

Mathematics in the Freshman Year: A Glimpse into Student Achievement and Attitudes

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Abstract

Mathematics plays a vital role in any aspect of a person's day to day life. Competency in this subject is necessary because it reflects a person's higher level thinking skill. To keep pace with the students' competency in mathematics, it is necessary to evaluate their skills from time to time and take a look at their attitudes towards the subject. It is on this basis that this study was conducted. The researcher looked into what mathematics subject (college algebra or college trigonometry) does college freshman students show higher achievement. The researcher also evaluated the attitude of the college freshman students towards mathematics. Test results show that students fared better in college algebra than in trigonometry, although scores in both subjects were categorized as good. The positive attitude towards mathematics can be considered an opportunity for teachers to devise strategies that would further enhance student achievement in the subject.

Keywords: Mathematics, Competency etc.

1. Introduction

The role of mathematics in our culture and its significance to an individual's day to day life has already been given due recognition. It cannot be denied that mathematics is considered the mother of all learning in both arts and sciences (Andaya, 2014). It is necessary in every fact of life and with the advances of information technology this perspective on Mathematics has gained even more ground.

While at least basic skills in mathematics should be acquired by students, only a few have the competencies in this field. Various factors exist that hinder majority of students to understand and apply mathematics concepts. Leongson (2003), for example, found that while Filipino students excel in knowledge acquisition, they are nevertheless poor in higher order thinking. This alarming state is made more visible with the poor performance of most students in national and international surveys on mathematics and science competencies.

College students, particularly, have to be given emphasis with regards to their Mathematics performance. In fact, it is posited that there are several factors that influence academic achievements of students, including socio-economic and demographic characteristics of students such as sex, age, course, place of residence, educational attainment of parents, occupation of parents and others. Attitudes of students have been pointed out as another factor of mathematical

achievement (Saritas and Akdemir, 2009; Mbugua *et al.*, 2012; Andaya, 2014; Osen, 2007; Lamb and Fullarton, 2001).

A better understanding of the students' performance would show the direction of help to be given to those who have poor achievements in mathematics (Grouse and Cebulla, 2000; Kantrov, 2000; Tuminaro and Redish, n.d.). It is on this premise that this study was conducted. Specifically, the researcher aims to investigate the achievement and attitudes of the College Freshman Students enrolled in mathematics subjects at the six of the ten campuses of Capiz State University in the school year 2014-2015. More specifically, it attempted to provide answers to the following questions:

1. In what mathematics subject (college algebra or college trigonometry) do the college freshman students show higher achievement?
2. What is the attitude of the college freshman students towards Mathematics?

Theoretical Framework

This study was anchored on Piaget's theory of cognitive development. A keen observer, Piaget noticed a pattern of errors in the children's thinking, such as confusing part-whole relationships and being unable to classify objects correctly (McLeod, 2009). He believed these errors were not simply mistakes but represented distinct ways of

Table 1 Total number of enrolment and sample size per course

School	No. Of Enrollment/ Course				Total	Sample Size/School				Total
	Agri.	Fish.	Educ.	For.		Agri.	Fish.	Educ.	For.	
Mambusao	33	0	51	13	97	25	0	34	12	71
Tapaz	21	0	0	0	21	17	0	0	0	17
Dumarao	12	0	0	0	12	11	0	0	0	11
Sapian	0	3	0	0	3	0	3	0	0	3
Pontevedra	38	145	64	0	247	28	59	39	0	126
Pilar	5	0	36	0	41	5	0	26	0	31
Total	109	148	151	13	421	86	62	99	12	259

thinking in children. Piaget was less concerned with whether children answered questions correctly than with the reasoning children used to arrive at their answers. He believed that the best way to understand how children think is to observe them closely as they interact with objects and solve problems. Furthermore, Piaget’s theory has to do with the nature of knowledge itself and how humans eventually acquire, construct, and use this knowledge since cognitive development is a mental process that stems from biological maturation and on the environment on which the person is exposed. Thus, in Mathematics teaching, the learner’s cognitive capacity is not just the sole factor that determines his proficiency. Classroom environment also has its share.

Methodology

This study used the descriptive-qualitative research method to find out the mathematical achievements of college freshman students and they attitude towards mathematics. A questionnaire was used to gather information on their attitudes toward mathematics subjects while a test was administered to determine their mathematical performance. Likewise, a key informant interview (KII) was conducted to qualify their responses and determine their thoughts about mathematics.

Freshman college students enrolled in mathematics during the school year 2014 – 2015 in the six of the ten campuses of Capiz State University were the respondents of this study.

The total number of respondents coming from the six campuses is found in Table 1. The table also reflects the sample size for each particular school or campuses per course taken.

After obtaining permission to conduct the study had been granted, scheduled visits to the six campuses of the university were arranged to administer the instruments to the respondents. The tests and questionnaire were personally administered by the researcher to be assured of one hundred percent retrieval.

Results and Discussion

Mathematical Achievement of Students

The highest score obtained in algebra by the respondents was 24 and the lowest was 3. A third of the students

(38.61%) yielded very poor results, while less than a quarter (22.78%) was categorized as poor. Nevertheless, more than a third got scores which was categorized as (38.61%) good and very good (35.91%), although a handful obtained scores categorized as outstanding (1.93%). The mean score in algebra was 13.77, which was good.

For the students' proficiency in trigonometry, more than a third yielded good (38.61 %) and very good (31.27%) results. A quarter fared poorly (27.03%), while a handful was very poor and outstanding. The mean score of 12.98 revealed good performance of students in trigonometry.

Table 2 Distribution of respondents according to their mathematical achievement

Scores	Category	Frequency	Percent
Algebra			
21-25	outstanding	5	1.93
16-20	very good	93	35.91
11-15	good	100	38.61
06-10	poor	59	22.78
01-05	very poor	2	0.77
Total		259	100
Mean =13.77			
Trigonometry			
21-25	outstanding	1	0.39
16-20	very good	81	31.27
11-15	good	100	38.61
06-10	poor	70	27.03
01-05	very poor	7	2.7
Total			
Mean =12.98			

Critical ratio revealed (as shown in Table 3) that a significant difference between students’ performance in algebra and trigonometry. This implies that college freshman students performed better in algebra than in trigonometry.

The result of the study is supported by the supposition of Lambitco, *et al.* (2007), who found that students have satisfactory performance although substantial high school preparation is compounded by poor alignment between high schools and colleges in the field of mathematics. This

Table 3 Comparison of the performance of the students in Algebra and Trigonometry tests

Subject	Stud. getting mean & above	Percent	SEM	S.D	SED	C.R	Prob. 5%
Algebra	198	76	0.25	4.05			
Trigonometry	182	70	0.26	4.2	0.26	2.09	s.

is the cause of "expectation gap" between what college requires and what high schools produce. On the other hand, the assessment conducted by National Assessment of Educational Progress (2004) in the United States reported overall gains in achievement although most students still perform below levels considered proficient or advanced by a national panel of experts. Likewise, the Grouws and Cebulla (n.d.) supported the results of this study with their findings of excellent mean student achievement scores in mathematics. The link between student mathematics achievement and opportunity to learn was also found in subsequent international studies, such as the Second International Mathematics Study (McKnight *et al.*, 1987) and the Third International Mathematics and Science Study (TIMSS) (Schmidt, McKnight & Raizen, 1997).

Respondents' Attitudes toward Mathematics Subjects

More than half of the respondents "agreed" that studying math is enjoyable (59.85%), that this subject makes them feel comfortable (59.07%), and that they enjoyed the assigned work, particularly problem solving (56.76%). Furthermore, more than a third of the student's agreed that they like math the most (30.88%), that they are interested to acquire knowledge in math (44.40%) and that knowing math makes one successful in life (30.89%). The following are what some students had to say about why they find mathematics interesting.

Mathematics has always been fascinating for me ever since I was elementary that is why I choose this as my major for my college degree. It is a pivotal subject on which so many others depend (such as physics and chemistry)...

Mathematics is a subject that I have thoroughly enjoyed throughout my school years. The challenge of thinking and the process of logic always attract me to Mathematical problems, however difficult and regardless of the form in which they come...

I am extremely enthusiastic about my decision to read Mathematics. From learning to count at primary school, to studying math in high school, I found this subject intriguing due to its obvious application to the real world...

However, there were also a considerable number of students who were unsure if math is interesting (38.61%) and if math makes students inquisitive (38.61%). Also, almost half of the students disagreed that math has greatly contributed to science (42.08%) and math develops a person's thinking skills (43.63%). There was also a quarter who revealed that they were not interested in acquiring knowledge in math (27.03%) and another quarter who strongly disagreed (24.761) that make makes students inquisitive. These negative responses arose from the fact that these students were the ones who found math difficult and are struggling to make it through this subject. Sherman, Richardson, and Yard (2014) best discussed why the difficulty in this subject: the content being taught is unconnected to students' ability level and/or experiences, serious achievement gaps result; a student may find the mathematics curriculum to be more advanced or paced differently than what was being taught in the previous school; and, too few life experiences, such as trips to neighborhood stores or opportunities to communicate with others about numbers through practical life examples, can make math irrelevant for students.

Various studies have been conducted attitude towards mathematics among students, which could support the claim of this study that in general, there is a positive attitude towards mathematics. Students' success in mathematics depends upon attitude towards this subject, thus, it plays a crucial role in the teaching and learning process, although there are also factors that might intervene in students' perceptions towards this subject (Farooq and Shah, 2008). Meanwhile, Mohamed and Waheed (2011) found that the students' positive attitude towards mathematics is medium and there is no gender difference in their attitudes, although this serves as an opportunity for improvement on students' attitudes towards the subject. Meanwhile, Mata, Monteiro and Peixoto (2012) students held positive attitudes towards mathematics and also highlighted the main effects of grade and math achievement on these attitudes. It could be surmised that different but interrelated factors are contributory to student attitudes towards math and to an understanding of the defining characteristics of these attitudes in the school environment.

Table 4 Attitude of the respondents toward Mathematics subjects

Statements	Sa	A	U	D	SD	Total	Wtd.Total
1. Studying math is enjoyable	22 (8.49%)	155 (59.85%)	31 (11.96%)	32 (12.35%)	19 (7.33%)	259	906
2. Math makes me feel comfortable	50 (19.31%)	153 (59.07%)	3 (1.16%)	45 (17.77%)	8 (3.09%)	259	974
3. Math is very interesting	70 (27.03%)	80 (30.88%)	100 (38.61%)	8 (3.09%)	1 (0.38%)	259	987
4. I like math most	80 (30.88%)	112 (43.24%)	12 (4.63%)	50 (19.31%)	5 (1.93%)	259	989
5. Math has contributed greatly to science	50 (19.31%)	96 (37.05%)	0	109 (42.08%)	4 (1.54%)	259	856
6. I'm interested to acquire knowledge in math	115 (44.40%)	70 (27.03%)	3 (1.16%)	70 (27.03%)	1 (0.38%)	259	1005
7. Knowing math makes one successful in life	80 (30.89%)	100 (38.61%)	20 (7.72%)	30 (11.58%)	29 (11.20%)	259	949
8. Math develops a person's thinking and reasoning	10 (3.86%)	120 (46.33%)	5 (1.93%)	113 (43.63%)	11 (4.25%)	259	782
9. I enjoy the assigned work and solving problems in math	50 (19.31%)	147 (56.76%)	0	19 (7.34%)	43 (16.60%)	259	919
10. Math makes students more inquisitive	15 (5.79%)	30 (11.58%)	100 (38.61%)	50 (19.31%)	64 (24.71%)	259	659
Total	542	1063	274	526	185	259	9026

Conclusions

College freshman students in the six campuses of the Panay State Polytechnic College enrolled in mathematics for the school year 1988-1989 performed better in algebra than in trigonometry. Nevertheless, this does not imply that all students are good in algebra. There are still a number of students who fared poorly in this subject.

In general, students display positive attitudes toward mathematics, which could be used as an opportunity to strengthen their interest and develop their competency in mathematics, particularly in areas that need improvement.

Recommendations

Based on these conclusions, the following recommendations are offered:

- 1) Teachers should give more attention on students who found mathematics difficult to improve their achievement in this subject. If possible, remedial classes are suggested.
- 2) The school administrators should closely supervise teachers to ensure efficient and effective classroom management.
- 3) Since positive attitude towards mathematics is evident, it is recommended that the school offers higher mathematics subjects. This is one way of developing the potentials of those who show proficiency in mathematics but cannot afford to study in the city.

- 4) Further studies may be conducted to find out why many students prefer to take courses that have less mathematics subjects despite the positive attitudes toward these subjects.

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