FACTORS INFLUENCING ENGINEERING FRESHMEN PERFORMANCE LEVEL IN MATHEMATICS

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ABSTRACT: *This study attempted to evaluate students' grade point average and school-related factors as correlates with the engineering freshmen performance in solid geometry. In mathematics, students are expected to learn to compute, to develop an understanding of mathematical concepts, and to solve quantitative problems encountered in daily lives. Specifically, it sought to profile the point grade average in high school mathematics, Performance in College Solid Geometry, Information and Communication Technology Facilities. The study involved 250 freshmen students of the College of Engineering of Technological University of the Philippines, Manila taking up BSCE, BSECE, BSEE, and BSME as the respondents of the study. A questionnaire was devised to elicit the evaluation of respondents in the Information Communication Technology facilities and student services facilities, while records from the Registrar, class records were the resources of High School Grade Point Average and midterm grades in solid geometry. The study used descriptive and correlation research, and corresponding statistical tools and techniques were used. The result of the study includes the following: (1) Engineering freshmen have almost equal skills, intelligence, and performance level in the High School and College Mathematics specifically in Solid Geometry. (2) Engineering freshmen have an adequate assessment of the effect of Information Communication Technology and student services facilities on their performance in mathematics particularly Solid Geometry, and lastly (3) Mathematics skills and abilities and school facilities greatly affect and influence engineering freshmen in learning mathematics particularly Solid Geometry. .*

Keywords: Math Education; Solid Geometry; learning facilities; Engineering Math

1. INTRODUCTION

The Philippine Basic Education System is a system in crisis [1]. The poor performance of students across the country in national and international achievement tests in both elementary and secondary school levels highlights the deterioration of the quality of the Philippines' academic standard.

In the fields of science, industry, and technology; and in every area of the complex society, mathematics plays a role of ever-increasing importance. It helps understand better many other important areas of study. Thus, it can be deduced that Mathematics is a tool subject in almost all disciplines. Despite its importance, "Mathematics" is the common answer to the question; what subject in the school requires the most thinking? That is why many of the Mathematics educators deplore the lack of thinking in Mathematics in view of this, it is but natural to ask whether teaching in schools could be made more effective and interesting to the students or not.

Class activities or learning areas greatly affect the efficiency of learning Mathematics. In preparing the class program the teacher should be aware of the factors affecting teaching-learning situations. In most cases, the classroom teacher should take into consideration several accepted principles of programming such as the alternation of easy and difficult subjects; the avoidance of boredom and fatigue; provision for the alternate use of books by different sections of a year level; thus, enabling the supervisor to observe in a single day a certain subject under several teachers. It is well to remember that instructions has its greatest effect on the learner when they are ready for it.

The Department of Education has begun to reconceptualize the policies and strategies of information and communication technology (ICT) in education towards life-long learning through the DepEd Computerization Plan (DCP). With the integration of information technology (IT) in education as an enabling and productivity tool that will enhance learner performance, educational efforts will be refocused on the requirements of the learners and the job market through ICT.

In addition, the Philippine Government believes that basic education should "evolve and nurture an ICT framework designed to enhance, broaden, strengthen, and transform learning to develop the Filipino learner into a person who is excellence-driven, global in perspective, innovative, ingenious and creative, with a deep sense of community and concern for harmony and the common good. "Toward this vision, basic education must empower learners, equipping them for the challenges in the new millennium by improving the quality and accessibility of education through the use of appropriate ICT. [2]

2. EXPERIMENTAL DETAILS

Information and communication technologies (ICTs) are the diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information, such as a computer, the internet, radio, television, telephones, and audio-visual equipment that can support the qualitative shift in the learning process, facilitate access to education, and improve administrative and instructional efficiency.

However, there are cases that students, though faced with the task of helping at home, come to school because they enjoy schoolwork. Teachers, then, should design a modern trend in-class activities with a concern for the students' welfare in mind. Classroom activities should be interesting, purposeful, relevant and challenging. They should involve more students in the activities and they must encourage more student participation. Students are encouraged to go to school when school activities catch their interest and motivate them to do more.

Engineering students know about their struggles as well as their satisfaction and pleasure in life when they are still in their primary and secondary, where they can assess their performance regularly, and when they are given credit for

explanations and strategies and solutions to problems. Students' experiences in a traditional classroom setting often lead them to develop beliefs about mathematics that generate negative responses. Surveys show that most students think that mathematics involves ability rather than effort. The role of Mathematics in the academic world is to tell students how to do things as well as to discover solutions for problems on their own. These problems require concerted efforts at a reasonable period of time and make use of several different strategies before solutions can be found. Students need to develop their individual ways of dealing with these problems. It is interesting to identify specific techniques to solve problems in mathematics more particularly solid geometry which deals with a solution on the perimeter, area, volume and more, which needs an individual's clear understanding of the subconcept.

3. RESULTS AND DISCUSSION

Mean and Percentage Distribution of Respondents according to their High School Final Rating or the Grade Point Average

Table 1 below presents the mean and percentage distribution of respondents according to their high school final rating or the grade point average. As shown, 107 or 42.80 percent of the engineering freshmen obtained Grade Point Average ranging from 85 to 87, 106 or 42.40 percent has 82 to 84, 22 or 8.80 percent have the highest Grade Point Average of 88 had above, and 15 or 6.00 percent whose Grade Point Average is 81 and below. The table also shows that Engineering Freshmen have a mean Grade Point Average rating of 84.63.

Table 1. Percentage Distribution and Grade Point Average of Respondents.

Grade	**f**	**P**
88 – above	22	8.80
85-87	107	42.80
82-84	106	42.80
Below-81	15	6.00
	x=84.63	100.00

Status of Physical Facilities

Table 5 presents the perceived status of the school in relation to the adequacy of Information Communication Technology (ICT) facilities. As appeared in the table, engineering freshmen were unanimous and agreed that Information Communication Technology (ICT) facilities have complete systems, programs, materials, and application that enable specific learning in mathematics with a weighted mean of 4.58, employs specialized software, and tools to support pedagogical innovations in solving Mathematics with a weighted mean of 4.28, deliver and develop students centered Information Communication Technology learning to the sync with the current trend and application with a weighted mean of 4.27, provides access to all social media technology enabling students learn Mathematics faster with a weighted mean of 4.18 and allows continual evaluation and reflects on professional practice on the use of technology in support of learning mathematics with weighted mean 4.09. Thus an overall weighted mean of 4.28, the school adequately provides Information Communication Technology facilities to engineering freshmen especially in the mathematics subjects.

Table 2. Status of Physical Facilities

Item	x	R	Verbal Interpretation
1	4.58	1	Very Adequate
2	4.28	2	Adequate
3	4.27	3	Adequate
4	4.18	4	Adequate
5	4.09	5	Adequate
Ave x = 4.28			Adequate

Learning Facilities for Student Services

Shown in Table 3 is the perception of the respondents in the adequacy of school learning facilities which affects their academic performance particularly in Solid Geometry. As can be seen, engineering freshmen perceived the status of the schools.

Table 3. Learning Facilities for Student Services

Item	x	R	Verbal Interpretation
1	4.59	1	Very Adequate
2	4.12	2	Adequate
3	3.78	4	Adequate
4	3.25	5	Moderately Adequate
5	4.10	3	Adequate
Ave x =3.968			Adequate

Learning facilities that have a great effect in learning engineering subjects especially Solid Geometry. Thus, respondents strongly agree that the school has sufficient facilities with the requirements of the engineering program like laboratories, classrooms, gymnasium, theatre, AVR, and other facilities with a weighted mean of 4.59. They also agree that the facilities conform according to the standards mandated by the Higher Education with a weighted mean of 4.12, complete and sufficient services such as a library, medical, and guidance with a weighted mean of 4.10 and with relevant upgraded and modern technology with a weighted mean of 3.78. On the other hand, the respondent moderately agrees on the adequacy of facilities for students' use with a weighted mean of 3.25. As the whole engineering freshmen agree on the sufficiency, conformity relevance and upgraded level of the school facilities for student services which affect their learning in Solid Geometry and other mathematics subjects.

Performance in Solid Geometry

Presented in Table 4 is the mean and percentage distribution of respondents according to their performance in Solid Geometry. As revealed the Engineering Freshmen performance in Solid Geometry ranges from below 81 to above 88. Results show that (1) majority or 67.30 percent of Engineering Freshmen have their grades between 82 to 84, (2) 60 or 24.0 percent was the lowest with grades of 81 and below, (3) 60 or 80 percent got grades between 85 to 81, and (3) there is only 2 or .80 percent of the respondents who show best academic performance in Solid Geometry with grades of 88 or above.

Table 4. Performance of Respondents in Solid Geometry

Score	f	P
88-above	2	0.80
85-87	20	8.00
82-84	168	67.20
Below-81	60	24.00
	X = 82.57	

Test of Significant Correlation Between Performance in Solid Geometry

Table 5 presents the t-test of a significant correlation between the performance of freshmen engineering in Solid Geometry and their high school grade point average.

Table 5. Performance of Freshmen Engineering in Solid Geometry and their High School Grade Point Average

Computed	Degree of correlation	tc value	t value	decision	interpretation
0.62	high	15.86	2.96	Reject H_0	Significant

As shown, there is a significant correlation between performance and grade point average with compute Pearson r coefficient of 0.62 or high and computed t value of 15.86 as against the tabular value of 2.96 at 0.05 level of significance. Finding implies as revealed in Table 5 that the t-test of a significant correlation between the performance of engineering freshmen in solid geometry and their high school final rating in mathematics is significant. As noted, there exists a significant correlation between their mathematics performance in high school and in solid geometry with Pearson r coefficient of 0.79 or a very high and computed t value of 33.09 which exceeded the tabular t value of 2.96 at 0.05 level of significance.

Information Communication Technology Facilities

The test of a significant correlation between engineering freshmen performance in solid geometry and the status of Information Communication Technology facilities which affect their learning is shown in Table 6. As revealed, there exists a sign correlation between variables since the coefficient correlation is 0.82 or very high and computed t value of 39.41 exceeding the tabular t value of 2.96 at 0.05 level of significance. This implies that the learning of Engineering mathematics is attributed.

Table 6. Correlation between respondent performance in solid geometry and the perceived status of the ICT facilities

Computed	Degree of correlation	tc value	t value	decision	interpretation
0.82	Very high	39.41	2.96	Reject H_0	Significant

On the availability of Information Communication Technology facilities such as computers, LCD, Multimedia, computer programs accessibility to social media, and the like. Further, the availability and adequacy of complete computer programs, materials and application, software and tools in solving mathematics and continual evaluation and practice in the use of technology full support their learning of engineering mathematics not only in solid geometry but probably in higher mathematics such as integral, and advanced calculus, differential equations and the like.

School Facilities for Student Services

The t-test of a significant correlation between the respondent's performance in Solid Geometry and their status of facilities for student services is presented in Table 7. As revealed, a significant correlation was found t exist with Pearson r or coefficient correlation value of 0.58 is substantial with a computed t value of 13.76 as against the tabular value of 2.96 at 0.05 level of significance.

Thus, engineering students perceive the importance and availability of physical resources such as a library, guidance, medical, and others in their studies.

Table 7. Correlation between Respondents Performance in Solid Geometry and their Status of Facilities for Students Services.

Computed	Degree of correlation	tc value	T value	decisions	interpretation
0.58	substantial	13.76	2.96	Reject H_0	Significant

0.05 LS

The engineering curriculum requires resources that may be helpful in learning mathematics. Moreover, its contribution would be more significant if it conforms with the CHED requirements accessible to students, relevant to the latest trends and technology and available to all students when needed.

4. CONCLUSIONS

Engineering freshmen have almost equal skills, intelligence, and performance level in the High School and College Mathematics specifically in Solid Geometry.

Engineering freshmen have an adequate assessment of the effect of Information Communication Technology and student services facilities on their performance in mathematics, particularly Solid Geometry.

Mathematics skills and abilities and school facilities greatly affect and influence engineering freshmen in learning mathematics particularly Solid Geometry.

Acknowledgment

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