



## ANXIETY, RESILIENCY, AND ATTITUDE AS PREDICTORS OF MATHEMATICS ACHIEVEMENT

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**Abstract:** *This study determined the predictors of mathematics achievement of college freshmen. Specifically, it determined the profile of the college freshmen; compared the Mathematics anxiety, resiliency, and attitude of the students when grouped by variables; assessed the mathematics achievement of the students; and identified the predictors of mathematics achievement. Using the correlational design, the study gathered data from first year students of the College of Teacher Education who responded to the set of instruments. Regression analysis was used to treat the data. Results indicated that students' mathematics performance was predicted by their sex, ethnicity, socio-economic status, teachers' specialization, and grade point average. Those with lower household income have higher anxiety level than those with higher household income. Teachers who were math majors had students doing better in math than those students taught by non-math major. The students' mathematics anxiety, resiliency and attitudes were significantly related to their mathematics performance. Likewise, their profile variables were significantly related to their mathematics performance.*

**Keywords:** *Math anxiety, resiliency, attitude in math, mathematics achievement*

### INTRODUCTION

#### Background of the Study

Classroom environment can be a source of anxiety if the teachers do not know how to handle the situations for which the students are exposed to. As research studies would point out a lot of these anxiety problems of students usually occur in their mathematics subjects and those subjects that involved calculations, derivations of formulas and even problem solving. The problem is even provoked by a combination of internal and external events in the classroom leading to the painful sensation of anxiety.

Anxiety is not a trait or personality characteristics but is acquired through classical, operant or vicarious learning and may develop as a result of real environment danger or perceived danger. This situation is especially true when teachers of mathematics put label in their subjects something that creates a feeling of fear and anxiety to the students. As learning



theorists would contend, a feeling of high anxiety has great impact on perceptions and thinking processes. Students of this nature usually have trouble defining who they are and what their skills are. This disturbance in perceptual processes and problem solving ability can alter their ability to make decisions and solve problems.

Anxiety affects students with or without learning, (Dobson, 2012). Certainly, anxiety is a big problem for students with learning impairments. In contrast, those students who spend more time preparing for exams tend to have lower levels of test Anxiety (Dobson, 2012). There is therefore a need to provide students with a good test preparation skill for them to combat test anxiety.

With the help of teachers, math anxiety among students can be translated into a productive undertaking thereby making them resilient from the horrible setbacks. Resilience in mathematics can take a longer period of time when no intervention is taken to address the anxiety problems. Who is at risk with math anxiety? Some research studies would point out that “anxiety is not limited to low reading achievement.” Anxiety is also attributed to low math achievement scores (Bensoussan, 2012).

Much have to be considered if only to make matters productive for the students, by looking at the situations or conditions that contribute to their high anxiety. While it is true that students experiencing math anxiety is a normal occurrence; however, when worries tend to be out of proportion, a feeling of avoidance starts to set in. Students may try to be absent from school just to avoid a possibly embarrassing or uncomfortable situation. For instance student who cannot manipulate simple equations or cannot explain practical laws of exponents tend to shy away from school. Hembree (1990) stated that mathematics anxiety has a positive relationship with mathematics performance and achievement.

Even students who do well on classwork and homework can suffer from test anxiety and do poorly on tests. On the other hand, Anxiety can negatively affect academic performance (Owens, 2012). It was found that students who reported higher levels of anxiety show lower levels of academic achievement. Thus there is a need for stressing and focussing on students prone to anxiety. Dobson (2012), pointed out that teachers and parents can teach students the skills they need to feel in control of their learning.

On the other hand, there are students who have the ability to interact with their environment and can cope up with risk factors such as emotional difficulties, poverty and



family circumstances. These individuals have the coping strategies and resiliency skills. Resiliency is a term referring to the individual's ability to maintain their competency despite encountering adverse situation, and stressful events. It may affect the individual in two ways, the positive side and the negative side. Positive resilience happens when the individual views the difficulty as an opportunity to pursue and must succeed. Negative resilience pertains to the individual who accepts a challenge as difficult and could not do anything to overcome the difficulty.

Moreover, resiliency when nurtured can develop a positive attitude to the individual the rest of his life. For the freshmen enrolled at the College of Education their math anxiety and resiliency including their attitude need to be explored as they are considered "predictors of their mathematics achievement."

### **OBJECTIVE OF THE STUDY**

The study aimed to determine the predictors of mathematics achievement of college freshmen. Specifically, it sought to determine the profile of the college freshmen; compare the math anxiety, resiliency, and attitude of students when grouped by their profile variables; ascertain mathematics achievement of the students; and to determine the predictors of mathematics achievement of students from among the independent variables.

### **METHODOLOGY**

#### **Study Design**

The study made use of the descriptive correlational method of research. The data were described the mathematics anxiety, resiliency and attitude of the students. Together with other personal and school factors, the psychological variables were tested if they could predict mathematics achievement of the students.

#### **Respondents**

The respondents in the study were the first year students of the College of Teacher Education since they have mathematics subject enrolled during the semester. All the first year students were included in the research study.

#### **Research Instrument**

Three checklists were used in the study: the math anxiety constructed by Bai, H., Wang, L., Pan, W., & Frey, M. (2009); resiliency scale by Martha Tapia (1996); and the attitude



inventory by Schackow (2005). These instruments were used to determine if the three variables are predictors of their math achievement.

### **Data Collection**

The checklists were reproduced and administered to the students. They were asked to answer the scales one at a time to avoid response fatigue. Though the scales were group administered, assurance was made that the data gathered are independent, valid, and reliable.

### **Analysis of Data**

The responses put forward by the respondents in the three checklists constituted the information that were tabulated and analysed. The frequency count and the weighted mean were used in the description of the respondents. In math anxiety scale, responses were made on a 4 point scale. For negative affect items low scores indicate high anxiety. Reverse coded items which include positive affect were reverse for scoring so that a high score indicates high anxiety. The same scoring for the resiliency scale was used with 4 as the highest and 1 as the least. Correlation and multiple regression analysis were used to analyse the data.

## **RESULTS AND DISCUSSION**

### **Students' Profile**

The College of Teacher Education freshmen were female-dominated and Ilocano. Generally, they performed fairly in their math subjects based on their grade point average (GPA). They were previously taught mathematics by subject majors. As regards the socio-economic status, majority had family income of P50,000 and below.

### **Mathematics Resiliency**

Students in the college varied in their resiliency. There were students who were resilient in their difficulties in mathematics. In fact it is their resilience that has allowed them to manifest a favourable feeling but it turned out that they were confused. For example, they disagreed that they got motivated to study whenever they failed in math and persevered more when their classmates were competitive. On the other hand, they agreed that they do not give up easily even the requirements in their math subject are many, so with getting upset with nagging math teachers and bullying friends.



### **Students' Mathematics Anxiety**

The students' anxiety in math was towards the usefulness of mathematics in earning a living since economic transaction deals with counting and calculations. These feelings of anxiety were manifested in their agreements to the following statements; "I see math as a subject I will rarely use"; "I'm not good in math"; "Math has been my worst subject". On the other hand, there were students who manifested little anxiety when they disagreed on the statement that "math seems unusually hard for me"; "I don't think that I could do advanced math"; "my mind goes blank and I'm unable to think clearly when working in mathematics" and "I'm not the type to do well in mathematics." The result of this study pointed out that the freshmen students have positive attitudes in their math subjects. . Certainly, teachers also have impact on students' attitudes. A teacher's own attitude affects the way they teach the material (Foy, 2013). The present condition at the college of teacher education showed that students have to take their math subjects from different teachers which are contributory to their math attitude. Kawakami et al. (2008) examined attitudes towards math and behaviour during math examinations, the result showed that women who were trained to approach rather than avoid math have positive attitude towards math.

### **Relationship between Mathematics Performance and Select Variables**

Correlation analysis revealed that females tended to get higher mathematics grades than male ( $r = 0.42$ ). Females are diligent in their studies while male have diverse activities. The non-Ilocano did well than the Ilocano group ( $r = 0.569$ ). Moreover, students under teachers who are math major performed better in math ( $r = 0.770$ ). In the words of Goulding, Rowland and Barber (2002), there are linkages between a teacher's lack of subject knowledge and ability to plan teaching material effectively. These findings suggest that "teachers that do not have a sufficient background in mathematics may struggle with the development of comprehensive lesson plans for their students." Laturner's research (2002), shows that those without certification about teaching math vary in their commitment to the profession depending on coursework preparation.

In terms of their economic status, those students with higher family income tended to perform well than those students who belonged to the lower income households. Likewise, those with higher academic achievement tended to have better performance than those with lower academic achievement ( $r = 0.191$ ). On the other hand, students with lesser



anxiety had better performance in the subject ( $r= 0.528$ ). This finding is parallel to the findings of Hembree (1990), Kesici and Ahmet (2009) and McCloy (2010). Their study revealed that females have lesser anxiety than males.

### **Regression Parameters on Mathematics Performance**

Regression parameters on the mathematics performance of the students indicated that Math Teachers Specialization (MTS) can explain 34.8 % of the variations in Math performance of the students, as explained variance is 0.348. If students are taught by teachers who specialized in Mathematics, their math performance increases by 0.287 unit as shown by regression coefficient of 0.287. Grade point average (GPA) could attribute 4.4 % of the differences in math performance, explained variance being 0.044. For every unit increase in GPA, the math performance of the students increases by 0.153 point. The inclusion of the two predictors in the regression equation is significant as F-ratio is 34.174 with associated probability of 0.000 at  $df = 2/101$ . Thus, the final regression equation is :  
Math Grade = 78.2 + 0.287 MTS + 0.153 GPA.

### **CONCLUSION**

Students' mathematics performance is explained by their sex, ethnicity, socio-economic status, teachers' specialization, and grade point average. Females performed better in mathematics than males. Non-Ilocano students performed better than the Ilocano at the college of teacher education. Those with lower household income have higher anxiety level than those with higher household income. Teachers who are math majors have students doing better in math than those students taught by non-math major. The students' mathematics anxiety, resiliency and attitudes were significantly related to their mathematics performance.

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**Table 1. Relationship between profile variables, anxiety, resiliency, attitude and students’ mathematics performance**

VARIABLES	CORRELATION COEFFICIENT	PROBABILITY	STATISTICAL INFERENCE
Sex	0.423 **	0.000	* at 0.01 level
Ethnicity	0.569 **	0.000	* at 0.01 level
Specialization	0.770 **	0.000	* at 0.01 level
Economic Status	0.201 *	0.031	* at 0.05 level
Math Grade	0.191 *	0.034	* at 0.05 level
Math Resiliency Score	0.662 **	0.000	* at 0.01 level
Math Anxiety Score	0.528 **	0.000	* at 0.01 level
Attitude Towards Mathematics	0.809 **	0.000	*at 0.01 level

**Table 2. Regression parameters on the mathematics performance of the students**

PREDICTORS	ADJUSTED R2	REGRESSION COEFFICIENT	STANDARD ERROR	T-VALUE	PROBABILITY
Constant		78.2			
Math Teachers Specialization	0.348	0.287	.074	-3.879	.000
Grade Point Average	0.392	0.153	.053	2.897	.005

F-value for regression (df = 2/101) = 34.174