter of the students agreed or strongly agreed they spoke up and share their ideas in mathematics class. Note that the sample size was quite small (n=12).

Table 7 – Students Confidence in Mathematics Pre-Survey Results in the Applied Classroom (n=12)

Items	Pre-Mean (*SD*)	Disagree/ Strongly Disagree	Neutral	Agree/ Strongly Agree
I always try my best in mathematics class.	4.4 (0.7)	5%	24%	62%
I speak up and get assistance in mathematics class.	4.1 (0.8)	10%	29%	52%
I am confident in my mathematic skills.	3.6 (0.7)	5%	52%	33%
I am good at mathematics.	3.5 (0.5)	10%	48%	38%
I like mathematics.	3.3 (1.0)	24%	43%	29%
I speak up and share my ideas in mathematics class.	3.1 (0.9)	33%	38%	24%

4.3.1.2 Open-Ended Questions

In the open-ended questions, four themes emerged: units being studied, ability to seek help, past mathematics history, and perceived subject difficulty. Ten (out of 12) students commented that their confidence in mathematics was dependent upon the unit being studied. One student wrote, "My confidence varies depending on the unit." Another student added, "Depending on what I'm learning. In some cases I find I will feel very confident because I understand it. Meanwhile in other cases I won't feel as confidence because I'm not as familiar." Three students noted that they were confident in mathematics if they were able to seek help when needed (e.g., "I am confident in math because it is easy for me and I can get help by the teacher.").

A number of students (n=10) felt that their confidence in mathematics was based on the mark they receive from their teacher. If they student received a good grade, they were confident about their abilities and had a more positive outlook on learning mathematics. One student wrote, "I am pretty confident that I can be successful in math because I am able to get an 87% in math. And if I continue to do my best, I think I can get higher than 90%." Another student remarked, "Pretty confident because I'm good at math." A third student added, "[I am] not very confident because I have never been good at stuff." Most students (n=9) were not confident in mathematics because they perceived the subject as being too difficult. One student wrote, "I dislike math because it has too much numbers and it is very complicated." Another wrote, "It stresses me out."

4.3.1.3 Pre-Post Mathematical Confidence Scores

There was no-significant difference between pre-mathematics confidence scores (*M*=22.3, *SD*=2.9) and post mathematics confidence scores (*M*=22.1, *SD*=3.8, *t*=0.22, *ns*).

4.3.2 Students in the Academic Classroom

4.3.2.1 Likert Questions

Table 8 displays confidence in mathematics in the academic classroom prior to beginning the study. Over 80% of students agree or strongly agree that they always try their best in mathematic class. Approximately two thirds of students agreed or strongly agreed that they were confident in their mathematic skills or are good at mathematics. Over 60% percent of students agreed or strongly agreed that they liked mathematics. While 52% of students agreed or strongly agreed that they would speak up and get assistance in mathematics class, only 37% of students agreed or strongly agreed that they would speak up and share their ideas in mathematics class.

Table 8 – Students Confidence in Mathematics Pre-Survey Results in the Academic Classroom (*n*=27)

Items	Pre- Mean (*SD*)	Disagree/ Strongly Disagree	Neutral	Agree/ Strongly Agree
I always try my best in mathematics class.	4.1 (0.8)	4%	15%	81%
I am confident in my mathematic skills.	3.9 (0.8)	4%	30%	67%
I am good at mathematics.	3.8 (0.8)	7%	26%	67%
I like mathematics.	3.7 (0.9)	11%	26%	63%
I speak up and get assistance in mathematics class.	3.4 (1.3)	22%	26%	52%
I speak up and share my ideas in mathematics class.	3.2 (1.2)	22%	37%	37%

4.3.2.2 Open-Ended Questions

In the open-response section of the survey, five themes emerged: units being studied, relevance, ability to seek help, past mathematics history and perceived subject difficulty. Eighteen students felt that their confidence was based on their success in the mathematics classroom. If they received good grades, they were confident in their abilities. One student wrote, "Pretty confident because I have a pretty good mark and I usually understand how to do math problems." Another student wrote, "I like math because I'm pretty good at it." Some students (*n*=6) who are unsuccessful in mathematics are not confident in their abilities and dislike mathematics. One student wrote, "I was very confident in the beginning of this year but my confidence went slightly down because I was getting some bad marks."

Several students (*n*=17) seemed to be confident if the mathematics concepts were relevant, important and useful to them. A student wrote, "I'm really confident because I use it a lot of the time in real life." Another student added, "I like it because it can help me get a career in the future."

Sixteen students commented that their confidence in mathematics was dependent upon the focus of the mathematical unit being covered. One student wrote, "From a scale of 1-10, I am a 7, but sometimes this goes up or down depending on my strengths and weaknesses. Ex. Algebra is a weakness and measurement is a strength." Another student noted, "I am good in certain units, but not others."

Some students (*n*=9 out of 27) were not confident in mathematics because they found the subject too difficult. One student wrote, "Because some of the questions are

difficult and sometimes when I try to solve it I get confused." Another wrote, "I dislike math because it requires a lot of thinking. There are too many rules and formula's too remember."

Some students (n=5) are confident in their mathematical abilities if they are able to receive help. A student responded, "I am very confident because I know I can understand math and if I don't I know I have plenty of ways to get help."

4.3.2.3 Pre-Post Mathematics Confidence Scores

A paired-t-test revealed that pre mathematics confidence scores (M=22.3, SD=4.2), were significantly higher than post mathematics confidence scores (M=21.0, SD=4.5, t=2.5, p<.05). According to Cohen (1988, 1992), the difference was somewhat meaningful (d=0.29). Therefore, students' overall confidence in mathematics decreased from the beginning to end of the study in the academic classroom.

4.4 Impact of Blogging on Mathematical Knowledge

4.4.1 Students in the Applied Classroom

Table 9 shows the students pre and post-mean test scores on each of the three mathematics units used in the applied classroom. Post-test scores increased significantly for all three units (p<.005). According to Cohen (1988, 1992), these changes were considered large and meaningful.

Table 9 – Students Mean Scores on Knowledge Tests in the Applied Classroom

Unit Topic	Pre-Mean[1] (*SD*)	Post-Mean[1] (*SD*)	N	t value	Cohen's d
Rates and Ratios	0.3 (0.6)	2.4 (1.2)	21	7.6*	2.2
Patterning	0.7 (0.8)	3.2 (0.8)	20	11.4*	3.1
Linear Relationships	0.3 (1.0)	2.3 (1.5)	18	5.7*	1.5

[1] Based on marking scale (Level 0 to Level 4) – see Appendix L.

* $p < .005$

4.4.2 Students in the Academic Classroom

Table 10 shows the mean scores on all the knowledge tests in the academic classroom. The scores between the pre- and post- knowledge tests for the slope and measurement-optimization units increased and were statistically significant. According to Cohen (1988, 1992) these changes were very large and meaningful. There was no significant difference between pre- and post-test score for the unit on linear relationships. It is worthwhile noting that the mean pre-test score for linear relationships unit appears to be higher than the means of the other two units.

Table 10 – Students Mean Scores on the Knowledge Tests in the Academic Classroom

Unit Topic	Pre-Mean[1] (SD)	Post-Mean[1] (SD)	N	*t* value	Cohen's *d*
Slope	0.6 (1.0)	3.0 (1.1)	25	10.1*	2.3
Linear Relationships	1.3 (1.2)	1.6 (1.4)	25	1.5	0.3
Measurement-Optimization	0.7 (1.0)	2.5 (1.3)	27	9.4*	1.6

[1] Five level marking scale (Level 0 to Level 4) – see Appendix L.

*$p < .005$

4.5 Impact of Blogging on Mathematics Communication

4.5.1 Students in the Applied Classroom

4.5.1.1 Frequency of Blogging

Table 11 shows the number of blog posts made by students in the applied classroom ranged from 0 to 8 posts. The majority of students (n=15) made 4 or more posts over eight weeks and three mathematics units. The mean number of posts for students in the applied classroom was 4.6 (SD= 2.4). This mean indicates that, on average, students in the applied classroom did not respond to every blogging question, as there were six in total.

Table 11 – Frequency of Student Blogging Posts in the Applied Classroom

# of Blog Posts	# of Students
0	1
1	1
2	4
3	0
4	3
5	4
6	4
7	1
8	3

Table 12 shows the number of blog posts made by students during each unit in the applied classroom, as well as the number of teacher prompts and responses to teacher prompts in each unit. In total, students in the applied classroom made 96 blog posts during the study. Forty-seven posts were made during the patterning unit, 31 posts were made during the rates and ratios unit, and 18 posts were made during the linear relationships unit. Students in the applied classroom did not seem to have a distinct preference for the

type of question they responded to on the blog as the number of posts for closed and open-ended questions were equal.

A total of 52 teachers prompts were made during the study. Twenty-seven teacher prompts were made during the patterning unit, 25 teacher prompts were made during the rates and ratios unit, and no teacher prompts were made during the linear relationships unit. As the number of teacher prompts increased, the total number of posts by students also increased. It is worth noting that students in the applied classroom only responded to teacher prompts 21% of the time (11 student responses to 52 prompts).

Table 12 – Frequency of Blogging Posts by Unit and Question Type in the Applied Classroom

Unit	Total # of Student Blog Posts		# of Teacher Prompts		# of Student Responses to Teacher Prompts	
Question Type	Closed	Open	Closed	Open	Closed	Open
Rates and Ratios	13	18	8	17	1	7
Patterning	25	22	13	14	2	1
Linear Relation	10	8	0	0	0	0
Totals	48	48	21	31	3	8

3.5.1.2 Quality of Blogging Posts

Table 13 displays the quality of mathematical communication by students in the applied classroom, based on the scoring scheme in Appendix L. Students were at Level 1 or below across all three units, for both closed and open-ended questions. Recall that a Level 1 quality of mathematical communication indicated that a student understood the question, and gave an answer, with no explanation or justification. The students in the applied

classroom had a higher mean mathematical communication score on the closed questions for the patterning and linear relationships units, and a lower mean score for the rates and ratios unit.

Table 13 –Means Scores of Blogging Posts by Unit and Question Type in the Applied Classroom

Unit	Closed Question Mean (*SD*)	Open-Ended Question Mean (*SD*)
Rates and Ratios	0.5 (0.8)	1.0 (1.0)
Patterning	1.5 (0.8)	1.0 (0.5)
Linear Relationships	1.1 (1.5)	0.6 (0.7)

Table 14 indicates the frequency of mathematical communication scores assigned to student blog posts in the applied classroom across each of the mathematical units. The quality of blog entry scores appeared to vary as a function of the units. For the rates and ratios unit and linear relationships unit the majority of students scored a level 0 or 1. However, in the patterning unit, the majority of students scored level 1 or 2.

An analysis of the blogging entries revealed almost no peer-to-peer interaction among students in the applied classroom.

Table 14 – Frequency of Students' Math Communication Scores by Unit in the Applied Classroom (*n*=21)

Unit	% Level 0		% Level 1		% Level 2		% Level 3		% Level 4	
	Closed	Open	Closed	Open	Closed	Open	Closed	Open	Closed	Open
Rates &Ratios	67%	38%	19%	38%	14%	14%	0%	10%	0%	0%
Patterning	14%	14%	29%	71%	52%	14%	5%	0%	0%	0%
Lin Relations	52%	57%	24%	29%	5%	14%	0%	0%	19%	0%

4.5.2 Students in the Academic Classroom

4.5.2.1 Frequency of Blogging

Table 15 shows the number of blog posts made by students in the academic classroom ranged from 0 to 10 posts. The majority of students (*n*=16) made 5 or more posts over eight weeks and three mathematics units. The mean number of posts per student was 5.1 (*SD*= 2.2). This mean indicates, that on average, students in the academic classroom did not respond to every blogging question, as there were six in total.

Table 15 – Frequency of Student Blogging Posts in the Academic Classroom

# of Blog Posts	# of Students
0	1
1	0
2	2
3	4
4	3
5	4
6	7
7	3
8	1
9	1
10	1

Table 16 shows the number of blog posts made by students in the academic classroom during each unit, as well as the number of teacher prompts and responses to teacher prompts in each unit. In total, students made 138 blog posts during the study. Fifty-three posts were made during the slope unit, 45 posts were made during the linear relationships unit, and 40 posts were made during the measurement-optimization unit. Students made slightly more blog posts on the closed question in each unit. A total of 59 teachers prompts were made during the study. Thirty teacher prompts were made during the linear relationships unit, 18 teacher prompts were made during the measurement-optimization unit, and 11 teacher prompts were made during the slope unit. Overall, students in the academic classroom responded to teacher prompts 66% of the time (39 student responses to 59 prompts). Students responded to a high number of prompts in the slope and measurement-optimization units. However, the high number of teacher prompts in the linear relationships unit resulted in almost no responses.

Table 16 – Frequency of Blogging Posts by Unit and Question Type in the Academic Classroom

Unit	Total # of Student Blog Posts		# of Teacher Prompts		# of Student Responses to Teacher Prompts	
Question Type	Closed	Open	Closed	Open	Closed	Open
Slope	27	26	9	2	7	4
Linear Relationships	25	20	16	14	3	1
Measurement-Optimization	20	20	7	11	8	7
Totals	72	66	32	27	18	21

4.5.2.2 Quality of the Blogging Posts

Table 17 indicates that the quality of students' average mathematical communication in the academic classroom was at Level 1 or below across all three units on both closed and open-ended questions. The students in the academic classroom had slighter higher scores for mathematical communication posts on the closed questions for all three units compared to open-ended questions.

Table 17 –Means Scores of Blogging Posts by Unit and Question Type in the Academic Classroom

Unit	Closed Question Mean (*SD*)	Open-Ended Question Mean (*SD*)
Slope	1.4 (1.0)	1.1 (1.1)
Linear Relationships	1.6 (1.3)	1.4 (1.3)
Measurement- Optimization	1.0 (1.0)	0.9 (0.9)

Table 18 indicates the frequency of mathematical communication scores assigned to student blog posts in the academic classroom. The majority of students scored a level 1 or 2 in the slope unit. In the linear relationships unit the majority of students scored a level 0 or a level 2, with fewer students scoring a level 1. In the measurement-optimization unit most students scored a level 0 or 1.

Table 18 – Frequency of Math Communication Scores by Unit in the Academic Classroom (*n*=27)

Unit	% Level 0		% Level 1		% Level 2		% Level 3		% Level 4	
Type of Question	Closed	Open	Closed	Open	Closed	Open	Closed	Open	Closed	Open
Slope	19%	33%	41%	37%	26%	19%	15%	7%	0%	4%
Linear Relationships	30%	37%	15%	11%	33%	30%	15%	15%	7%	7%
Measurement Optimization	33%	41%	41%	37%	15%	19%	11%	4%	0%	0%

Three of the six blogging groups in the academic classroom had strong peer-to-peer interactions. They were able to help each other progress through their work on different questions Table 19 shows sample peer-to-peer conversation from three blogging questions. Example 1 shows how students were able to help each other get started on the question. Example 2 and 3 show how students were able to question each other's thinking and use other students work and feedback to progress their work and thinking.

Table 19 – Blogging Group Conversations in the Academic Classroom

Example 1	
Student 1	How do you get that? I don't know where to start?
Student 2	Start by extending the frustum to make a cone. The find the SA.
Student 1	How do you extend it?
Student 3	To extend the frustum you have to double the height.
Student 4	I got 3506.92 for the frustum. I got 265.76 for the cone.
Example 2	
Student 1	The slope of the ladder should be 7.9 because it's 1.6 more than 6.3 and 1.6 less than 9.5. If you add 6.3 and 9.5 together and divided by 2, should get 7.6, which is evenly spaced out between 6.3 and 9.5.
Student 2	Oh I get it, you do 6.3-9.5 and get 3.2, then you divide by two and get 1.6.
Student 1	Yes basically.
Student 2	That's wrong because we learned how to calculate slope and that's not it.
Student 3	I agree.
Student 4	I got -3.2.
Student 5	I got the same answer as Student 1.
Student 1	So how do we do this question?

Example 3	
Student 1	m=y2-y1/x2-x1 m=2350-1825/28000-17500 m=0.05 Now I know that 0.05 is the slope since I used the slope formula. y=mx+b 2350=0.05x28000+b 2350=1400+b b=950 To find the b value I will plug in the x and y values to find the value of b. y=0.05x+950 y=0.05(47000)+950 y=2350+950 y=3300 Now I plug in 4700 to find total pay. Therefore Hannah's total pay is $3300 when her sales are $470.
Student 2	Isn't the equation y=mx+b to find the slope.
Student 3	y=mxplusb y=2350=0.05x28000+b 2650=1400+b b=940
Teacher	Excellent job. Can you explain what you did in words? How did you find m and b?
Student 2	You can use the equation y2-y1/x2-x1 like Student 1 did then once you found that you can solve it in the equation for y=mx+b.
Student 4	I think we have to start off y=mx+b…I think we start off as y2-y1/x2-x1. So 1825-1700/17500-15000 =125/16000 =0.0078125 -0.007 And now I don't know where to go from here.

4.6 Impact of Ability Level and Using Blogging

4.6.1 Attitudes Toward Blogging

Table 20 indicates that students in the academic and applied classrooms had similar attitudes toward blogging in mathematics class. Over 50% of students in both the academic and applied classrooms agreed or strongly agreed that they enjoyed using the blogging site in mathematics class, that the blogging site was easy to access and navigate, and that they were confident sharing their ideas on the blogging site. The students in the applied classroom enjoyed using the blogging site slightly more than students in the academic classroom with a mean of 3.9 compared to 3.5. Only about one-third of both students in both classrooms found the blogging site a useful learning resource. Students in

both classrooms were unwilling to use the blogging site on their own time, with means close to 2 (disagree).

Table 20- Comparison of Attitudes Toward Blogging between Applied (*n*=15) and Academic (*n*=22) Classrooms

	Mean (*SD*)		Agree/ Strongly Agree	
Items	Applied	Academic	Applied	Academic
I enjoyed using the blogging site in mathematics class.	3.9 (0.7)	3.5 (1.3)	57%	59%
The blogging site was easy to access.	3.8 (0.7)	3.8 (0.9)	62%	59%
The blogging site was easy to navigate.	3.7 (0.9)	3.8 (1.0)	57%	63%
I was confident sharing my ideas on the blogging site.	3.7 (0.7)	3.7 (1.1)	52%	63%
I found the blogging site a useful learning resource.	3.1 (1.0)	3.2 (1.2)	29%	33%
I used the blogging site regularly on my own time.	2.1 (1.0)	2.1 (1.1)	5%	7%

Qualitative data indicated that students in both the academic and applied classrooms enjoyed using the blogging site for its collaborative nature, and that it was different from other class work. Students in the academic classroom also felt they could receive help through the blog, making it appealing. Both groups noted that technology was sometimes an issue and prevented the blog from always being used effectively.

4.6.2 Confidence in Mathematics

Table 21 compares students' confidence in mathematics between the applied and academic classroom on the pre-survey. Students in both classrooms agree that they always try their best in mathematics, with a mean of 4 (agree). Students in the applied classroom

tend to speak up in the mathematics classroom more often to seek assistance. Students in the academic classroom seemed to be slightly more confident with respect to their mathematics skills. In addition, they appeared to like mathematics more than students in applied classroom. Students in the academic classroom also seem to be more confident sharing their ideas in mathematics class with a slightly higher mean than students in the applied classroom. It is noteworthy to mention the difference in sample size between the applied (n=12) and academic classrooms (n=27).

Table 21- Comparison of Confidence in Mathematics between Applied (*n*=12) and Academic (*n*=27) Classrooms

	Mean (*SD*)		Agree/ Strongly Agree	
Items	Applied	Academic	Applied	Academic
I always try my best in mathematics class.	4.4 (0.7)	4.1 (0.8)	62%	81%
I speak up and get assistance in mathematics class.	4.1 (0.8)	3.4 (1.3)	52%	52%
I am confident in my mathematic skills.	3.6 (0.7)	3.9 (0.8)	33%	67%
I am good at mathematics.	3.5 (0.5)	3.8 (0.8)	38%	67%
I like mathematics.	3.3 (1.0)	3.7 (0.9)	29%	63%
I speak up and share my ideas in mathematics class.	3.1 (0.9)	3.4 (1.3)	24%	52%

The qualitative data indicated that student mathematical confidence in both the academic and applied classrooms was based on the unit they were studying, their ability to seek help during the unit, their mathematical past (e.g. how they did in previous years or on previous tests), and how difficult they perceived the subject of mathematics. Students in

the academic classroom also felt their confidence was affected by the personal relevance of the content that was being studied, with more relevant content leading to more confidence.

Students' mathematical confidence in the academic classroom decreased significantly from the pre- to post- survey, however, there was no significant difference between per- and post- confidence survey in the applied classroom.

4.6.3 Mathematical Knowledge

Table 22 shows that the pre- to post- knowledge tests scores were significantly different for each unit being studied in both the academic and applied classrooms. The mathematics knowledge scores were significantly different for all three units in the applied classroom, and those differences were considered meaningful based on Cohen's *d* (Table 9). In the academic classroom students increased mathematics knowledge scores were significant for two of the three units, and those differences were meaningful based on Cohen's *d* (Table 10).

Table 22- Comparison of Knowledge Test Scores between Students in the Applied and Academic Classrooms

	Applied		Academic	
	Pre- Mean (*SD*)	Post- Mean (*SD*)	Pre- Mean (*SD*)	Post- Mean (*SD*)
Unit 1	0.3 (0.6)	2.4 (1.2)	0.6 (1.0)	3.0 (1.1)
Unit 2	0.7 (0.8)	3.2 (0.8)	1.3 (1.2)	1.6 (1.4)
Unit 3	0.3 (1.0)	2.3 (1.5)	0.7 (1.0)	2.5 (1.3)

4.6.4 Mathematical Communication

On average, students in the academic classroom posted 5.1 times on the blog for a total of 138 posts and students in the applied classroom posted 4.6 times on the blog for a total of 96 blog posts. Both classrooms had six blogging questions, therefore at least half of the students in both groups did not post once for every blog question. The teacher prompted both groups about the same number of times for their respective units. Students in the applied classroom were prompted 52 times and students in the academic classroom were prompted 59 times. Students in the academic classroom responded more often to teacher prompts (39 times) compared to students in the applied classroom (11 times).

Tables 20 indicated that the mathematical communication means for all blogging questions for students in both classrooms were Level 1 or below. Students in the academic classroom had a slightly higher mathematical communication mean on all three open-ended questions, and two of the three closed questions.

Table 23- Comparison of Mean Scores by Unit and Question Type between Applied and Academic Classrooms

	Applied		Academic	
	Closed Question Mean (*SD*)	Open-Ended Question Mean (*SD*)	Closed Question Mean (*SD*)	Open-Ended Question Mean (*SD*)
Unit 1	0.5 (0.8)	1.0 (1.0)	1.4 (1.0)	1.1 (1.1)
Unit 2	1.5 (0.8)	1.0 (0.5)	1.6 (1.3)	1.4 (1.3)
Unit 3	1.1 (1.5)	0.6 (0.7)	1.0 (1.0)	0.9 (0.9)

Qualitative data indicated that students in the academic classroom had more peer-to-peer interactions on the blog then students in the applied classroom and were more able to assist each other in reaching a reasonable solution to each question.