Nexus Between Affective Factors And Mathematics Achievement Of Students In College Algebra

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Abstract: The study focused on the relationship between some affective factors and mathematics achievement of BS Accountancy students in College Algebra. It utilized a descriptive research which is an initial research into a hypothetical or theoretical idea of Blooms Model on mathematics learning. The researcher observed and sought to understand more about the link between the students' mathematical self-concept and mathematical anxietsy to their mathematics achievement in College Algebra. A random sample of 237 BS Accountancy students using .05 margin of error, who took Math 103 for the first time and currently enrolled in the second semester of AY 2016 were considered in the study. A 29-item self-report scale (Mathematics Self-Concept) and 40-item on Mathematics Anxiety were administered to the respondents. And the students' mathematics achievement was based on the obtained final grade in College Algebra. Most of the respondents obtained a grade ranging from 2.51 to 3.0 described as low with a mean grade of 2.335 described as average performance. It was found out that majority of the respondents of which comprise 54 percent or 127 out of 237 showed high level of mathematical self-concept. In terms of mathematical anxiety, 56 percent showed average level. The students' performance in College Algebra was found to have a significant relationship with their mathematical self-concept and mathematical anxiety. The gamma coefficient of .34 indicates moderate positive correlation between students' performance in College Algebra and mathematics self-concept while -0.53 showed high negative correlation between mathematical anxiety and performance in College Algebra. Based on the result of the study, the researcher proposed activities on minimizing test taking errors, evaluation of mathematics teachers' teaching behaviors and developing better self.

Keywords: Mathematics Achievement, Affective Factors, Mathematical Self-concept, Mathematical Anxiety

Introduction

The shift from an industrialized society to the age of information has changed the mathematics that individual need to learn. Over 75 percent of all jobs require proficiency in fundamental algebraic concepts, either as a prerequisite for advanced training, or as part of a licensure program. Employees must be able to use algebraic tools to translate problem situations involved in a given field to mathematical models that can be solved. In addition, Algebra is used in nearly every scientific discipline. The most common and familiar uses of algebra are the many formulas that relate to business, industry, science and technology. Examples of these uses include formulas for bank interest, installment loans , service and pricing options for management information system. Variables, functions and relations are useful in analyzing situations involving costs, prices, rentals and profits. Algebraic expressions and equations serve as models for interpreting and making inferences about the data. While algebraic reasoning and symbolic notations also serve as the basis for the design and use of computer spreadsheets. College Algebra or known by its course number Math 103 is a 3-unit course intended as a preparatory course to Calculus and Statistics subjects for BS Accountancy program. As such, Math 103 is a gateway to higher mathematics and to other sciences courses as well. Clearly, high quality of performance among the students who will take the subject is sometimes axiomatic to ensure continuity of the instruction process. However, over the years the dismal performance of the students in this subject due to increase rate of dropped outs and failing rates raise concerns among the faculty member and even the school administration. Because this results would mean redoing the class schedules and teaching loads since the expected students did not pass the pre-requisite course. These changes in the schedule will normally involved abolishing sections for the higher courses and opening of new ones for the repeaters. These problems maybe purely administrative in nature, but there are concomitant problems pertaining to the students and faculty members as well. Due to the high rate of failure among the students, they tend to become frustrated, thereby, causing them to shift programs or transfer to another school. On the other hand, teachers are disappointed especially when they claimed to have done their very best in teaching the subject. This scenario causes insecurity to both students and teachers. According to Ben Bloom model (1995), in learning mathematics there are several variables that contribute to student success. These variables fall into three categories: cognitive entry skills 50 percent, quality of instructions 25 percent and affective characteristics 25 percent. Cognitive entry are skills are the students' abilities to do mathematics and their previous math knowledge. Quality of instruction is based on the textbook, curriculum design, tutorial services, lab resources and the match between the instructor and students' learning style. Moreover, the affective characteristics are personality, self-concept, attitudes, locus of control, anxiety and study habits. However, the most neglected area in colleges today is the students' affective characteristics. This is also the easiest to improve because it calls for a change in student behavior instead of instructor behavior. In this study, the researcher attempted to determine the effect of some affective factors on the students' failure in College Algebra. These include the students' mathematical self-concept and mathematical anxiety. Anxious students may become preoccupied with and apprehensive or worry about their performance, and these intrusive thoughts may undermine the students' self-esteem, interfering with their ability to sustain attention to task relevant instructional materials, thereby preventing students from engaging in cognitive operations that would facilitate test performance. In terms of students' self-concept, they may tend to have a higher academic self-concept after experiencing academic success. They may develop higher appraisals of their academic ability, which in turn often stimulate them to work harder and achieve more. Based on the results of the study, the research intend to proposed activities that will help students gain positive regard of one's

mathematics self and lessen their mathematical anxiety to ensure better performance in College Algebra.

Objectives of the Study

The study aims to determine the association of some affective factors to the mathematics achievement of BS Accountancy students in College Algebra AY 2016 with an end view of proposing activities to enhance their performance in the said subject. Specifically, the researchers consider the following specific objectives

1. To determine the mathematics achievement of first year BS Accountancy students in College Algebra.
2. To assess the students in terms of the following affective factors:
   2.1 mathematical self-concept;
   2.2 mathematical anxiety
3. To determine the association between students mathematics achievement and the aforementioned variables.
4. To propose activities that may enhance students mathematics achievement in College Algebra.

Research Design

The study is a descriptive type of research. It utilized an exploratory research,which is an initial research into a hypothetical or theoretical idea of Blooms Model on mathematics learning. The researcher observed and sought to understand more about the link between the students' mathematical self-concept and mathematical anxiety to their mathematics achievement in College Algebra.

Respondents of the Study

A random sample of 237 BS Accountancy students using .05 margin of error, who took Math 103 for the first time and currently enrolled in the second semester of AY 2015 were considered in the study.

Data Gathering Instrument

A 29-item self-report scale Mathematics Self-Concept (Gourgey, 1982) with reliability of .96 measured attitudes, beliefs and feelings about one's ability to learn mathematics. Half of the items were worded positively and half negatively. Item responses used a 5-point scale ranging from strongly agree to strongly disagree and after reverse scoring the total score ranges from 29 (low self-concept) to 145 (very high self-concept). The Mathematical Anxiety consists of 40-item was administered to the respondents. The test consists of 20 positive and 20 negative items. The scale involved a five-point frequency scale ranging from never to always. The highest score is 200 (very low) and the lowest score is 40 (very high). For the students' mathematics performance it was based on the obtained final grade in College Algebra.

Data Gathering Procedure

In conducting the study, the researcher sought the approval of the college dean. Using the standardized questionnaires pertinent information on the students mathematical anxiety and mathematical self-concept were attained. While students grades were requested from the registrars office. Finally, results of the actual survey were tabulated and analyzed using different statistical tools. In order to further explain the gathered data, an informal interview among Mathematics teachers was also facilitated.

Statistical Treatment of Data

The data obtained were treated using various statistical treatments necessary to determine the natural tendencies of responses. Percentage and gamma correlation coefficients were utilized in the study.

Results and Discussions

1. Mathematics achievement of the first year BS Accountancy students in College Algebra

Table 1: *Performance of the Respondents in College Algebra*

Performance	f	%
Very High	39	17
High	36	16
Average	46	19
Low	85	35
Failed	31	13
Total	237	100

Generally, the selected BS Accountancy students obtained a mean grade of 2.78, which is described as low performance. These are the students who gained a passing grade from 2.51 to 3.0. The results may be attributed to the students' examination since it comprises 80 percent of their final grade. This is followed by 19 percent of the students who obtained a grade from 2.01 to 2.50. while only 17 percent obtained a grade ranging from 1.0 to 1.50. According to the faculty members teaching the subjects, the college required them to have a departmentalized examination. Hence, they need to face followed the topics from the syllabus that sometimes makes it difficult for some of the students to follow the topics.

2. Assessment of the Respondents in terms of the following affective factors:

2.1mathematical self-concept;

Self-concept is fed by daily experiences of the students relative to learning mathematics.

Table 2: *Level of Self-concept of the Respondents*

Performance	f	%
Very High	15	6
High	127	54
Average	92	39
Low	3	1
Very Low	0	0
Total	237	100

It was noted from that more than half of the students were found out of having a high level of mathematical self-concept. These students tend to show enjoyment and satisfaction in dealing mathematics problems. They also showed greater appreciation and give importance on mathematics as an integral part of their everyday life. According to the teachers, their students showed interest in learning the topics presented as indicated by their regular attendance in the class as well as the timely submission of requirements like problem sets and exercises. This is supported by Teague and Austin-Martin study that viewed mathematical self-concept as a generalization of confidence in learning mathematics. However, 95 out of 237 or 40

percent were found of having average to low level of mathematical self-concept.

2.2 mathematical anxiety

Mathematical anxiety is considered to be related to test anxiety, worry and emotionality which also to be the most stable component of general and state anxiety. The table shows that about 56 percent of the respondents showed average level of mathematical anxiety or 132 out of 237.

***Table 3**: Level of Mathematical Anxiety of the Respondents*

Performance	f	%
Very High	2	1
High	7	2
Average	132	56
Low	96	41
Very Low	0	0
Total	237	100

These students showed somewhat difficulty in understanding mathematical concepts resulting to low scores in the given test. As profess by the Math instructors most of their students tend to be anxious in taking examination. Some of them exhibited apprehensions in dealing word problems and in simplifying complex algebraic expressions. Moreover, the instructors pointed also that most of the test results were given deductions due to errors committed which may be attributed to concepts learned during their secondary level. However, it was noted that 41 percent of the respondents exhibited low level of mathematical anxiety.

3. Significant Association between the students' mathematics achievement in College Algebra to their mathematical self-concept and anxiety

***Table 4:** Relationship of Students' Performance to their mathematical anxiety and mathematical self-concept*

Variables	p-values	GC	Decision on Ho	VI
Mathematical Self-concept	.021	.34	Reject	S
Mathematical anxiety	.001	-0.53	Reject	S

GC-Gamma coefficient VI-Verbal Interpretation S-Significant

The table shows the relationship between the students' performance in college algebra and their level of mathematical self-concept and mathematical anxiety. Since the p-values are both lower than .05 level of significance, then the computed gamma correlation coefficient of .34 and -.053 are found to be significant. Specifically, the positive correlation coefficient between the students' performance and mathematical self-concept indicates that students who have high level of mathematical self-concept tend to perform better in college algebra. The results is parallel with the result of De Leon [4], which showed that mathematics high achievers tend to exhibit more confidence in dealing mathematics problems. However, the negative correlation coefficient indicates that students with high mathematical anxiety tend to perform less in college algebra. Because students who obtained low grades in college algebra expressed of experiencing difficulty and apprehension in dealing math concepts and lack of confidence during the test and evaluation of assignments and exercises.

4. Proposed activities to enhance students performance in College Algebra

Since most of the students showed average to high mathematical anxiety and high in mathematical self-concept, the proposed activities focused on lectures in taking test and teachers strategies and practices. These is expected to lessen students apprehension in taking examinations by understanding their interest and abilities through the help of their teachers. Similarly, the classroom activities to be facilitated by teachers may possibly encourage students engagement in learning mathematics concepts. Some of these activities are Interactive Learning Problem Solving activities, Self-analysisand group dynamics exercises.

Conclusions

Based on the findings, the following conclusions were drawn.

1. Generally the performance of students in College Algebra was low.
2. The first year BS accountancy students have high regards on the value of mathematics but are preoccupied about their performance.
3. The mathematical self-concept has positive relation to performance while mathematical anxiety has negative relation and showed to have the highest effect on the students' performance in Math 103.
4. The proposed activities will enhance students' performance in College Algebra.

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References

[1]. Atkinson, rita I, (1996), Hilgards Introduction to Psychology, 12th ed. Harcourt Brace and Company

[2]. Kaplan, Paul S. (1998), The Human Odessey:Life Span Development, 3rd ed. Brooks/Cole Publishing Company

[3]. Cheong, Y.F., Pajares&Graham,:.H. Self-efficacy, motivation and mathematics performance of middle school students: a development study

[4]. De Leon, Margarita P. "Relationship between General Self-Concept and Academic Achievement of Grade Seven High and Low Achievers of Ateneo de Manila Grade School Year 1998-1999.

[5]. Marsh, Herbert W. (1992), Content Specificity of Relations Between Academic Achievement and Academic Self-concept, The Journal of Education Psychology Vol 84, No.1

[6]. Teague, PT and Austin Martin, G.G (1991), Effects of Mathematics methods Course in prospective elementary school teachers' math attitude, math anxiety and teaching performance. ERIC Document Reproduction Service No. Ed, 200 557

Author Profile

Dr. Realiza M. Mame received her BS Mathematics at University of the Philippines, Los Banos, MS in Mathematics at Batangas Sate University and Doctor in Mathematics Education at Batangas State University in 1990, 2005 and 2016 respectively. She has been working at Batangas State University since 1998 teaching Mathematics, Statistics and Research both in the undergraduate and graduate programs of the university. Currently, she is designated as Assistant Director for Education, Mathematics and Social Science.