

# MATHEMATICS PLACEMENT TEST SCORES & ITS SIGNIFICANCE – A CASE STUDY

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## **Abstract**

The aim of this study is to examine the relationship between Mathematics placement test scores and students' final scores in Mathematics course. Questions have been raised before regarding the importance of Mathematics placement tests in placing students into the most suitable Mathematics course. The study examines the importance of the Mathematics placement test and its significant contribution to students' performance in Mathematics course taken at their pre university level of studies. Mathematics placement tests undeniably fulfil their purpose of providing preliminary Mathematics course placement recommendations, encouraging students to register themselves for the most appropriate Mathematics course based on their competence, thus helping students to perform better. The study will focus on the 86 students enrolled in Monash University Foundation Year (MUFY) at Sunway College Johor Bahru in 2013. The correlation and regression between their Mathematics placement test scores and their final marks in the MUFY Mathematics Unit 1 (equivalent to year 12 Mathematics) and MUFY Fundamental Mathematics Unit 1 (equivalent to year 11 Mathematics) is analysed.

Keywords: Mathematics placement test, correlation, regression

## **1.0 INTRODUCTION**

Students entering pre university studies often come from a wide variety of backgrounds. Such heterogeneity highlights the need for a placement measure for incoming students, as the more variation in class, the more challenging it is for lecturers to accommodate to students' need. Lam (2010) states that the diversity of levels is also a disadvantageous to students, who may feel intimidated and discouraged by their more competent classmates or, conversely, bored by the less competent ones. Sen, Ucar and Delen (2012) emphasised that placement tests and future academic achievements are considered to be related concepts. They also added that the analysis of the success factors behind placement tests may help understand and potentially improve academic achievement. Mo, Yang, Hu, Calaway and Nickey (2011) state that the advanced placement tests provide high school students with the opportunity to choose appropriate college-level courses and greatly increase the likelihood of passing the subject in high school. They have reported that the advanced placement test - taking experience has a positive impact on academic performance and retention for college students. Schumacher and Smith (2008) cited that mathematics departments at

colleges and universities in the United States have been concerned with students' success in Mathematics courses and correct placement for many years. They also reported that today, many universities in the United States use Mathematics placement tests in combination with high school grades and Scholastic Aptitude Test (SAT) scores to place students in freshman Mathematics course.

## **2.0 METHODS**

Students' Mathematics placement test scores were extracted from their individual diagnostic reports on their Mathematics placement tests which is conducted early in the semester upon registration into the MUFY programme. Then, final marks in Mathematics and Fundamental Mathematics for the same group of students are also compiled at the end of the semester. Descriptive analysis helps to draw general conclusions about the Mathematics placement test scores, Mathematics unit 1 scores and Fundamental Mathematics Unit 1 scores. The correlation between the Mathematics Placement Test scores and their final marks in the Mathematics Unit 1 and Fundamental Mathematics Unit 1 is analysed. McClave and Sincich (2009) stated that the correlation describes the relationship between two independent variables. Simple linear regression develops the straight line relationship between the Mathematics placement test scores and the Mathematics course score.

## **3.0 RESULTS AND DISCUSSION**

A sample of 86 students who sat for the mathematics placement test at the beginning of the semester were selected and their Mathematics score at the end of the semester was recorded. Sixty-three of these students are enrolled in Mathematics Unit 1 and 23 of them are enrolled in the Fundamental Mathematics Unit 1. The statistics show that students relatively scored slightly higher in Fundamental Mathematics Unit 1 because of the nature of the paper itself, which is comparatively easier than the Mathematics Unit 1. The dispersion of the score is fair across all the three sets of scores. The assumption of normality is a prerequisite for many inferential statistical techniques. The normality is explored and the Shapiro-Wilk statistics is calculated. The significance level is greater than 0.05, hence the normality is assumed for the placement test scores and Mathematics course scores. The correlation between the Mathematics placement test scores and their final marks in the Mathematics Unit 1 and Fundamental Mathematics Unit 1 is analysed.

Table 1: Correlation Statistics between Placement Test scores and Mathematics course

Correlation Statistics with Placement Test	Mathematics Unit 1	Fundamental Mathematics Unit 1
Pearson's Correlation, $r$	0.618	0.677
Significant, $p$	0.000	0.000
N	63	23

There is a significant, positive and moderate linear relationship existing between the placement test scores and their Mathematics Unit 1 scores ( $r = 0.618$ ,  $p < 0.05$ ). The output also shows that there is a significant, positive and moderate linear relationship between the placement test scores and their Fundamental Mathematics Unit 1 scores ( $r = 0.677$ ,  $p < 0.05$ ).

The simple linear regression between Mathematics Unit 1 and placement test scores is  $y = 1.083x - 23.114$  where  $y$  is Mathematics Unit 1 scores and  $x$  is the placement test scores. The simple linear regression between Fundamental Unit 1 and placement test scores is  $y = 0.744x + 21.251$  where  $y$  is Fundamental Mathematics Unit 1 scores and  $x$  is the placement test scores. These equations can be used to forecast Mathematics Unit 1 scores and Fundamental Mathematics Unit 1 scores given their placement test scores, also provided that the standards and the difficulty level of placement test, Mathematics Unit 1 and Fundamental Mathematics Unit 1 papers are comparable to the forecast year.

The Mathematics placement test does give us an early indication on how the students will score in their Mathematics course in which they are enrolled. It will be a reliable forecast for the students' Mathematics score as well as a guideline for them to work harder to achieve a better score in their Mathematics course.

#### 4.0 CONCLUSION & RECOMMENDATION

The Mathematics placement test is imperative not only to place the student in to the appropriate level of the Mathematics course, but also to give an early prediction of the students' score in the Mathematics course undertaken. As significance of the Mathematics placement test is apparent from the results of this study, the Mathematics placement test should be carried out and the results should be taken into serious consideration in placing the students in the appropriate Mathematics course. The Mathematics placement test should also be implemented for students who are enrolled in other pre university programmes such as Australian Matriculation programme (AUSMAT) which offers various Mathematics courses - Mathematics 3AB/3CD and Mathematics Specialist 3CD. A larger sample size in future research will also ensure the reliability and validity of the results of this study.

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