Mathematics Self Efficacy and Anxiety and Mathematics Performance of Elementary Education Students

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ABSTRACT

Behavior can be affected by the beliefs of the students about their capabilities. Students often made statements about their unpleasant experiences about mathematics or their inability to succeed in their mathematics subject. The purpose of this study was to investigate the mathematics self-efficacy and anxiety, and mathematics performance of the 354 elementary education students enrolled at the University of Northern Philippines during the first semester, S.Y. 2015-2016. The results show that students experience average self-efficacy and moderate anxiety. Mathematics self-efficacy among elementary education students by year level differ while mathematics anxiety does not. Furthermore, the number of mathematics class taken in high school and of mathematics teachers in college determines the level of mathematics self-efficacy. On the other hand, mathematical anxiety is affected by the number of mathematics subjects taken in high school. Lastly, mathematics self-efficacy and anxiety affect the mathematics performance of the elementary education students. It is recommended for students to identify and understand their mathematics self-efficacy and anxiety which affect their mathematics performance so they can alter their feelings of self-worth and apprehensions towards mathematics. Furthermore, administrators should assign different teachers to handle mathematics subjects to the elementary education students.

Keywords: Mathematics Self-efficacy, Mathematics Anxiety, Mathematics Performance

Introduction

Behavior can be affected by the beliefs of the students on their capabilities. Students often make statements about their unpleasant experiences about mathematics or their inability to succeed in their mathematics subject. They establish most of their beliefs on their capabilities or abilities on their experiences. For instance, when a student succeeds in his previous mathematics subject, he most likely believes that he can also pass succeeding mathematics subjects.

Mathematics self-efficacy may be defined as the judgment of students on their capabilities or potential to learn mathematics. Mathematics self-efficacy is in part students' reliance on their personal performance of mathematics and may be related to their experiences, beliefs, failures and successes. Self-efficacy can be acquired after learning from personal experiences or from the experiences of others which create an impact on the person emotionally, and which are influenced by the environment and the various sources of information. A student can have self-efficacy at different levels for different mathematics activities. Bandura (1997), as cited by May (2009), suggested that students with higher levels of self-efficacy tend to be more motivated to learn and more likely to persist when presented with challenging tasks.

May (2009), further stressed that poor mathematics self-efficacy in college students often decreases their motivation to learn and eventually can lead to low mathematics achievement. In a study of college freshmen enrolled in a developmental mathematics course, Higbee and Thomas (1999) found that mathematics self-efficacy, along with other affective factors such as test anxiety and perceived usefulness of mathematics, influenced students' mathematical performances. The results of their study suggests that instructors focus on teaching mathematical content. However, focusing on mathematical concept alone is insufficient for some students to learn mathematics. Mathematics instructors must also consider emotional or attitudinal factors that influence how students learn mathematics.

Mathematics anxiety is another factor that has an effect on the mathematics performance of the students. Anxiety consists of fear, worry, and uneasiness. Students may experience fear and anxiety when facing different situations. Great number of students is affected by their emotional response with respect to mathematics and this is what is called mathematics anxiety. The effect of mathematics anxiety varies on every student. Students who engage into a high level of mathematics anxiety can most likely develop negative emotions and attitudes along mathematics.

Students' readiness in mathematics is still a great concern in College. Many students who experienced mathematics anxiety and poor self-efficacy have little confidence in doing mathematics and tend to drop, get a failing grade or a low grade in their mathematics courses. As experienced, the researchers observed that some students had fear of and dislike for mathematics. Most of them perform poorly in their mathematics subjects and many have not mastered their previous mathematics subjects. This is unfortunate since the society becomes more dependent on mathematical literacy. Hence, the need to study students' mathematics self-efficacy and anxiety and some factors related to it,

which in turn, is correlated to mathematics performance. This study aims to investigate mathematics self-efficacy and anxiety and mathematics performance of the elementary education students during the First Semester, S.Y. 2015-2016.

This study investigates the mathematics self-efficacy and anxiety and the mathematics performance of the elementary education students of the College of Teacher Education, University of Northern Philippines during the S.Y. 2015-2016. Specifically, it sought answers to the following: (1) what were the mathematics experiences of the students during their high school and college years?; (2) what is the level of mathematics self-efficacy and anxiety of the students?; (3) what is the level of mathematics performance; (4) are there significant differences on the mathematics self-efficacy and anxiety of the students by year level; and (5) is there significant relationship between the students' previous mathematics experiences and the level of mathematics self-efficacy and anxiety; (6) are there significant relationships between mathematics self-efficacy and anxiety and their performance in mathematics?

On Mathematics Self-efficacy

Mathematics self-efficacy is defined as an individual's beliefs or perceptions with respect to his or her abilities in mathematics (Bandura, 1997). In other words, an individual's mathematics self-efficacy is his or her confidence about completing a variety of tasks, from understanding concepts to solving problems, in mathematics. Self-efficacy, in general, has been linked with motivation. It has been well established that students with higher levels of self-efficacy tend to be more motivated to learn than their peers and are more likely to persist when presented with challenges (Zeldin, Britner & Pajares, 2008). Although the development of self-efficacy is not fully understood, researchers have consistently confirmed Bandura's (1997) four main sources of self-efficacy: mastery experiences, vicarious experiences, social persuasion, and physiological states (Usher & Pajares, 2009). In a study on designing a scale to explore the sources of mathematics self-efficacy, Usher and Pajares (2009) found that "perceived mastery experience is a powerful source of students' mathematics self-efficacy. Students who feel they have mastered skills and succeeded at challenging assignments experience a boost in their efficacy beliefs" (p. 100).

According to Bandura's (1997) social cognitive theory, self-efficacy is specific to context and must be measured appropriately. For example, students might feel confident that they can correctly solve systems of linear equations but lack confidence in their abilities to prove a geometric theorem. In this situation, asking the students to rate their confidence in mathematics generally could result in misleading responses. Bandura also suggested that self-efficacy should be measured close to the time that the task would take place. This proximity helps students to make more accurate judgments about their abilities than otherwise. With these guidelines for measuring self-efficacy in mind, it is crucial to understand how researchers typically measure mathematics self-efficacy.

Many of the initial research studies conducted on college students' mathematics self-efficacy sought to explore how students' mathematics self-efficacy influenced their college major and career choices. Betz and Hackett (1983) developed the MSES, as discussed previously, specifically to determine how mathematics self-efficacy and gender influence students' choices of science-based college majors. Betz and Hackett found that an individual's mathematics self-efficacy plays a major role

in deciding college majors; students with higher levels of mathematics self-efficacy were significantly more likely to choose science-based college majors than students with lower levels of mathematics self-efficacy. Mathematics self-efficacy has also been shown to be a predictor for students' career choices, with higher levels of mathematics self-efficacy being related to more science based careers (Hackett & Betz, 1989).

Mathematics self-efficacy has also been associated with college students' mathematics achievement. In a study of college freshmen, Hall and Ponton (2002) set out to explore the differences between students enrolled in a developmental mathematics course and those enrolled in a calculus course. Not surprisingly, the developmental mathematics students had lower mathematics self-efficacy than the calculus students did. Hall and Ponton hypothesized that this finding supported Bandura's beliefs that mathematics achievement is the greatest source of self-efficacy. Developmental mathematics students are less likely to have previous successful mathematics achievement than calculus students and are therefore less likely to have higher levels of mathematics self-efficacy.

Gresham's (2009) study shows similar findings to Swars' et al. (2006) research on mathematics anxiety and beliefs of efficacy. Pre-service elementary teachers who were enrolled in a mathematics methods course completed the Mathematics Anxiety Rating Scale (Richardson & Suinn, 1972) and the Mathematics Teaching Efficacy Beliefs Instrument. A portion of the participants participated in individual interviews. The pre-service teachers who had lower mathematics anxiety had higher scores for mathematics teaching beliefs of efficacy, demonstrating a negative relationship between mathematics anxiety and efficacy beliefs.

Research also shows that pre-service teachers' knowledge in mathematic teaching methodology impacts pre-service teachers' efficacy beliefs. Ball (1990) explains mathematics instruction is driven by teachers' ability to understand and use mathematical knowledge to carry out the task of teaching which goes beyond the content knowledge that is needed to convey the mathematical algorithm. For example, not only do pre-service teachers need to know the procedures in solving the mathematical problems, they also must know the concepts or the reasons behind the procedures, and how to convey the mathematical content to others.

In a longitudinal study, Swars, Hart, Smith, Smith & Tolar (2007) discover instruction in mathematical pedagogy improves pre-service teachers' efficacy beliefs. The study investigates the mathematics beliefs of efficacy and mathematical instructional knowledge of elementary preservice teachers who took part in a developmental teacher preparation program which included two courses of mathematics teaching methodology. Results show participants' mathematical pedagogical and teaching efficacy beliefs were low at the beginning of the program. Pre-service teachers significantly increased their personal efficacy beliefs for teaching mathematics as they completed the two courses of mathematics teaching methodology.

On Mathematics Anxiety

A remarkable body of research on mathematics anxiety has been considered since the 1960s. There have been a variety of definitions of mathematics anxiety. Richardson and Suinn (1972) view it as feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide

variety of ordinary life and academic situations (as cited in Gierl & Bisanz, 1995, p.140). Mathematics anxiety has to do with a sense of discomfort while required to work on mathematical problems (Hadfield & Trujillo, 1999; Ma, 2003) and with fear and apprehension to specific math-related situations (D'Ailly & Bergering, 1992).

Mathematics anxiety can also affect students' motivation to learn in mathematics classes. It is related to students feeling tense or anxious when working with numbers or solving mathematical problems (Richardson & Suinn, 1972). Students who suffer from mathematics anxiety do not necessarily experience anxiety in other subjects. There are many negative consequences of mathematics anxiety. For example, students who experience higher levels of mathematics anxiety typically develop negative attitudes and emotions toward mathematics. By the time students take college mathematics courses, some students' attitudes toward the subject become relatively stable, while those with mathematics anxiety evade mathematics classes or careers requiring mathematics. Perhaps the most severe consequence of mathematics anxiety is a decreased level of achievement. In a study on college undergraduates' mathematical performance, Cates and Rhymer (2003) found that students with higher levels of mathematics anxiety had significantly lower computational fluency in all areas of mathematical computations. This lower level of fluency in turn decreases students' achievements in mathematics and likely contributes to negative attitudes toward mathematics.

Studies point out a host of factors associated with mathematics anxiety. These variables range from environmental factors such as family pressure for higher achievement, to intellectual factors as learning styles or to personality factors such as low self-esteem (Uusimaki & Nason, 2004; Woodard, 2004). In other words, mathematics anxiety is a multifaceted construct with affective and cognitive dimensions. Personality, self-concept, self-esteem, learning style, parental attitudes, high expectation of parents, negative attitudes toward mathematics, avoidance of math, teachers' attitudes, ineffective teaching styles, negative school experiences and low degree of achievement in mathematics are among the concepts and constructs related to mathematics anxiety.

Mathematics anxiety in elementary school students indicates that its onset coincides with early years of schooling. This could in part be due to social learning from parents and teachers with mathematics anxiety or negative perceptions of math. Parents or teachers might give children mixed messages (Williams, 1988; as cited in Thomas & Furner, 1997) about mathematics. They might emphasize how highly difficult mathematics is and at the same time tell them how mathematics skills are of essential importance for their future achievements. Vann (1993) observed that mathematics anxiety in mothers was significantly predictive of mathematics anxiety in children. This could be so for excessive expectations as well. As pointed out by Geçtan (1995) children of parents with excessive expectations whose love and acceptance is conditional to how well children live up to these expectations have high degree of anxiety. These circumstances might lead to self-consciousness about one's performance and to anxiety arising from not living up high standards of parents. Children's excessive self-critical attitude might cause anxiety disproportionate to their failure in living up to these expectations. In fact, studies do show that low self-esteem, confidence and efficacy are closely related to mathematics anxiety (Uusimaki & Nason, 2004; Woodard, 2004).

METHODOLOGY

This study utilized the descriptive correlational design. It described the mathematical experiences of the students, the level of mathematics self-efficacy and anxiety and the mathematics performance of the students. Correlation was used to determine relationship between the students' mathematical experiences and to mathematics self-efficacy and anxiety to mathematics performance.

This study was conducted to the 354 elementary education students of the College of Teacher Education during the first semester, SY 2015-2016. It covers the 131 second year, 102 third year and 121 – fourth year students.

The instruments used composed of the Mathematics Experience questionnaire, the Mathematics Self-Efficacy and Anxiety Questionnaire (MSEAQ). The students' mathematics performance includes their average grade in high school mathematics and grade in College Algebra.

The Mathematics Experience questionnaire gathers the data on students' high school and college experiences. High School mathematics experiences include the number of mathematics class taken and the number of mathematics teachers they have. On the other hand, college experiences include number of mathematics teachers who handled them and the number of mathematics subjects taken and to be taken to complete the course.

The Mathematics Self-Efficacy and Anxiety Questionnaire (MSEAQ) developed by May (2009) which has a very good internal consistency (Cronbach's coefficient alpha = 0.94) was used to determine the mathematics self-efficacy and anxiety of the students. It consists of 29 statements wherein 14 statements are on self-efficacy and 15 statements on anxiety.

RESULTS AND DISCUSSION

1. The mathematics experiences of the students during their high school and college years

Table 1
Mathematics Experiences of the Students during High School and College Years

Mathematics Experiences	Year Level						Total	%
	II	%	III	%	IV	%		
No. of HS Math Classes								
0 – 4	112	87.50	80	80	103	85.12	295	84.53
5 or more	16	12.50	20	20	18	14.88	54	15.47
Total	128	36.68	100	28.65	121	34.67	349	100
No. of HS Math Teacher								
1 – 4	119	90.84	88	88	111	91.74	318	90.34
5 or more	12	9.16	12	12	10	8.26	34	9.66
Total	131		100		121		352	100
No. of College Math Teachers								
1 – 4	128	100	92	96.84	89	74.17	309	90.09
5 or more	0	0	3	3.16	31	25.83	34	9.91
Total	128		95		120		343	100
No of Finished Math Subjects								
1 – 4	128	99.23	94	98.95	11	9.57	233	68.73
5 or more	1	0.77	1	1.05	104	90.43	106	31.27
Total	129		95		115		339	100
No of math subjects to complete the course								
1 – 4	103	78.63	102	100	121	100	326	92.09
5 or more	28	21.37	0	0	0	0	28	7.91
Total	131		102	0	121		354	100

Great majority (84.53%) has less than five mathematics subjects during high school, 15.47% students have more than five, probably those who were under the mathematics/science class. Most students have 1-4 mathematics teachers during their high school and college. Majority (68.73%) of the students have finished less than 5 mathematics subjects and most (92.09%) are expecting at least one more subject to finished the course.

2. Level of mathematics self-efficacy and anxiety of the students

The elementary education students have an average ($\bar{x}$ = 2.98) mathematics self-efficacy. They highly believed that they can complete all the assignments in a mathematics course, be able to use mathematics in their future career when

needed and can learn well in a mathematics course. However, students have a low ($\bar{x}$ = 2.13) self-efficacy on believing they can think like a mathematician.

Table 2

Level of Mathematics Self-efficacy of the BEEd Students

Self-efficacy	2nd yr		3rd yr		4th yr		As A Whole	
	x	DR	x	DR	X	DR	X	DR
1. I feel confident enough to ask questions in my mathematics class.	2.70	A	2.54	L	2.91	A	2.72	A
4. I believe I can do well on a mathematics test.	3.12	A	3.12	A	3.14	A	3.13	A
7. I believe I can complete all of the assignments in a mathematics course.	3.75	H	3.38	A	3.72	H	3.62	H
9. I believe I am the kind of person who is good at mathematics.	2.47	L	2.23	L	2.78	A	2.50	L
10. I believe I will be able to use mathematics in my future career when needed.	3.70	H	3.50	H	3.77	H	3.66	H
12. I believe I can understand the content in a mathematics course.	3.08	A	2.93	A	3.29	A	3.10	A
13. I believe I can get an “A” when I am in a mathematics course.	2.84	A	2.70	A	2.92	A	2.82	A
16. I believe I can learn well in a mathematics course.	3.60	H	3.55	H	3.56	H	3.57	H
19. I feel confident when taking a mathematics test.	2.63	A	2.55	L	2.78	A	2.66	A

20. I believe I am the type of person who can do mathematics.	2.92	A	2.72	A	3.02	A	2.88	A
21. I feel that I will be able to do well in future mathematics courses.	3.00	A	3.01	A	3.19	A	3.07	A
23. I believe I can do the mathematics in a mathematics course.	3.06	A	2.99	A	3.08	A	3.04	A
28. I believe I can think like a mathematician.	2.10	L	2.11	L	2.19	L	2.13	L
29. I feel confident when using mathematics outside of school.	2.95	A	2.57	L	2.86	A	2.79	A
Overall	3.00	A	2.85	A	3.08	A	2.98	A

Self-efficacy	Norms	Anxiety
Very High	4.21 – 5.00	Extremely Severe
High	3.41 – 4.20	Severe
Average	2.61 – 3.40	Moderate
Low	1.81 – 2.60	Mild
Very Low	1.00 – 1.80	Normal

It can be also be observed that the 3rd year students have lower self-efficacy on asking questions in mathematics class, completing assignments in a mathematics course, taking a mathematics test, and using mathematics outside of school as compared to the other years.

Table 3
Level of Mathematics Anxiety of the BEEd Students

Anxiety	2nd yr	3rd yr		4th yr		As A Whole		
	X	DR	x	DR	X	DR	X	DR
2. I get tense when I prepare for a mathematics test.	2.57	Mi	2.58	Mi	2.63	Mo	2.59	Mi
3. I get nervous when I have to use mathematics outside of school.	3.55	S	3.32	Mo	3.43	S	3.43	S
5. I worry that I will not be able to use mathematics in my future career when needed.	3.70	S	3.52	S	3.70	S	3.64	S
6. I worry that I will not be able to get a good grade in my mathematics course.	2.84	Mo	2.86	Mo	2.89	Mo	2.86	Mo
8. I worry that I will not be able to do well on mathematics tests.	3.09	Mo	2.93	Mo	2.96	Mo	2.99	Mo
11. I feel stressed when listening to mathematics instructors in class.	3.26	Mo	3.30	Mo	3.06	Mo	3.21	Mo
14. I get nervous when asking questions in class.	2.98	Mo	3.14	Mo	3.28	Mo	3.13	Mo
15. Working on mathematics homework is stressful for me.	2.97	Mo	3.02	Mo	3.19	Mo	3.06	Mo
17. I worry that I do not know enough mathematics to do well in future mathematics courses.	3.34	Mo	3.13	Mo	3.26	Mo	3.24	Mo
18. I worry that I will not be able to complete every assignment in a mathematics course.	3.33	Mo	3.29	Mo	3.55	S	3.39	Mo
22. I worry I will not be able to understand the mathematics.	3.27	Mo	3.09	Mo	3.35	Mo	3.24	Mo
24. I worry that I will not be able to get an "A" in my mathematics course.	3.05	Mo	2.78	Mo	3.03	Mo	2.95	Mo
25. I worry that I will not be able to learn well in my mathematics course.	3.42	S	3.16	Mo	3.22	Mo	3.27	Mo

26. I get nervous when taking a mathematics test.	2.91	Mo	2.87	Mo	3.00	Mo	2.93	Mo
27. I am afraid to give an incorrect answer during my mathematics class.	2.75	Mo	2.77	Mo	2.88	Mo	2.80	Mo
Overall	3.13	Mo	3.05	Mo	3.16	Mo	3.11	Mo

In this study, elementary education students experience moderate ($\bar{x}$ = 3.11) anxiety in mathematics. All year level experiences same level of anxiety which is at Moderate level. This finding complements Zarch and Kadivar's (2006) conclusion that mathematics anxiety exists among student teachers and in some adults (Perry, 2004 as cited by Jackson, 2008). Moreover, it seems like students have severe anxiety against using mathematics outside school and not being able to use the subject in their future career. This may indicate that students are concerned on how to apply mathematics in their everyday lives. It supports Jackson's (2008) contention that the key factors identified as leading to anxiety in mathematics are its link to real life and its usefulness.

It is noteworthy that the second year elementary education students are greatly anxious that they will not be able to learn well in their mathematics course. This may be attributed to their observation that as they go up the ladder, mathematics concepts that they are required to study become more complicated and difficult to understand. This anxiousness may have also sprung from their performance in mathematics in the past years.

3. Level of mathematics performance

Table 4
Level of Mathematics Performance of the BEEd Students

Year Level	Average Grade in High School		Grade in College Algebra	
	X	DR	x	DR
II	85.77	Good	1.9	Good
III	85.66	Good	2.04	Good
IV	85.90	Good	2.06	Good
As a Whole	85.78	Good	2.00	Good

As a whole, the students are at Good level both in their average grade in high school mathematics ($\bar{x}$ = 85.78) and College Algebra ($\bar{x}$ = 2.00). The performances in mathematics by all year level are found to be at Good level, ranging from 85.66 – 85.90 for average grade in high school mathematics while from 1.90 – 2.06 for grade in College Algebra.

4. Significant differences on the mathematics self-efficacy and anxiety of the students by year level

Table 5
ANOVA Results on Significant Difference between the Mathematics Self-efficacy and Anxiety Among the BEEd Students by Year Level

		Sum of Squares	df	Mean Square	F	Sig.
Self-efficacy	Between Groups	2.866	2	1.433	4.490	.012
	Within Groups	112.013	351	.319		
	Total	114.879	353			
Anxiety	Between Groups	.747	2	.373	1.194	.304

When subjected to ANOVA, results show that the computed F-ratio of 4.490 is significant at 0.05 level. This result rejects the null hypothesis that there is no significant difference on the mathematics self-efficacy of the elementary education students by year level. It implies that the mathematics self-efficacy significantly differ by year level.

To determine where the difference of self-efficacy among students by year level lies, the Scheffe test was utilized.

Table 6
Scheffe Test on Significant Differences on the Mathematics Self-efficacy Between Year Level

Dependent Variable		Mean Difference (I-J)	Sig.
self-efficacy	2nd yr vs 3rd yr	.14118	.168
	2nd yr vs 4th yr	-.08527	.489
	3rd yr vs 4th yr	-.22646*	.012

*. The mean difference is significant at the 0.05 level.

The mean difference of -.226 between the mathematics self-efficacy of the third year students and the fourth year students is significant at 0.05 level. This reveals that the fourth year students have a higher mathematics self-efficacy than the third year students. The finding may indicate that these fourth year students may have already conquered their anxiety toward the subject in as much as they have passed the previous mathematics subjects they have enrolled. The third year students, on the other hand, are less confident than the fourth year specifically on asking questions in class, completing all assignments, taking a mathematics test, and using mathematics outside of school. These students must have felt that they have not yet mastered the skill and have not mustered themselves in facing

more complex mathematical concepts and problems.

However, ANOVA results show that the computed F-ratio of 1.194 on mathematics anxiety is not significant at 0.05 level. This indicates that the null hypothesis which states that there is no significant difference between the mathematics anxieties among the students by year level is not rejected. It implies that the students experiences the same level of mathematics anxiety in all year level.

5. Significant relationship between the students' mathematics experiences and the level of mathematics self-efficacy and anxiety

Table 7
Correlation Coefficients Between The Student-related Experiences and Mathematics Self-efficacy And Anxiety

Mathematics Experiences	Self-efficacy	Anxiety
Number of math class taken in high school	.172**	.148**
number of math teachers in HS	.080	.066
number of math teachers in college	.116*	-.024
no. of math subjects taken in college	.069	.014
no. of math subjects to complete the course	-.054	-.011

** Correlation is significant at the 0.01 level
*Correlation is significant at the 0.05 level

Results of test analysis show that the correlation coefficient between the numbers of mathematics class taken in high school and mathematics self-efficacy of .172 is significant at 0.01 level. This means that the more mathematics class attended by students during their high school years, the higher their self-efficacy. This could be attributed to the fact that they are more exposed to mathematics thus the more learning, the more confident they are.

Similarly, the correlation coefficient computed between the number of mathematics teachers the students have in college and mathematics self-efficacy is .116 is significant at 0.05 level. Students who has different teachers for their mathematics subjects has a higher self-efficacy. It entails that teachers play a significant role in making or breaking the students' self-confidence. It concurs what Jackson (2008) quoted from DfES (2002:2),

> *...teachers can and do make huge differences to children's lives ...indirectly through their ...attitudes...*

On the other hand, the number of mathematics subjects is found to be significantly related to students' mathematics anxiety. The findings point that students with more mathematics subjects during high school are more anxious probably because these students belonged to the special mathematics or science class who are grade conscious since they have to maintain a certain grade.

6. Significant relationship between mathematics self-efficacy and anxiety, and the mathematics performance of the students

Table 8
Correlation Coefficients between the Mathematics Performance and Mathematics Self-efficacy and Anxiety

Mathematics Performance	Self-efficacy	Anxiety
High school Average grade in mathematics	.403**	.418**
Grade in College Algebra	-.295**	-.234**

The average grade in high school mathematics of the elementary education students and mathematics self-efficacy is significantly related as evidenced by the correlation coefficient of .403 which is significant at 0.01 level. The result indicate that the higher the average grade of students in high school, the higher their mathematics self-efficacy. This means that students who are good in mathematics during their high school years are more assertive towards mathematics in their college years probably because of the strong foundation they have.

Similarly, a correlation coefficient of -.295 between grade in College Algebra and mathematics self-efficacy is significantly related at 0.01 level. This indicates that students with better performance in College Algebra tends to have higher mathematics self-efficacy. It implies that students are more motivated in their succeeding mathematics class if they have good grade in their previous mathematics subjects. The result concurs with the suggestions of Bandura (197) that students with higher levels of self-efficacy tend to be more motivated to learn and more likely to persist when presented with challenging tasks and agrees with Usher and Pajares (2009) that students who feel they have mastered skills and succeeded at challenging assignments experience a boost in their efficacy beliefs.

Likewise, mathematical anxiety is significantly related to their average performance in high school mathematics (r = 0.418**) and grade in College Algebra (-.234**). Students who are more anxious tend to have performed better in high school mathematics and in College Algebra. Those who are more anxious of mathematics would likely prepare for, read in advance, or pay attention during discussion because they want to overcome this anxiousness. Furthermore, they avoid embarrassment or ridicule from both their instructor and classmates so they are challenged to learn what gives them difficulty. Their anxiety becomes, for them, their motivation to learn and excel.

These results conform the findings of Uusimaki and Nason (2004) that the degree of achievement in mathematics are among the concepts and constructs related to mathematics anxiety. However, they contradict the findings of Cates and Rhymer (2003) which show that students with higher levels of mathematical anxiety had significantly lower computational fluency in all areas of mathematical computations.

CONCLUSIONS & RECOMMENDATIONS

The elementary education students experience average level of mathematics self-efficacy and moderate anxiety specifically on applying mathematics in their everyday lives. Mathematics self-efficacy among elementary education students by year level differ while mathematics anxiety does not. The number of mathematics class taken in high school, and the number of mathematics teachers in college determines the level of mathematics self-efficacy. While mathematical anxiety is affected by the number of mathematics subjects taken in high school. Lastly, mathematics self-efficacy and anxiety affects the mathematics performance of the elementary education students.

It is recommended for students to identify and understand their mathematics self-efficacy and anxiety which affects their mathematics performance so they can make changes on their feelings of self-worth and apprehensions towards mathematics. In addition, teachers should help their students by boosting their self-efficacy through encouraging them to participate in class discussions or activities and emphasizing on the vital significance of mathematics in their lives by providing them with real world problems. They should be encouraged to develop positive attitude and strive harder even in their elementary years so that their enthusiasm to take higher mathematics subjects be sustained. There should be a strong foundation on the basic mathematics to boost their confidence and at the same time to lessen their fear in dealing mathematics. Furthermore, Administrators should assign different teachers to handle mathematics subjects to the elementary education students.

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