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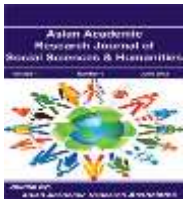

STUDENTS' PERFORMANCE ON MATHEMATICS DEPARTMENTAL EXAMINATION: BASIS FOR MATH INTERVENTION PROGRAM

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ABSTRACT

The study aimed to determine the performance of the students in the area of Mathematics particularly in Algebra and Trigonometry. The researchers used a retrospective study where documentary analysis in gathering the data was more appropriate. The data were gathered from the departmental examination given in Algebra and Trigonometry for the academic year 2011-2013. The respondents of the study were the students who took both the two subjects. The results revealed that the students who took the subjects for the two academic years were not able to meet the required criteria. On the other hand, study techniques were the common factor that affects the performance of the students in Mathematics. The researchers formulated an action plan to enhance the students' performance and for the intervention program. The researchers recommended to organize periodic seminar and workshops for students, teachers and school administrators to promote positive attitude towards mathematics and to conduct tutorials session to improve students' performance.

Keywords: Intervention, Performance, Positive Attitude, Mathematics

INTRODUCTION

Mathematics education has long been recognized as a major factor in development, prompting nations to emphasize this in their national agenda. An alarming observation of Filipino students reveals that they excel in knowledge acquisition but fare considerably low in lessons requiring higher order thinking skills. How students learn and how to measure student performance in these areas are thus a priority concern of policy makers and educators worldwide. It can not be denied that most of the prospective college students are unprepared for learning mathematics. The low understanding level accompanied by discouraging achievements of the students in Mathematics has become a cause of great concern of our country and has bothered badly the educationists.

As cited by Benito in the study of Cabatay et.al (2011) that mathematics is learned because of many reasons. Firstly, the mastery of basic mathematical skills is needed in order to cope with the demand of life. Such demands include being numerically literate, gaining tools for future employment, developing the prerequisites for further education, and appreciating the relationship between mathematics and technology. Secondly, mathematics is the language of the sciences, and many disciplines depend on this subject as a symbolic means of communication. Thirdly, mathematics education can play an important part in developing students' general decision making and problem solving skills.

Academic performance refers to how students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers. It is the ability to study and remember facts and the capability to communicate acquired knowledge verbally or down on paper, which are commonly measured by means of grades. Academic performance, which is measured by the examination results, is one of the major goals of the school. Schools are established with the aim of imparting knowledge and skills to those who go through them and behind all this is the idea of enhancing good academic performance.

The students' performance (academic achievement) plays an important role in producing the best quality graduates who will become great leader and manpower for the country; thus, responsible

for the country's economic and social development (Ali et.al, 2009). Educational services are often not tangible and are difficult to measure because they result in the form of transformation of knowledge, life skills and behavior modifications of learners (Tsinidou, Gerogiannis, & Fitsilis, 2010). The school personnel, members of the families and communities provide help and support to students for the quality of their academic performance. This social assistance has a crucial role for the accomplishment of performance goals of students at school (Goddard, 2003). Besides the social structure, parents' involvement in their child's education increases the rate of academic success of their child.

There is a range of factors that affect the quality of performance of students (Waters & Marzano, 2006). Obama (2004) asserts that parents have the primary responsibility of instilling an ethic of hard work and educational achievements in their children.

According to World Bank report (2007), in most developing countries, not enough Mathematics teachers are being produced by Universities and Colleges. Therefore, College and Universities graduates are being encouraged to pursue these courses purposely to fill the gap. Students' performance in mathematics subject has been investigated through bilateral surveys in two European countries (Robertson, 2000). Poor school performance not only results in the child having a low self-esteem, but also causes significant stress to the parents (Karande and Kulkarni, 2005). Teacher's quality supported by training and experiences has influencing role in effective teaching-learning. Teaching experience plays important role in success of education. Baruah (2010) revealed that mathematics performances of schools are positively correlated with (a) the academic performance of school indicated by school leaving pass percentage and also (b) with the performances in subjects other than mathematics. On the other hand, students and teacher ratio seems not to affect the mathematics performance of the schools under study. The requirement of urgent attention to improve the performance of secondary school is indicated considering the societal needs.

Lyceum of the Philippines University whose vision is to be a recognized university in the Asia Pacific Region is keen on quality assurance and maintenance of standards. Based on the meetings of the Dean and the faculty members under Mathematics Department they noted that

while some students perform highly, others, on the contrary, do not perform well. They are concerned about those who do not perform well because if this poor performance goes unchecked, the university may lose its reputation, which may result in loss of confidence in LPU graduates.

This study aimed to serve as basis in planning for the enhancement of instruction as well as the curriculum. This study will also help to determine the strength and weaknesses of the students in the area of Mathematics. In addition, this will be the backbone of the department in order to improve the performance of the students.

OBJECTIVES OF THE STUDY

The study generally aimed to determine the performance of the students in the area of Mathematics. More specifically, to present the performance of the students on departmental examination for the school year 2011 – 2012; identify factors influencing/affecting the performance of the students'; and propose plan of action to improve the passing rate in the departmental examination.

MATERIALS AND METHOD

The researchers utilized the retrospective study where documentary analysis in gathering the data was more appropriate. Retrospective study refers to study based on examination of existing data, on events that have already occurred. An ex-post facto type of research design was used because data were collected from the already existing school records which do not require the manipulation of the independent variables (Ajayi, 2011). The data of the study consist of rating performance of all students who took Math subjects such as Algebra and Trigonometry for the academic year 2010 to 2012. The main data were gathered from the results of Departmental exams of students filed at the College of Education Arts and Sciences, specifically from the students who took the exam during the semester (SY 2011- 2013). Interview was also used to validate all the data gathered. Descriptive statistics such as frequency distribution and weighted mean were used. Frequency distribution and weighted mean were utilized to determine the performance of students and teachers evaluation.

RESULTS AND DISCUSSION

1. Performance of the Students on Departmental Examination

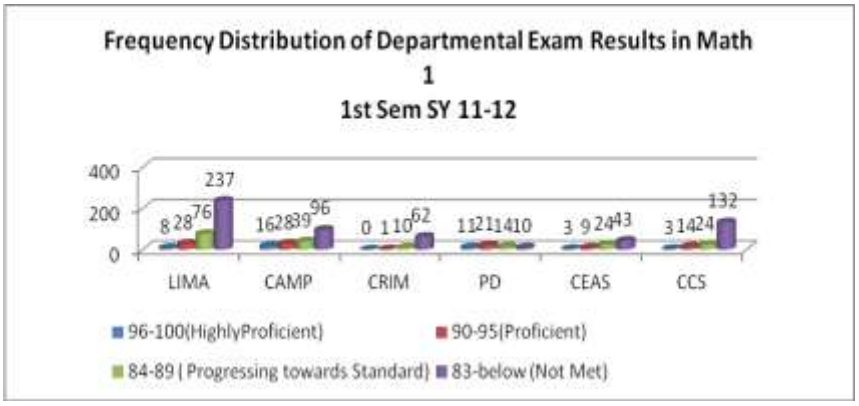

Figure 1. Frequency Distribution of Departmental Exam Results in Math 1

Based on the graph, it shows that there is poor performance with regards to College Algebra (Math 1) since "not met" obtained the highest frequency among all the colleges enumerated. It is followed by progressing towards the standard then by proficient. It can also be observed that there is few number who fall at the bracket of 96-100 or highly proficient. The result implies that students were find hard time analyzing and learning mathematical concepts. There are many techniques of how to teach algebra and no one way is the "correct" way. However, it was found out that one of the best approaches is for the Algebra to ease the student's anxiety, along with working a great deal of examples in an ordered sequence that show every single step to get the answer. This powerful combination of ideas can boost the student's confidence in Algebra, which is the most important element for continued success (Tsinidou,2010).

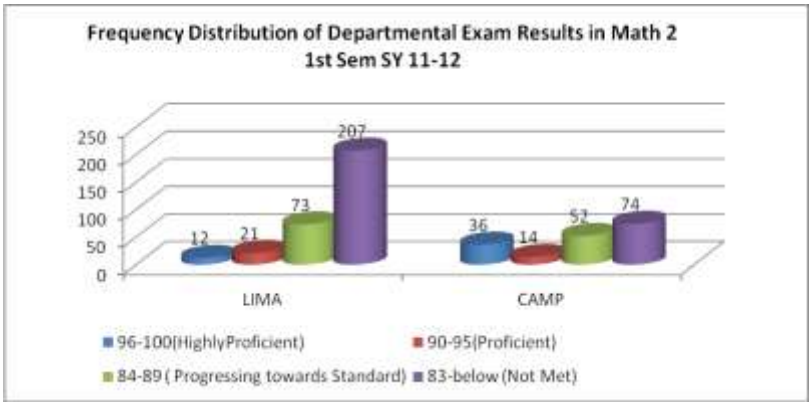

Figure 2. Frequency Distribution of Departmental Exam Results in Math 2 During 1st Sem SY 11-12

It was found out that from the two colleges LIMA and CAMP, both obtained the lowest performance of below 83 which fall under the criteria of not met. It was followed by those who were progressing towards the standard of 73 and 52 and those who are highly proficient got the lowest frequency of 12 and 36 respectively. Students have difficulty constructing coherent understandings of trigonometry and trigonometric functions This study conjectured that their weak understandings of angle measure and compartmentalized knowledge of right triangle and unit circle trigonometry are sources of the problem. The response was to devise an instructional sequence to promote these foundational understandings and connections.

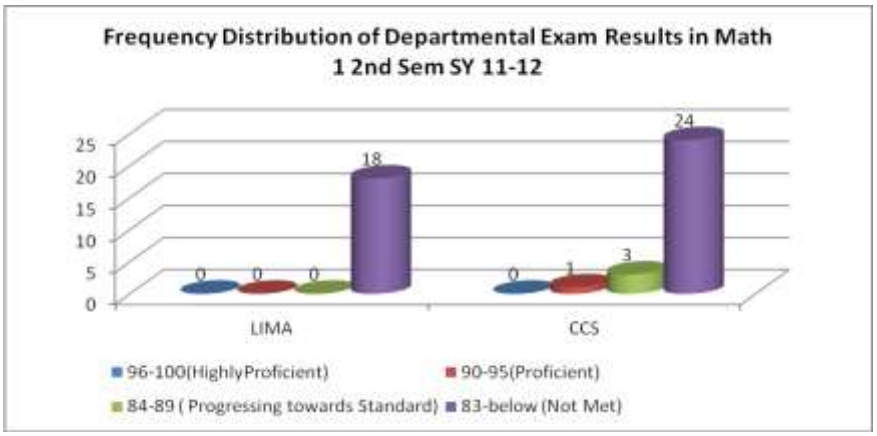

Figure 3. Frequency Distribution of Departmental Exam Results in Math 1 During 2nd Sem SY 11-12

The graph shows the performance of the students on their departmental examinations in Math a (College Algebra) for the second semester, 2011 – 2012. Both the students from LIMA and CCS who took the exam were categorized under not met since their scores in the exam were below 83. Although the students passed the exam, the students were not able to perform better in this subject. This implies that students really find it difficult to deal with numbers especially evaluating concepts in Math 1. This is in line with the study of Baruah (2010) which revealed that mathematics performances of schools are positively correlated with (a) the academic performance of school indicated by school leaving pass percentage and also (b) with the performances in subjects other than mathematics.

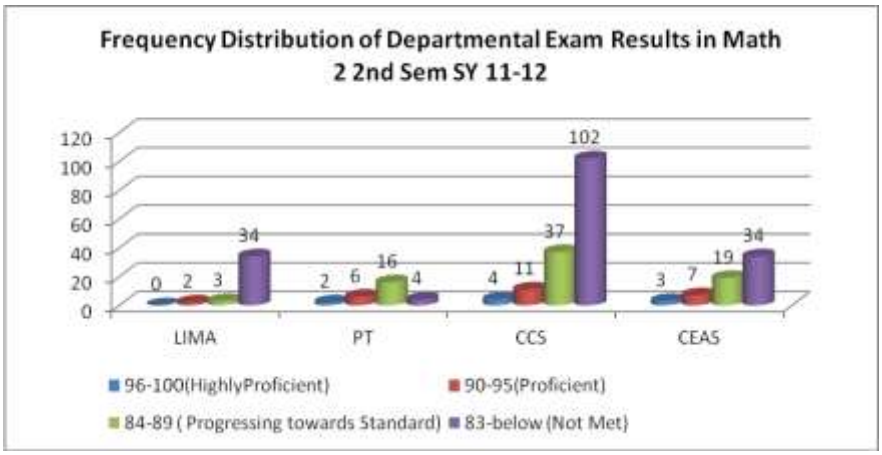

Figure 4. Frequency Distribution of Departmental Exam Results in Math 2 During 2nd Sem SY 11-12

Graph revealed that students still obtained poor perfromance in Trigonometry on the four colleges mentioned above. All of them were not able to meet the required criteria of above 83 percent. Students' poor performance on mathematical problem solving tasks in Trigonometry has led many Mathematics departments and instructors to adopt conceptual math courses, which dilute mathematical problem solving or simply remove it from the curriculum. If students simply do not possess the requisite mathematical knowledge, these conceptual math courses provide them with exposure to many important math concepts to which they would otherwise not have access. However, if students have the relevant mathematical resources, the dilution or removal of mathematical problem solving tasks in math does not help them learn to apply these mathematical resources appropriately; instead, it robs them of the opportunity to do so.

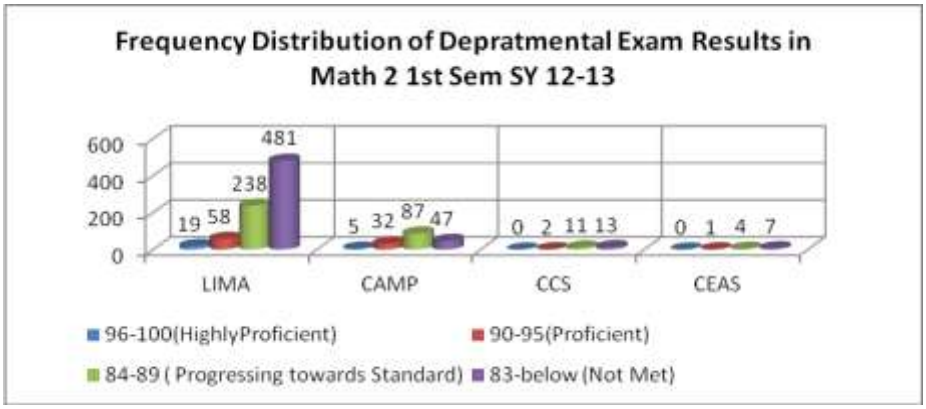

Figure 5. Frequency Distribution of Departmental Exam Results in Math 2 During 1st Sem SY 12-13

Based from the result, only students from CAMP obtained a rating of 84 to 89 percent which are progressing towards the standard. The college obtained a frequency of 84 followed by not met (47), proficient (32) and highly proficient (5). However, LIMA, CCS and CEAS were not able to meet the required criteria. The self-worth theory of achievement motivation holds that in situations in which poor performance is likely to reveal low ability, certain students (known as self-worth portective students) intentionally withdraw effort in order to avoid the negative implications of poor performance in terms of damage to self-worth. Relative to low math self-worth protective students, high math self-worth protective students performed poorly on noth mathematical tasks (World Bank, 2007).

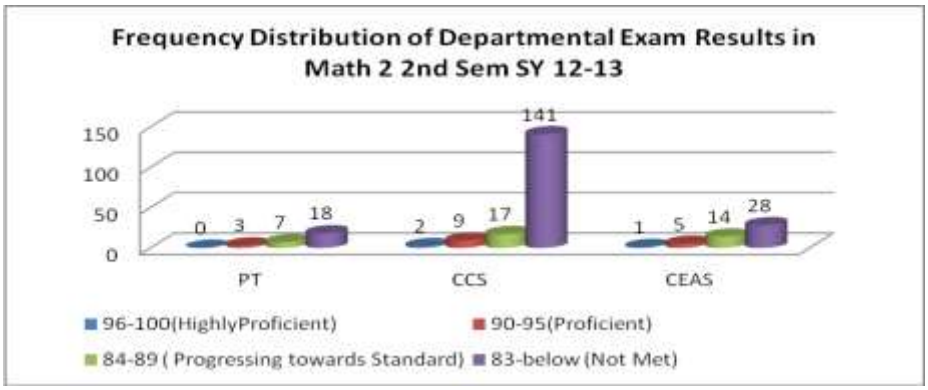

Figure 6. Frequency Distribution of Departmental Exam Results in Math 2 During 2nd Sem SY 12-13

It can be gleaned from the result that the three colleges obtained poor performance in Math 2 for the second semester. The result shows that there is still no progress in the performance of the students since the previous results were consistent in their performance. Some of the causes of poor performance in mathematics include: lack of concentration in class, negative attitude, slow learning and lack of commitment to learn the formulas. The results indicated that most of the students had negative attitude towards mathematics, which also originated from their parents. Most schools had inadequate mathematics teachers and textbooks. The mathematics syllabus was wide and some topics were above the intellectual ability of the students. In order to improve the performance in mathematics at tertiary school level, then it is necessary to review mathematics syllabus, have adequate mathematics teachers and textbooks, educate parents on the importance of the subject and assess students more frequently.

2. Factors Affecting the Mathematics Performance of the Students

Table 1

Students' Study Techniques

N = 80

Study Techniques	WM	VI	Rank
1. Reading some text before the session of the class	3.39	Often	5
2. Recognizing key points when there are made in lecture	3.50	Always	3
3. Comparing your notes after class	3.36	Often	6
4. Testing yourself	3.43	Often	4
5. Doing the assignments regularly	3.51	Always	2
6. Taking notes during class hours	3.66	Always	1
7. Studying hard at night	3.31	Often	7
Composite Mean	**3.45**	**Often**	

Legend: 3.50 – 4.00 = Always; 2.50 – 3.49 = Often; 1.50 – 2.49 = Sometimes; 1.00 – 1.49 = Never

Table 1 presents the mean score of the study techniques used by the students. It can be gleaned from the table that respondents often used different study techniques to learn Mathematics with a composite mean of 3.45. The items registered high to very high mean ranging from 3.31- 3.66 interpreted as “always” and ”often” .

The results revealed that taking notes during class hours is the highest in rank with a weighted mean of 3.66 and interpreted as “always”. Most of the respondents always do the assignments (3.510) and recognized key points when these are made in lecture (3.50). However, among the study techniques, the lowest 2 and often used by the respondents are comparing notes after class (3.36) and studying hard at night (3.31).

This implies that despite the fact that the students have different study techniques, they still find difficulty in Mathematics. Students must develop the best study technique that will suit their capabilities in order to learn Mathematics. The students may fail to maintain higher level of

achievements in Mathematics due to a particular study habit. It is, therefore, desirable that the students should be motivated toward such habits of study by which they may score good grades with better understanding of the subject matter.

Table 2

Teacher's Personal and Professional Characteristics

N = 80

Personal traits	**WI**	**VI**	**Rank**
1. Show the students how to study and learn by themselves	3.84	Strongly Agree	2
2. Excited on what he/she is teaching	3.76	Strongly Agree	3
3. Set high expectation for all	3.54	Strongly Agree	4
4. Became angry to students	2.18	Disagree	5
5. Dress and act properly	3.90	Strongly Agree	1
Composite Mean	**3.44**	**Agree**	
Professional traits			
1. Master the subject matter	3.94	Strongly Agree	1.5
2. Come to class prepared and organized	3.94	Strongly Agree	1.5
3. Motivate the students to enjoy and understand the lesson	3.23	Agree	3
4. Reinforce learning by providing opportunities for practice and consolidation	2.86	Agree	4
5. Reinforce learning by providing opportunities for practice and consolidation	1.95	Disagree	5
Composite Mean	**3.18**	**Agree**	
Over-all Composite Mean	**3.31**	**Agree**	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 – 1.49 = Strongly Disagree

Table 2 presents the mean score of teachers' professional and personal characteristics. It can be seen from the table that among the professional characteristics, the respondents strongly agreed that their teachers dress and act properly (3.90) and show the students how to study and learn by themselves (3.84). Among the personal characteristics, the lowest in rank and disagreed by the respondents is the teacher became angry with the students (2.18).

Among the professional characteristics, the respondents strongly agreed that the teacher masters the subject matter (3.94) and come to class prepared and organized (3.94). On the other hand, the respondents disagreed that their teacher accepts suggestions and opinions of the students (1.95).

This suggests that even the teachers possess the personal and professional characteristics needed by the students; the students still have low achievement in Mathematics. Teachers must be open for some of the characteristics that will help the students learn mathematics.

Table 3
Students' Attitude Towards Mathematics
N = 80

Attitudes Towards Mathematics	WM	VI	Rank
1. Mathematics gives me the pleasure of creating something.	3.54	Strongly Agree	3
2. Mathematics allows me to develop good reasoning.	3.81	Strongly Agree	1
3. Working with Mathematics allows me to acquire a well-balanced personality	3.60	Strongly Agree	2
4. When I start solving, I feel completely in the dark.	3.29	Agree	6.5
5. If I can't find the solution, I feel defeated.	3.29	Agree	6.5
6. When confronted with a problem, I want to give up right away.	2.76	Agree	9
7. Mathematics is doing something that I am told to do and that I have to keep doing over and over, like a machine.	3.44	Agree	4
8. I am confident that I can learn Mathematics	3.34	Agree	5
9. I am always under a terrible strain in a Mathematics class	3.04	Agree	8
10. I am comfortable expressing my own ideas on how to look for solutions to a difficult problem in Mathematics	2.74	Agree	10
Composite Mean	**3.28**	**Agree**	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 – 1.49 = Strongly Disagree

Table 3 revealed that the respondents strongly agreed that mathematics allows them to develop good reasoning (3.81), working with mathematics allows one to acquire a well-balanced personality (3.60) and mathematics gives them the pleasure of creating something (3.54).On the other hand, the respondents agreed they feel they are under a terrible strain in a Mathematics class (3.04), when confronted with a problem. They want to give up right away (2.76) and they

are comfortable expressing their own ideas on how to look for solutions to a difficult problem in Mathematics (2.74).

This indicates that the respondents have positive attitude in Mathematics. Positive attitudes towards mathematics denote interest or feeling towards studying mathematics. However, even if the students try to develop positive attitudes in Mathematics, they find hard time learning the subject.

Table 4

Proposed Action Plan to Improve the Academic Performance in Mathematics Departmental Examinations

Proposed Plan of Action	Persons In-Charge	Budget
Conducting/attending seminars regarding different methods of teaching Mathematics (teaching in a form of game, mathematics trick)	Mathematics professors	Php 3,000
Developing a positive classroom atmosphere	Mathematics professors	
Organizing periodic seminars and workshops for students, parents, teachers and school administrators designed to promote positive attitudes towards mathematics.	Mathematics professors and administrators	Php 5,000
Conduct tutorials session or peer tutoring especially for those who have low performance in Mathematics.	Students Unified in Mathematics (SUM) officers	Php 500

CONCLUSION AND RECOMMENDATION

The students' performance in Math 1 (Algebra) and Math 2 (Plane and Spherical Trigonometry were not met, based on university standards. The factors that can affect the performance in Mathematics are study techniques, characteristics of the teachers and attitudes towards mathematics. A proposed plan of action was formulated to improve the performance of the students in Mathematics.

Teacher may develop positive relationship with students and focus more on classroom activities, which will involve active teaching- learning process and students' participation in the class. Teachers may organize periodic seminars and workshops for students, parents, teachers and school administrators designed to promote positive attitudes towards mathematics. Students Unified in Mathematics (SUM) may conduct tutorials session or peer tutoring especially for those who have low performance in Mathematics. The proposed plan of action may be implemented and evaluated to enhance teaching-learning activities. Future researchers may conduct similar study using other variables that covered in this paper.

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