

**MATHEMATICS ANXIETY AND CONFIDENCE TO
TEACH MATHEMATICS AMONG PROSPECTIVE
ELEMENTARY SCHOOL TEACHERS**

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ABSTRACT

This study ascertained the relationship of confidence to teach mathematics and mathematics anxiety among 62 prospective elementary school teachers at West Visayas State University Calinog Campus from June to November 2014. The data were obtained using researcher-made questionnaires on confidence to teach mathematics and mathematics anxiety. The descriptive statistics employed were the mean. The inferential statistics employed were the t-test for independent sample, one-way ANOVA, Least Significant Difference test, Pearson's r, and Regression Analysis set at 0.05 alpha. The findings of the study revealed that the confidence level to teach mathematics among prospective elementary school teachers was high. The Mathematics anxiety among prospective elementary school teachers was moderate. There was no significant difference in the confidence to teach mathematics among prospective elementary school teachers when classified as to sex but a significant difference when classified as to monthly family income and mathematics anxiety. There was no significant difference in the mathematics anxiety among prospective elementary school teachers when classified as to sex but a significant difference when classified as to monthly family income. The confidence to teach mathematics among prospective elementary school teachers was significantly related to mathematics anxiety. Mathematics anxiety was the predictor of confidence to teach mathematics.

Key Words: anxiety, confidence, mathematics, and teach

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Introduction

There is a strong perception that the Philippines is lagging behind other Asian countries such as Thailand, Malaysia, and Singapore. Among the reasons given is the low quality of basic education in the country. Recent National Achievement Test given to all Grade Six pupils in public and private elementary schools in 2012 show low scores in mathematics test (mean percentage score is 66.47 percent) which is below 75 percent, the standard national target of Department of Education. In the National Secondary Achievement Test given in year 2012, students gave correct answers to less than 50% (mean percentage score equals 46.37 percent) of the questions in mathematics.

Internationally, the Philippines belongs to the bottom five of poor achievers in mathematics. According to a study by the Trends in International Mathematics and Science Study (TIMSS) in 2003, of the 45 participants in the Mathematics Achievement test of the 8th grade level (second year high school in the Philippines), the Philippines ranked 41st.

This study was guided by the conceptual framework as shown in Figure 1 on the assumption that confidence to teach mathematics is related to mathematics anxiety.

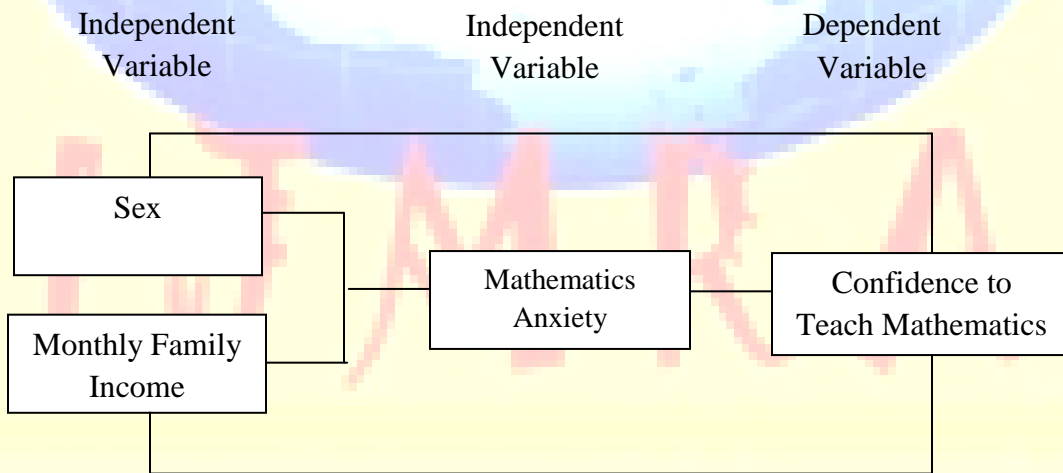


Figure 1. Confidence to teach mathematics as related to mathematics anxiety

The study aimed to determine relationships among prospective elementary school teachers' confidence to teach mathematics and mathematics anxiety.

Specifically it sought answers to the following questions:

1. What is the mathematics anxiety level among prospective elementary school teachers as an entire group and when they were classified as to their sex and monthly family income?
2. What are the causes for the increase and decrease in mathematics anxiety among prospective elementary school teachers?
3. What is the confidence level to teach mathematics among prospective elementary school teachers as an entire group and when they were classified as to their sex, monthly family income, and mathematics anxiety?
4. Is there a significant difference in the mathematics anxiety among prospective elementary school teachers when they were classified as to their sex and monthly family income?
5. Is there a significant difference in the confidence to teach mathematics among prospective elementary school teachers when they were classified as to their sex and monthly family income?
6. Is there a significant relationship between confidence to teach mathematics and mathematics anxiety among prospective elementary school teachers?
7. Is mathematics anxiety a significant predictor of prospective elementary school teachers' confidence to teach mathematics?

Method

Research Design

The descriptive-correlational research was used in the study. According to Subong (2005), descriptive research involves collecting data in order to test hypotheses or answer questions concerning the current status of the subject of the study. Descriptive data are typically collected through a questionnaire survey, an interview, or observation. Correlational research attempts to determine whether to what degree a relationship exists between two or more quantifiable variables.

Respondents

The study involved sixty-two (62) prospective elementary school teachers of the West Visayas State University Calinog campus enrolled in AY 2013-2014. Table 1 shows the distribution of the respondents.

Table 1. Distribution of Respondents

Category	Number of Respondents	Percentage
Entire Group	62	100
Sex		
Male	16	26
Female	46	74
Monthly Family Income		
Below 10,000.00 pesos	29	47
10,000.00-19,999,99 pesos	29	47
20,000.00 pesos and above	4	6
Mathematics Anxiety		
Low	25	40
Moderate	31	50
High	6	10

Instrumentation

The researcher-made and duly validated questionnaires on confidence to teach mathematics and mathematics anxiety were used to gather the data. The instruments were validated by experts in the areas of mathematics. The instruments were pilot tested using the ninety six (96) student teachers teaching in the elementary grades. Cronbach alpha was used to determine the reliability of the data-gathering instrument. The reliability coefficients were: 0.88 for confidence to teach mathematics, and 0.95 for mathematics anxiety. A five-point scale was used on confidence to teach mathematics and mathematics anxiety, with the following responses; 1- not true of me, 2- somewhat true of me, 3- moderately true of me, 4- true of me, and 5- very true of me.

Data Collection Procedure

Permission to conduct the study was secured from the WVSU Calinog campus administrator. Upon approval of the permission to conduct the study, the researcher coordinated with the dean/director for the administration of the instrument. The schedule was set. The researcher personally administered the questionnaires to the prospective elementary schoolteachers.

Statistical Data Analysis Procedure

The data gathered were processed and subjected to certain statistical analyses to determine the level of confidence to teach mathematics, and mathematics anxiety among the prospective elementary school teachers, mean was used.

For the level of confidence to teach mathematics the scale with corresponding description was the basis of analysis: 4.51 - 5.00, very high; 3.51 - 4.50, high; 2.51 - 3.50, average; 1.51 - 2.50, low; 1.00 - 1.50, very low.

For mathematics anxiety, the following scale was used to interpret the means obtained: 4.51 - 5.00, very high; 3.51 - 4.50, high; 2.51 - 3.50, moderate; 1.51 - 2.50, low; 1.00 - 1.50, very low

The t-test for independent sample was used to determine the significant differences in the prospective elementary teachers' confidence to teach mathematics when classified as to sex since the data was normal. One-Way ANOVA was used to determine the significant difference in the prospective elementary teachers' confidence to teach mathematics when classified as to monthly family income and mathematics anxiety because the assumptions for normality of data, homogeneity of variance, and independence were met. Further, Least Significant Difference (LSD) was used to determine the difference in the prospective elementary teachers' confidence to teach mathematics when classified as to monthly family income and mathematics anxiety between categories.

Pearson's r was used to determine the significant relationship between the level of confidence to teach mathematics and mathematics anxiety because the data were normally distributed. To interpret the degree or strength of correlation, the researcher used the guide below (Subong, 2005): 0.00 - ± 0.10 , no correlation; ± 0.11 - ± 0.25 , negligible correlation; ± 0.26 - ± 0.50 , moderate correlation; ± 0.51 - ± 0.75 , high correlation; ± 0.76 - ± 1.00 , very high correlation.

Linear Regression Analysis was used to determine whether mathematics anxiety was a significant predictor of confidence to teach mathematics.

All the statistical computations were computer processed through the Statistical Package for the Social Sciences (SPSS) Software.

The significance level was set at 0.05 alpha.

Results and Discussions

Mathematics Anxiety Among Prospective Elementary School Teachers.

The Mathematics anxiety among prospective elementary school teachers as an entire group as reflected in Table 2 was moderate, ($M = 2.64, SD = 0.74$). This means that most of the prospective elementary school teachers might have moderate mathematics anxiety and probably only few prospective elementary school teacher experienced high mathematics anxiety. When they were classified as to sex, male and female had moderate mathematics anxiety, ($M_s = 2.64$ and $2.64, SD_s = 0.68$ and 0.77) respectively. When they were classified as to monthly family income, those with 10,000.00 pesos and below had a low mathematics anxiety, ($M = 2.40, SD = 0.66$), those with 10,000.00-19,999.99 pesos and 20,000.00 pesos and above had an average mathematics anxiety ($M_s = 2.76$ and $3.49, SD_s = 0.70$ and 0.92) respectively.

Table 2. Mathematics Anxiety Among Prospective Elementary School Teachers

Category	Mean	Description	SD
Entire Group	2.64	Moderate	0.74
Sex			
Male	2.64	Moderate	0.68
Female	2.64	Moderate	0.77
Monthly Family Income			
Below 10,000 pesos	2.40	Low	0.66
10,000.00-19,999.99 pesos	2.76	Moderate	0.70
20,000.00 pesos and above	3.49	Moderate	0.92
Mean	Description	Mean	Description
4.51-5.00	Very High	1.51-2.50	Low
3.51-4.50	High	1.00-1.50	Very Low
2.51-3.50	Moderate		

As shown in Table 3 the causes for the increase in mathematics anxiety among prospective elementary school teachers were “I start a math test thinking I know the work than do poorly”, $M = 3.16, R = 1$; “I worry about my grades in math”, $M = 3.11, R = 2$; and “I am nervous and worry a lot during math test”, $M = 2.92, R = 3$. These means that prospective elementary school teachers have difficulties in their mind thinking what they are going to do during mathematics test. Perhaps they were not ready in their mathematics test which resulted to their nervousness and worries during the test. On the other hand, the causes for the decrease or less contribution in mathematics anxiety among prospective elementary school teachers were “I

don't like to go to math class", $M = 1.94$, $R = 25$; "I have trouble sleeping the night before a math test", $M = 2.31$, $R = 24$; and When I come into math class, I feel like turning around and leaving, $M = 2.35$, $R = 23$. These means that prospective elementary school teachers like to attend their mathematics classes.

Table 3. Causes of Mathematics Anxiety Among Prospective Elementary School Teachers

Particulars	Mean	Rank
1. I have very few headaches in math.	2.77	9
2. I sweat very easily even on cool days during a math test.	2.48	18
3. I worry about my grades in math.	3.11	2
4. I become nervous when the math teacher calls on me to answer a	2.61	14
5. I am nervous and worry a lot during math test.	2.92	3
6. I cannot keep my mind on math concepts.	2.82	7.5
7. I find it hard to keep my mind on a task about math.	2.90	4
8. I have trouble remembering my math facts.	2.85	5.5
9. I think I'll never catch up with the work in math.	2.60	15
10. Math is hard for me to understand.	2.68	12
11. It is difficult for me to remember the formulas in mathematics.	2.82	7.5
12. I forget what I studied in math during a test.	2.52	16.5
13. I start a math test thinking I know the work than do poorly.	3.16	1
14. I get so nervous when I take a math quiz that I don't remember how to	2.69	11
15. My mind goes blank during a math test.	2.40	20.5
16. I am usually calm by anything related to math.	2.85	5.5
17. I don't like to go to math class.	1.94	25
18. When I come into math class, I feel like turning around and leaving.	2.35	23
19. I review my math work every day but I perform poorly.	2.45	19
20. I have trouble finishing my math work.	2.65	13
21. I don't like to ask my teacher questions in math.	2.52	16.5
22. I never finish a math test on time.	2.71	10
23. I panic before and during a math test.	2.37	22
24. I feel nauseated before a math test.	2.40	20.5
25. I have trouble sleeping the night before a math test.	2.31	24

Confidence to Teach Mathematics Among Prospective Elementary School Teachers.

The confidence to teach mathematics among prospective elementary teachers as an entire group as reflected in Table 4 was high, ($M = 3.51$, $SD = 0.41$). This only shows that probably most or majority of the prospective elementary school teachers possess high confidence level to teach mathematics. When they were classified as to sex, male had high confidence level to teach mathematics, ($M = 3.57$, $SD = 0.40$), female had an average confidence level to teach mathematics, ($M = 3.49$, $SD = 0.42$). When they were classified as to monthly family income, those with 10,000.00 pesos and below had a high confidence level to teach mathematics, ($M =$

3.63, $SD = 0.38$), those with 10,000.00-19,999.99 pesos had an average confidence level to teach mathematics, ($M = 3.45, SD = 0.42$), and those with 20,000.00 pesos and above had an average confidence level to teach mathematics, ($M = 3.14, SD = 0.36$). When they were classified as to their mathematics anxiety, those with low had high confidence level to teach mathematics, ($M = 3.71$ and $3.60, SD = 0.35$), and those with moderate and high had average confidence to teach mathematics, ($M_s = 3.39$ and $3.35, SD_s = 0.38$ and 0.55), respectively.

Table 4. Confidence to Teach mathematics Among Prospective Elementary School Teachers

Category	Mean	Description	SD	
Entire Group	3.51	High	0.41	
Sex				
Male	3.57	High	0.40	
Female	3.49	Average	0.42	
Monthly Family Income				
Below 10,000 pesos	3.63	High	0.38	
10,000.00-19,999.99 pesos	3.45	Average	0.42	
20,000.00 pesos and above	3.14	Average	0.36	
Mathematics Anxiety				
Low	3.71	High	0.35	
Moderate	3.39	Average	0.38	
High	3.35	Average	0.55	
Mean		Description	Mean	Description
4.51-5.00		Very High	1.51-2.50	Low
3.51-4.50		High	1.00-1.50	Very Low
2.51-3.50		Average		

Differences in the Mathematics Anxiety Among Prospective Elementary School Teachers.

The t-test for independent sample result shown in Table 5 reveals no significant difference in the mathematics anxiety among prospective elementary school teachers when classified as to sex, $t(60) = 0.005, p = 0.996$. The computed p-value is greater than 0.05. The null hypothesis of no significant difference in the mathematics anxiety when classified as to sex was not rejected. Male and female prospective elementary school teachers had the same mathematics anxiety level.

Table 5.t-testfor Independent Sample Result for the Difference in the Mathematics AnxietyAmongProspective Elementary School Teachers Classified as to Sex

Compared Groups	df	Mean	Mean Difference	t	t-Prob
Sex					
Male	60	2.64	0.00	0.005	0.996
Female		2.64			

The one-way ANOVA result in Table 6 reveals a significant difference in the mathematics anxietyamongprospective elementary school teachers when classified as to monthly family income $F(2,59) = 5.143, p = 0.009$. The computed p-value is less than 0.05. The null hypothesis of no significant difference in the mathematics anxiety amongprospective elementary school teachers when classified as to monthly family income was rejected. This means that at least one group among the monthly family income categories had varied mathematics anxiety level than other groups.

Table 6.ANOVA Result for the Difference in the Mathematics AnxietyAmongProspective Elementary School Teachers Classified as to Monthly Family Income

Sources of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	Sig.
Between Groups	2	4.978	2.489	5.143**	0.009
Within Groups	59	28.550	0.484		
Total	61	33.527			

** $p < 0.01$

Pair-wise comparison using Least Significant Difference (LSD) test in Table 7 shows that the mathematics anxiety amongprospective elementary school teachers with monthly family income of 10,000 pesos and below differ significantly from those with monthly family income of 20,000 pesos and above, but do not differ significantly from those with family income of 10,000-19,999.99 pesos. This means that prospective elementary school teachers with monthly family income of 20,000 pesos and above had higher mathematics anxiety than prospective elementary school teachers with monthly family income of 10,000 pesos and below; prospective elementary school teachers with monthly family income of 10,000 pesos and below, and 10,000-19,999.99 pesos had similar mathematics anxiety level. Prospective elementary teachers with family income of 10,000-19,999.99 pesos do not differ significantly in their mathematics anxiety from those with monthly family income of 20,000 pesos and above. This means that they have the same

mathematics anxiety level even though that numerically students with family income of 20,000 pesos and above had higher anxiety level than those with family income of 10,000-19,999.99 pesos.

Table 7. Least Significant Difference Test Result Showing the Difference in the Mathematics Anxiety Among Prospective Elementary School Teachers When Classified as to Monthly Family Income

Monthly Family Income	Mean Difference	Sig
Below 10,000 pesos vs. 10,000.00-19,999.99 pesos	0.36	0.054
Below 10,000 pesos vs. 20,000.00 pesos and above	1.09**	0.005
10,000.00-19,999.99 pesos vs. 20,000.00 pesos and above	0.73	0.053

**p < 0.01

Differences in the Confidence to Teach Mathematics Among Prospective Elementary School Teachers.

The t-test for independent sample result shown in Table 8 reveals no significant difference in the confidence to teach mathematics among prospective elementary school teachers when classified as to sex, $t(60) = 0.608, p = 0.545$. The p-value is greater than 0.05. This means that male and female prospective elementary school teachers had a similar confidence to teach mathematics even though numerically male prospective elementary school teachers had a higher mean score than female prospective elementary school teachers in their confidence to teach mathematics.

Table 8. t-test Result for the Difference in the Prospective Elementary School Teachers' Confidence to Teach mathematics Classified as to Sex

Compared Groups	df	Mean	Mean Difference	t	t-Prob
Sex					
Male	60	3.57	0.07	0.608	0.545
Female		3.50			

The one-way ANOVA result in Table 9 reveals a significant difference in the confidence to teach mathematics among prospective elementary school teachers when classified as to monthly family income $F(2,59) = 3.395, p = 0.040$. The p-value is less than 0.05. This means that at least one group in the monthly family income categories differ significantly in their confidence

level to teach mathematics than the other groups. The confidence levels to teach mathematics among monthly income categories were not similar.

Table 9. One-way ANOVA Result for the Difference in the Confidence to Teach Mathematics Among Prospective Elementary School Teachers Classified as to Monthly Family Income

Sources of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	Sig.
Between Groups	2	1.083	0.541	3.395*	0.040
Within Groups	59	9.406	0.159		
Total	61	10.488			

* $p < 0.05$

Pair-wise comparison using LSD test in Table 10 shows that prospective elementary school teachers with monthly family income of 10,000 pesos and below differ significantly in their confidence to teach mathematics from those prospective elementary teachers with monthly family income of 20,000. This means that prospective elementary school teachers with monthly family income of 10,000 pesos had higher confidence level to teach mathematics than those prospective elementary school teachers with monthly family income of 20,000 pesos and above. Prospective elementary school teachers with family income of 10,000-19,999.99 pesos, and 20,000 pesos and above had the same level of confidence in teaching mathematics despite of the fact that numerically prospective elementary school teachers with family income of 10,000-19,999.99 pesos had higher mean score than prospective elementary school teachers with monthly family income of 20,000 pesos and above.

Prospective elementary teachers with family income of 10,000-19,999.99 pesos do not differ significantly in their confidence to teach mathematics from those with monthly family income of 20,000 pesos and above.

Table 10. LSD Test Results Showing the Difference in the Confidence to Teach Mathematics Among Prospective Elementary School Teachers Classified as to Monthly Family Income

Monthly Family Income	Mean Difference	Sig
Below 10,000 pesos vs. 10,000.00-19,999.99 pesos	0.18	0.085
Below 10,000 pesos vs. 20,000.00 pesos and above	0.49*	0.025
10,000.00-19,999.99 pesos vs. 20,000.00 pesos and above	0.31	0.155

* $p < 0.05$

The one-way ANOVA result in Table 11 reveals a significant difference in the confidence to teach mathematics among prospective elementary school teachers when classified as to mathematics anxiety $F(2,59) = 5.475, p = 0.007$. The p-value is less than 0.05. This means that at least one group in the mathematics anxiety categories differ significantly than the other groups in their confidence to teach mathematics.

Table 11. One-Way ANOVA Result for the Difference in the Confidence to Teach Mathematics Among Prospective Elementary School Teachers Classified as to Mathematics Anxiety

Sources of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	Sig.
Between Groups	2	1.642	0.821	5.475**	0.007
Within Groups	59	8.846	0.150		
Total	61	10.488			

** $p < 0.01$

Pair-wise comparison using LSD test in Table 12 shows that prospective elementary school teachers with low mathematics anxiety differ significantly in their confidence to teach mathematics from those prospective elementary teachers with moderate and high mathematics anxiety. Prospective elementary school teachers with low mathematics anxiety had higher confidence level to teach mathematics than those prospective elementary school teachers with moderate and high anxiety. Prospective elementary teachers with moderate mathematics anxiety do not differ significantly in their confidence to teach mathematics from those with high mathematics anxiety. Prospective elementary school teachers with moderate and high mathematics anxiety had similar confidence level to teach mathematics despite of the fact that numerically the mean score of prospective elementary school teachers with moderate mathematics anxiety is higher than those with high mathematics anxiety in their confidence level to teach mathematics.

Table 12. LSD Test Results Showing the Difference in the Confidence to Teach mathematics Among Prospective Elementary School Teachers Classified as to Mathematics Anxiety

Mathematics Anxiety	Mean Difference	Sig
Low vs. Moderate	0.32**	0.003
Low vs. High	0.36*	0.043
Moderate vs. High	0.04	0.821

* $p < 0.05$ ** $p < 0.01$

Relationship between Confidence to Teach Mathematics and Mathematics Anxiety Among Prospective Elementary School Teachers.

The confidence to teach mathematics among prospective elementary school teachers as shown in Table 13 is moderately and significantly negatively related to mathematics anxiety, ($r = -0.462, p = 0.000$). The p-value is less than 0.05. This means that the higher the mathematics anxiety among prospective elementary school teachers the lower the confidence to teach mathematics while the lower their mathematics anxiety the higher their confidence to teach mathematics. Bursal & Paznokas (2006) stressed that pre-service teachers' mathematics anxiety was negatively correlated to their confidence to teach mathematics. Brady and Bowd (2005) indicated that the confidence of the pre-service teachers in teaching mathematics was related to their mathematics anxiety.

Table 13. Relationship Among Prospective Elementary School Teachers' Confidence to Teach Mathematics and Mathematics Anxiety

Compared Variables	r	Sig
Confidence to teach mathematics Mathematics anxiety	-0.462**	0.000

** $p < .001$

Predictor of Confidence to Teach Mathematics.

As shown in Tables 14, mathematics anxiety, ($p = 0.000$) is the predictor of confidence to teach mathematics, $F(1,60) = 16.253, p = 0.000$. This means that if the score on the mathematics anxiety is known the confidence to teach mathematics can be computed. Mathematics anxiety contributed about 21.3% to the total variance in the confidence to teach mathematics among prospective elementary school teachers. The general equation for the confidence to teach mathematics is:

$$\text{Confidence to Teach Mathematics} = 4.194 - 0.236 \text{ Mathematics Anxiety}$$

Thus, if the prospective school teacher has a high mathematics anxiety, e.g., 4.50, the confidence to teach mathematics is equal to $4.194 - 0.236(4.50) = 4.194 - 1.062 = 3.132$, which is average. If the prospective school teacher has a low mathematics anxiety, e.g., 2.00, the

confidence to teach mathematics is equal to $4.194 - 0.236(2.00) = 4.194 - 0.472 = 3.722$, which is high.

Based on the above examples, prospective school teacher with higher mathematics anxiety tends to have lower confidence to teach mathematics while those with lower mathematics anxiety tend to have higher confidence to teach mathematics.

Table 14. Predictor of Confidence to Teach Mathematics of Bachelor of Elementary Education Students

Variable	Confidence to Teach Mathematics		
	B	t	sig
Constant	4.194**	23.919	0.000
Mathematics Anxiety	-0.236**	-4.032	0.000
R ²	0.213		
F(1,60)	16.253**		0.000

**p < 0.001

Conclusions

Based on the results, the following conclusions were advanced:

1. Sex is not a determining factor of mathematics anxiety among prospective elementary school teachers but monthly family income is the determining factors.
2. Sex is not a determining factor among prospective elementary school teachers' confidence level to teach mathematics but monthly family income and mathematics anxiety are the determining factors.
3. Mathematics anxiety is inversely proportional to confidence to teach mathematics; the lower the mathematics anxiety the higher the prospective elementary school teachers' confidence to teach mathematics.
4. Mathematics anxiety can predict the confidence to teach among prospective elementary school teachers.

Recommendations

1. School administrators may review and strengthen their curricular offerings to include seminars on mathematics anxiety so that mathematics anxiety may be reduced among prospective elementary school teachers who are enrolled in their schools or institutions.

2. An assessment on mathematics anxiety levels should be carried out among prospective elementary school teachers a year prior to student teaching so that proper actions may be undertaken to remedy or enhance their level of confidence in teaching mathematics.

3. Prospective elementary school teachers may be given assistance by teachers/counselors in schools so as to reduce their mathematics anxiety and at the same time build their confidence in teaching mathematics.

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