On Mathematics Anxiety and Achievement of BSHRM Students in Surigao City, Philippines

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Abstract: *Mathematics anxiety is an intense feeling of uneasiness about one's ability to do mathematics, interfering achievement in the subject. The study aimed to describe the relationship between mathematics anxiety and mathematics achievement, and the respondents' profile characteristics, including the extent of student-teacher rapport. The sample comprised of 109 BSHRM students (32 males and 77 females) selected through stratified sampling. Mathematics anxiety was measured using the internally reliable Mathematics Anxiety Rating Scale-Philippines, the student-teacher rapport using the Instrument for Teacher-Student Rapport, and mathematics achievement using the respondents' performance in College Algebra. A descriptive-correlational design was used, where Pearson product-moment correlation, analysis of variance, and linear regression modelling were the means to analyze the data. The results revealed that mathematics anxiety has a significant negative correlation with mathematics achievement. In addition, it was found that the respondents significantly differed among each other when grouped based on the extent of student-teacher rapport, but no differences when they were grouped based on gender, age, and type of high school they graduated. There is a cubic polynomial function model that describes the relationship between math achievement and anxiety. These findings suggest that student-teacher rapport is an important factor to mathematics anxiety and achievement. Also, a student support program relevant to enhancing self-efficacy, classroom atmosphere, class participation, and study skills may be designed to facilitate mathematics education of students with anxiety in the subject.*

Keywords: Mathematics Anxiety, Mathematics Achievement, Hotel and Restaurant Management

I. INTRODUCTION

Math anxiety has been known for the past decades as interfering factor for math achievement and this incidence has significantly risen exponentially among college students. It is defined as an intense emotional feeling of uneasiness that people have about their ability to understand and do mathematics (Magna Carta). People who suffer from Math anxiety feel that they are incapable of doing activities and classes that involve math. Some Math anxious people even have a fear of math; it is called math phobia. Effandi and Norazah (2007) defined Math anxiety as an emotional, rather than intellectual problem which interferes with a person's ability to learn Math and therefore results in an intellectual problem. It is existed around a set of circumstances in which students suffered from fears that were based upon years of painful experiences with mathematics (Miller & Mitchelle, 1994).

Lazarus (1974) believed that the roots of mathematics anxiety are in the elementary and secondary grades. In a similar vein, Jackson and Leffingwell (1999) have linked mathematics anxiety to prior experience with formal instruction in mathematics at the elementary and secondary level. In order to minimize the level of anxiety and enhance the achievement of the students, Miller and Mitchell (1994) suggested that Instructor should create a positive learning environment, free from tension and possible causes of embarrassment or humiliation.

Now, there were a lot of studies that could prove a strong negative relationship between mathematics anxiety and achievement of college students however, as to the knowledge of the researcher there was no given specific insights from the previous studies to be used for an intervention program to address such problem and there was no linear regression model that could deeply show the relationship between these variables, thus this study is conducted to connect the gap. This study assessed the anxiety level and achievement in College Algebra of Freshmen HRM students of Surigao City, to determine the relationship between these variables and make an appropriate linear regression model.

II. LITERATURE REVIEW

In a study conducted by Rokiah and Mazlina (1998) on first year engineering students, it was found that students had negative attitudes towards mathematics. Some students do well during mathematics lessons and assignments yet fail to perform well in examination. Although there are many diverse reasons for the poor performance in mathematics. Crawford (1980) found that a student's lack of success with Math might be caused by any one of several factors: a poor Math instructor at some point; an insufficient number of Math courses in high school; unintelligible textbooks; or misinformation about what math is and what it is not, as well as who should do well in Math. Crawford also found that many people often blamed their failures on their lack of a mathematical mind, the notion that men were better than women at Math, or that they had poor memories or learning disabilities rather than any of the other aforementioned obstacles but the most prevalent variable worth considering for math achievement is mathematics anxiety which not mentioned above. The said anxiety is rampant among the college students population (Betz 1978). Many college students have even chosen their college major in thebasis of how little Math is required for the degree. One of the courses which has less number of math subject(s) where my study was sampled is the Bachelor of Hotel and Restaurant management (BHRM).

Studies conducted by Hardfield et al (1992), Satake and Amato (1995), and Ma (1999) found that the relationship between mathematics anxiety and mathematics achievement is significant. Studies by Rahmah (1999), Ahmad Sukri et al. (1996) and JasmaniBidinetal. (2005) found that a majority of Malaysian students have moderate level of mathematics anxiety. It was also found that once math anxiety takes shape, its relationship with math achievement is consistent across the levels. Effandi and Norazah (2007) revealed a low ($r = -0.32$) but significant ($p<0.05$) negative correlation between mathematics anxiety and mathematics achievement. A high level of anxiety is associated with a lower level of achievement (Quilter and Harper, 1988).

III. METHODOLOGY

The study would make use of the descriptive - correlational type of research undertaking which is definitive of the perceptions and conditions on Math anxiety of the respondents. The First year HRM students of Surigao City were taken as respondents of the study which is composed of 50% plus one in every school as sample; 71 first year HRM students in SSCT, 17 students in STI, 6 students in SEC and 15 students in SPUS; comprising the total sample of 109 students. Questionnaire was the only instrument used to gather data. Two instruments were used in gathering the data; Self – Test for Mathematics Anxiety and Instrument for Student – teacher rapport. The Mathematics Anxiety Rating Scale – Philippines (MARS – P) was adopted from Freedman (1997, www.google.com) with slight modification to suit the level of comprehension of the students. The intent of this instrument was to measure the students' classroom mathematics anxiety. It was composed of 15 items describing the different emotions felt by the students before, during, and after mathematics class. This was conducted to the study groups before and after the treatment period. This instrument utilized also the four-point Likert scale. Each item of this scale was rated on a four – point scale rating, from very much extreme – 4 to normal – 1. Psychometric properties of this scale was computed by the researcher. The correlation between scores on MARS-P and MARS (Freedman 1997) was 0.82. Three weeks test – retest reliability of the scale was 0.84 and internal consistency alpha coefficient was computed 0.87. The Instrument for Teacher-Student Rapport (ITSP); with 15 – item self- report instrument on a four response Likert Scale. This instrument was designed to gather information about teacher- student rapport. The four response options range from 1 = Not observed at all to 4 = Very much observed. The psychometric properties of this scale has shown that internal consistency alpha coeffient was computed 0.81. The researcher sent a letter request for permission to conduct the study from the President/Administrator of each school and personally administered a self-test for Mathematics anxiety and student-teacher rapport to on the same day of their usual schedule of classes.

IV. RESULTS AND DISCUSSION

As to the profile of the respondents. There were 77 female respondents with an equivalent percentage of 70.60%. However, there were 32 male respondents only with an equivalent percentage of 29.40%.

The anxiety level of the respondents is normal on indicator 1 with a mean of **1.50** "I tend to be absent in math class" which implied that they have normal level of math anxiety on this item and so the anxiety is very much tolerable.

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However they have very high level of anxiety on the indicators 9 with a mean of **2.51** "Math is not so tough now; but it is going to get really hard soon", 13 with a mean of **2.51** "I understand math now, but I am worried that it is going to be more difficult soon" and 15 with a mean of **2.65** "I am worried about the previous test results in math" which meant that the anxiety is intense and hard to control. In general, the level of Math anxiety of the respondents based on the given indicators was **2.09** which implied that they have a little bit or somewhat level of math anxiety so therefore the math anxiety that they have is only manageable.

In the data analysis on the teacher – student rapport, the items 5 "not tolerant of my weaknesses",9 "too rigid in the requirements", 11 "too fast to discuss the topics", 12 "attentive only to students who perform well in math", and 14 "not so strict to enforce classroom discipline" are being observed by students while the rest of the items are not observed at all. The average student – teacher rapport is 1.66 with SD = 0.641 which indicates that the teacher – student rapport of the respondents is not observed at all so it is qualitatively described as positive.Based on the gathered data after doing the descriptive analysis, the mean average of the achievement level of BSHRM students in Surigao City measured in terms of their grades is only 79.61 (SD=5.34) which means that they have poor performance in math.

Difference on the Students' Mathematics Anxiety Level as to Gender, Age, Type of high school graduated, and Student – teacher rapport.

The probability of the difference on the students' Math anxiety level as to gender, age and type of high school graduated are **.57, 0.76, and 0.25** respectivelywhich are greater than **.05** level of significance, it means that the null hypotheses should be accepted. It indicates also that there is no significant difference on the level of Mathematics anxiety as to gender, age, and type of high school graduated.

While the probability of the difference on the students' Mathematics anxiety as to Student – Teacher Rapport is **.02** which is less than **.05** the level of significance, it implies that the null hypothesis is rejected. This result revealed that there is a significant difference on the level of math anxiety as to Student – Teacher Rapport, it further implies that if the rapport of the teacher is positive, the level of math anxiety of the students is low and otherwise.This finding supports previous studies that strong teacher-student rapport is associated with greater motivation to learn as well as improved academic performance (Benson, et al., 2005; Borman& Overman, 2004; Downey, 2008; Johnson, 2008). Voelp (2005) found that the relationship students have with their teacher directly impacted academic success and overall learning. All students surveyed perceived that a positive connection with their teacher increases their desire to learn and to take ownership in their learning.

Relationship on the Students' Mathematics Anxiety level and Achievement level

The probability of the relationship between the students' Math anxiety level and Achievement level is 0.0000005 which is less than .05 level of significance. It means that the null hypothesis is rejected. The result revealed that *there is a relationship between mathematics anxiety and achievement*..
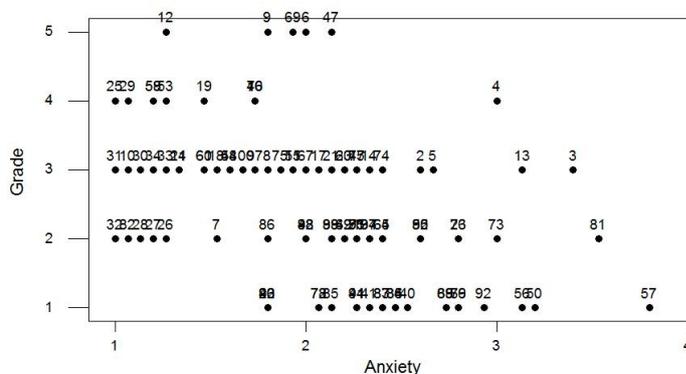

Figure 1. Plot of the Mathematics Achievement of the respondents versus math anxiety

This indicates that as math anxiety scores increase, achievement scores decrease. This finding is consistent with the studies of Betz (1978), Ma (1999) and Woodard (2004), which revealed a negative relationship between these two

variables. Although the magnitude of the correlations calculated is not very high, teacher should be aware of the needs and the capabilities of the students with different mathematics anxiety levels when designing teaching strategies for them

The above plot shows that the model Grade = 4.05 -0.792 (Anxiety) doesn't fit for this type of data because the R-squared is 18.4% only. So there is a need to play the data, We get the average of the grades with the same anxiety level to have new generated grades. The Plot below shows the new plot after doing the play.

As shown above there some possible patterns that can be formed to describe the relationship between math achievement and anxiety.
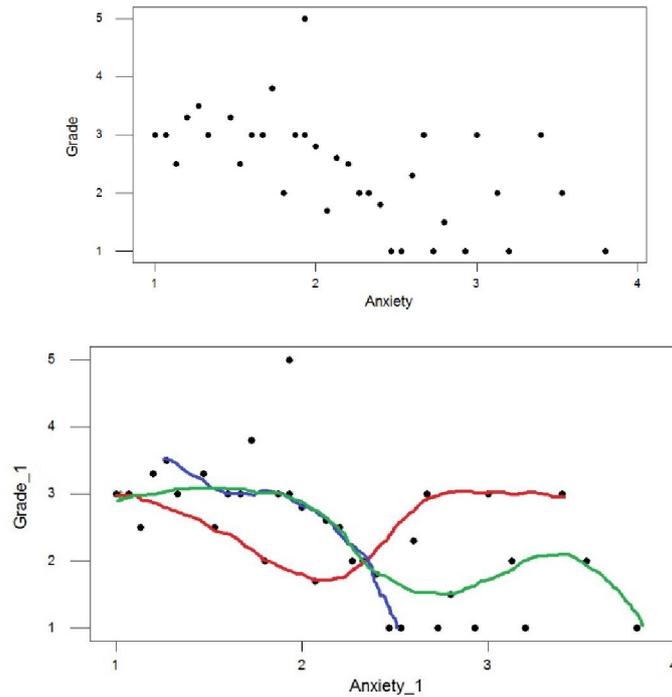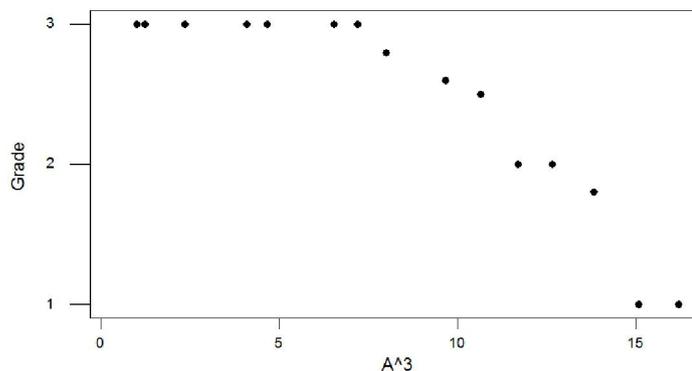

Figure 2. Plot of G2 versus A

The above plot shows the three patterns formed after connecting the points. But there's a need to show the relationship between the variable of each pattern.

The regression equation is
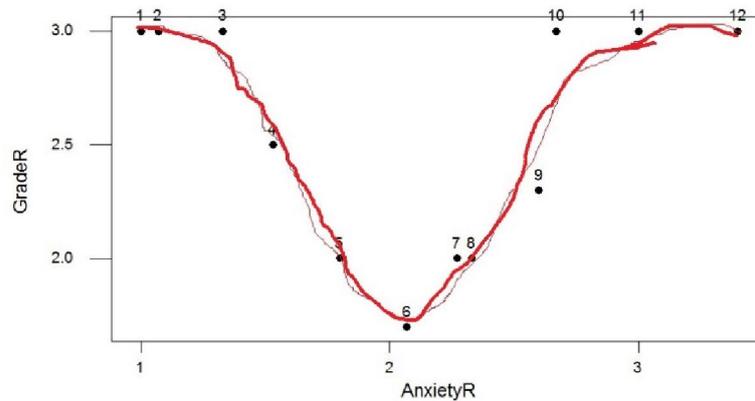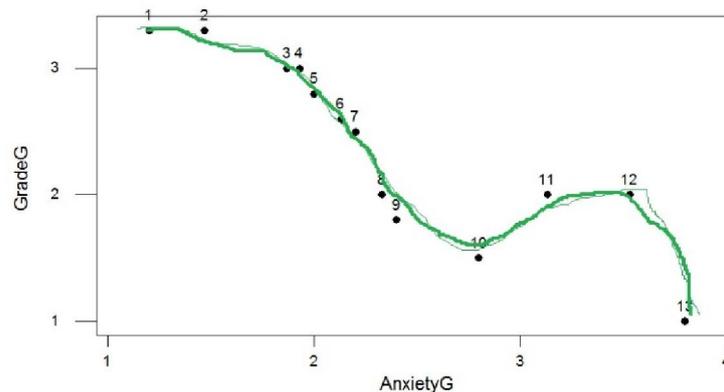Grade = 8.29 - 1.91 A^3 + 8.27 A^2 - 11.6 Anxiety

Figure 2. Plot of G2 versus A^3, A^2, Aniety

Regression Analysis: GradeR versus AnxietyR, AR^2, AR^3

The regression equation is

GradeR = 8.38 - 7.81 AnxietyR + 3.01 AR^2 - 0.344 AR^3

$S = 0.3407$ $R\text{-}Sq = 68.1\%$ $R\text{-}Sq(adj) = 56.1\%$

Regression Analysis: GradeG versus AG^3, AG^2, AnxietyG

The regression equation is Grade = 4.35 + 0.077 A^3 - 0.40 A^2 - 0.35 A

$S = 0.3682$ $R\text{-}Sq = 80.2\%$ $R\text{-}Sq(adj) = 73.5\%$

V. CONCLUSION

Under general classroom condition, the negative correlation is noted between math achievement and anxiety and is best described by the polynomial function model of third degree in a 'ceteris paribus' setting. This means that there is a certain range of math anxiety where grades are unaffected but beyond that range of anxiety there is a gradual, albeit imperceptible decline in the performance of the students. It is recommended to make models which will have a larger R squared.

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