Assessing the Enrichment Program for Sophomore Engineering Students of UPHSL School Year 2013-14: Basis for Development Interventions

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Abstract

Previous board examinations in the different Engineering programs, showed that licensure exam takers usually got below passing grades in the area of sciences and mathematics. Since these subjects were taken in the first two years in college, students have the tendency to forget and focus the review in professional subjects. This study determined the pre-test and posttest performance of students in Mathematics and Sciences and if there is significant difference in the pre-test and post-test performance of students. One way of doing it was by assessing the Enrichment Program as a basis for Development Interventions.

The respondents of the study were 200 Sophomore Engineering students. They were tested to answer the pretest then Review Classes were done for them before taking the posttest. In general Sophomore Engineering students had poor performance in the exams. The mean scores in both subjects are below the passing of 25 for the 50-item exam. When an enrichment classes were conducted the test performance of sophomore students increased in the post-test as compared to pre-test.

When tested for the significant difference (pre-test and post-test), it was found out that there is significant difference. It is an implication that improvements are seen after undergoing

enrichment classes. The result would be more meaningful as the students themselves perform self review as if they would take major exams or even licensure exam.

Keywords: Assessment, Enrichment Program, Pre-Test, Post-Test.

INTRODUCTION

Part of the annual summer activities of the tenured mathematics and science faculty members of the College of Engineering of the University of Perpetual Help System Laguna is devoted in conducting enrichment classes for sophomore students in the areas of mathematics and science. A pre-test is given before the review classes and a post-test is administered right after the classes. This activity aims to gauge the knowledge of students in general engineering subjects in preparation for the licensure examination even in their early years in college. The activity was a product of brain storming of faculty members as to what activity must be given priority for their summer assignment. This study also wanted to determine the effectiveness of the enrichment program; and to determine test performance of students and its direction.

As observed in the results of the previous board examinations given by the Professional Regulation Commission in the different Engineering disciplines, licensure exam takers usually got below passing grades in the area of engineering sciences and mathematics. Since these subjects were taken in the first two years in college, students have the tendency to forget topics covered in these subjects and focus the review in professional of major subjects. Having review classes before they enter their third year in engineering wherein most subjects they will take up are major subjects in their respective engineering discipline will refresh their knowledge in basic mathematics and sciences.

The diagram below illustrates the concept of the study. Performance of Sophomore Engineering students were compared using their Pre-test and Post-test scores in Engineering Sciences and Mathematics. In the framework, it is assumed that the Review Classes conducted by College of Engineering faculty will definitely be beneficial to students thus improved academic performance is anticipated. If students passed the exam, they are allowed to take board courses and if students taking non-board course fails the exam he is advised to take non Engineering course.

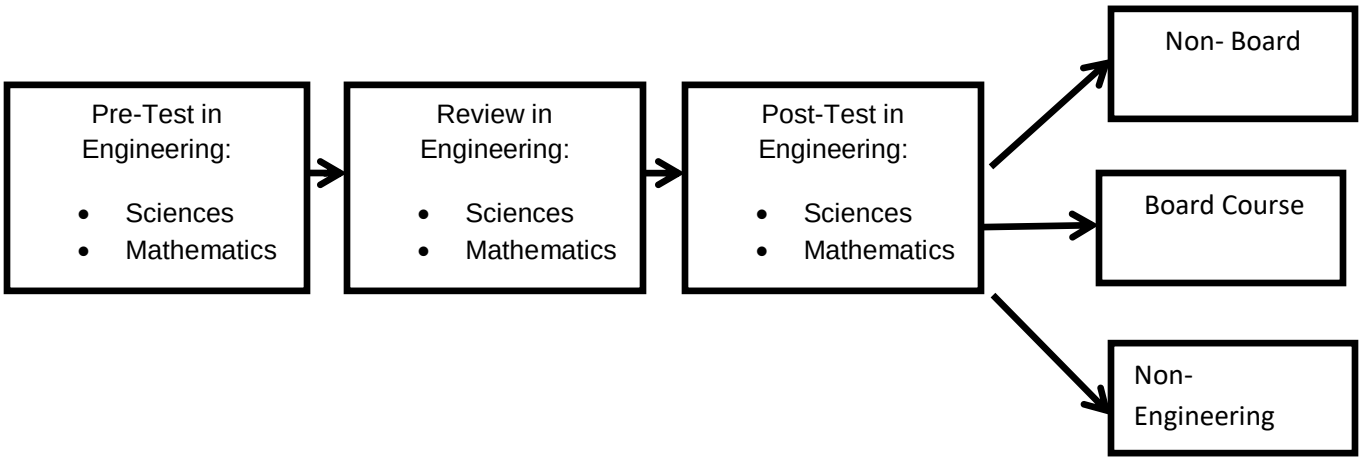

Figure 1. The Conceptual Framework Diagram

Literature Review

The basic premise behind the pretest-posttest design involves obtaining a pretest measure of the outcome of interest prior to administering some treatment, followed by a posttest on the same measure after treatment occurs. Pretest-posttest designs are employed in both experimental and quasi-experimental research and can be used with or without control groups. In the simplest

pretest-posttest design, researchers gather data about some outcome through a single pretest, administer a treatment, and then gather posttest data on the same measure (Bell, 2010).

Pretest is a preliminary test administered to determine a student's baseline knowledge or preparedness for an educational experience or course of study; a test taken for practice; the advance testing of something, such as questionnaire, product, or idea (Miffin, 2009).

Chappa, et al (2012) showed from their table that most students successfully mastered each of the outcomes, even after considering differences in the samples. A pre and post-test was given in all sections of College Algebra. A total of 496 students, distributed across 15 sections, participated in the pre-test, while a total of 421 students participated in the post-test. The pre-test was conducted during the first three weeks of the course, while the post-test was conducted during the final three weeks of the course. Pre and post tests contained embedded questions contributed by course instructors that measured competency in each of the measured outcomes. There were two questions per outcome, and questions were designed to be independent (answering correctly or incorrectly a question, did not affect the outcome of a different question).

Furthermore, Chappa expressed the following statement: the passing rates for the post-test show students mastered the topics during the course. Even considering the difference between samples, there was a passing rate above 60% in all outcomes, It seems that among the students that take the pos-test that the passing rate is consistently above 70% (including last year's data), so we should reconsider increasing our target passing rate for each outcome.

ASEE (2012) showed that the data from the pre-test and post-test analysis of the students' knowledge of skills in the areas of engineering mathematics and physics improved. All participants engaged in and learned from planned sessions and activities.

Dela Cruz (2009) revealed from his findings that the pretest scores of the engineering student-respondents is average in terms of number sense, solving numerical problems, measurement and estimation, data analysis and probability, and solving equations. Furthermore, it was also found out that the post-test scores of the engineering student-respondents are excellent in terms of number sense, solving numerical problems, measurement and estimation, data analysis and probability, and solving equations. He further stated that there is a significant difference between the pretest and posttest means of the engineering student-respondents on the levels of mathematical ability of the engineering students of the Technological Institute of the Philippines - Manila in terms of number sense, solving numerical problems, measurement and estimation, data analysis and probability, and solving equations. It was revealed that engineering students performed better than accountancy students.

This study aimed to assess the Enrichment Program conducted by the College of Engineering tenured Faculty members to Sophomore Engineering Students of UPHSL School Year 2013-14 . It sought answers to what is the pre-test performance of Sophomore Engineering students in Mathematics and Sciences, what is the post-test performance? Is there a significant difference in the pre-test and post-test performance?

METHODOLOGY

This pretest-posttest design to assess the enrichment program involved 200 (82.33%) Sophomore Engineering students who were able to complete the Mathematics and Science subject took the pre-post test. This program was done annually through the initiative of some selected faculty members of UPHSL. Quantitative approach to research was employed in order to achieve the purpose of this study. Quantitative data were gathered by utilizing the scores of

respondents who took the exam which was given in multiple choice format and the topics covered were Physics, Calculus, Algebra, and Trigonometry. Eventually, through the efforts of some engineering faculty members the researchers were able to facilitate the gathering of data for the summer of school year 2013-14 and the evaluation of results was done by other faculty members who are experts in statistics and its measurement.

Data Analyses

Scores in the exam obtained by the respondents were treated using various statistical tools, namely: percentage, mean, standard deviation and Z-test and all data analyses were conducted using SPSS.

RESULTS Test Scores in the Two Subjects for School Year 2013-14.

Table 1. Pre-test Performance of Sophomore Engineering Students in Mathematics and Science

2013-2014				
	Mathematics		Science	
Score	Pre-Test	Frequency	Pre-Test	Frequency
26 – 30	1	0.72%	2	1.44%
21 – 25	21	15.11%	29	20.86%
16 – 20	50	35.97%	58	41.73%
11 – 15	48	34.53%	33	23.74%
6 – 10	18	12.95%	17	12.23%
0 – 5	1	0.72%		

Total	139	100.00%	139	100.00%
Mean	17.12		18.46	

Table 1 illustrates 2013 frequency distribution of the pre-test exam scores in Mathematics and Science. In Math, the highest frequency observed was in the intervals 16-20 (35.97%) while the lowest was in the intervals 0-5 and 26-30 at 0.72%. Mean was 17.12 .

For Science, the highest frequency observed was 16-20 (41.73%). Mean was 18.46.

Table 2. Post-test Performance of Sophomore Engineering Students in Math & Science.

SY 2013-14				
	Mathematics		Science	
Score	Post-Test	Frequency	Post-Test	Frequency
46 – 50	1	0.5%		
41 – 45	2	1%		
36 – 40	7	3.5%	8	4%
31 – 35	40	20%	22	11%
26 – 30	31	15.5%	38	19%
21 – 25	62	31%	57	28.5%
16 – 20	40	20%	57	28.5%
11 – 15	15	7.5%	17	8.5%
6 – 10	2	1%	1	0.5%
0 – 5				

Total	200	100.00%	200	100.00%
Mean	24.53		23.37	

Table 2 presents 2013 post-test frequency distribution of the exam scores in Mathematics. Seven students got a score in the range 36-40 which is 3.5%, two got a score in the range 41-45 (1%) and one got a score in the range of 46-50 (0.5%). Nobody got a score 0-5 in the post-test. The recorded mean was 24.53.

For the frequency distribution of the exam scores in Science, the highest frequency was observed in the intervals 16-20 (28.5%) while the lowest was in the intervals 6-10 (0.5%). In the post-test eight got a score in the range 36-40 which is 4%.

Summary Test Result in the Two Subjects

Table 3. Comparison of Pre-Test and Post-Test in Engineering Mathematics and Science.

	Mean			
SUBJECT	Pre-test	Post-test	Z-test	Interpretation
Mathematics	17.12	24.53	– 12.05	Significant
Science	18.46	23.37	– 9.36	Significant
Critical Value Z = ± 1.96				

Significant at 0.05 alpha level; two-tailed test (positive and negative)

Table 3 shows the difference in the means for both pre-test and post-test in Engineering Mathematics and Science for school year 2013-14. This only shows that the enrichment class for this subject helps in the improvement of the test scores of students. The computed Z – value of – 9.36 is lower than the critical value of -1.96 using a two-tailed test at 0.05 level. This only

implies that null hypothesis is rejected, since there is a significant difference between the test scores of respondents in the pre-test and post-test. The result is significant.

DISCUSSION

Results of the quantitative episode of this study yielded interesting results. With the participation of sophomore students of the College of Engineering, the researchers were able to prove that review or enrichment classes being conducted by some Engineering faculty members are relevant in improving the test outcome of respondents. However, in general sophomore Engineering students had poor performance in the exams administered. Even though improvement is noticeable in the field of Mathematics, still the scores are not quite satisfactory since the mean scores are below 25 for the 50-item exam. Furthermore, an increase is observed from a mean of 17.12 to 24.53 for year 2013. However, this score is unsatisfactory since the passing is 25 out of 50.

Applying the Z-test in order to determine if there is significant difference in the means of pre-test and post-test, it was found out that the Z-value in the area of Mathematics is – 16.24. Using a two-tailed test at 0.05 level and comparing to the critical value of – 1.96, the Z-value is less than the critical value, so it is concluded that there is really significant difference.

Same is true with the exam result in Engineering Sciences wherein an improvement from 18.46 to 23.37 for year 2013 was recorded. When tested for the significant difference in the means of pre-test and post-test, it was found out that there is significant difference in the area of Engineering Sciences where Z-value of – 9.36 was computed, which is lower than the critical value of -1.96 using a two-tailed test at 0.05 level. It is an implication that improvement is seen in this area after undergoing enrichment classes preparing them for the administration of the

post-test. However, their performance came out to be unsatisfactory because not all sophomore students participated well in attending the review classes and in taking the exams, they were not serious with the review / exam given and knowing that this exam will not reflect in their credentials. Serious considerations must be taken by students in attending the enrichment classes and in taking the pre-post tests exam for the result to be more valid and reliable. The result would be more meaningful if aside from the review conducted by the faculty members, students themselves must perform self review as if they would take major exams or even licensure exam.

Conclusion and Future Direction

An enrichment or review classes conducted by engineering faculty members is one way of improving the test performance of sophomore students. It was proven by the increase of pre-test and post-test means from 17.12 to 24.53 and 18.46 to 23.37 of Engineering Mathematics and Science, respectively. This enrichment took into consideration the level of difficulty of both the pre-test and post-test exam for each subject. There were times exam is too easy or too difficult for the students to answer. The result of the pre-post test only demonstrates that the extra effort of concerned faculty members are really needed to help students elevate their learning from good to better and hopefully from better to best. This activity can boost their confidence and as a result motivate them to have strong determination to pass the licensure exam. Ample time should be allotted for each subject for the student to fully comprehend what is being taught during the said program. And lastly, students taking the review classes should be aware of the relevance of the program, that passing the exam will mean he/she be allowed to take a board course in College of Engineering. Furthermore, this should be reiterated to the students prior to taking the pre-test exam.

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