

Relationship Between the Diagnostics Test and the Overall Performance in Business Mathematics Course for Diploma in Business Studies Students

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Abstract—The Mathematics diagnostic test which evaluates students' competency level and knowledge in mathematics has been implemented in Universiti Teknologi MARA (UiTM) since December 2013. However, the implementation of the test is time consuming and requires higher cost. Web based online mathematics diagnostic test (WbOMDT) is a web based application for diagnosing students' strengths and weaknesses in mathematics in an effective manner. It is a one hour test that should be taken prior to a mathematics course. It contains of 40 multiple choice questions in the main area of mathematics such as Algebra, Geometry and Trigonometry. The objective of this study is to investigate the relationship between the diagnostics test and the performance of Business Management Students' in Business Mathematics course. The correlation analysis was used to check between the final results of the course and the possible factors influencing the performance, which are WbOMDT results, gender and the on-going assessments results. Then, the coefficient of determination, R-square value was used to explain the degree of influence. Based on the correlation analysis, there are significant relationship exist between the dependent variable final examination results, the WbOMDT results and on-going assessments results. Based on the values, it shows that 41% of the variation in the final examination results for Business Mathematics course can be explained by the marks obtained through the WbOMDT results.

Keywords—Business Mathematics, Diagnostic test, Web based

I. INTRODUCTION

Mathematics diagnostic test was first introduced in December 2013 by Faculty of Computer and Mathematical Sciences (FSKM). It was meant to measure the first semester students' overall competency in Mathematics. The test consists of 40 multiple choice questions on main area of mathematics such as Algebra, Geometry and Trigonometry. Based on the diagnostic test results, the lecturer may apply teaching techniques that suit the need of their students. The early diagnostic test was implemented by giving a one-hour test. The test was monitored and the results obtained after the marking process was completed. The WbOMDT is an improved version of the diagnostic test, which is cost effective. It was developed using Socrative, a cloud-based student response system. This system enables students and lecturers to access the test at

anytime, anywhere by using their own gadget. The lecturers may obtain the results immediately after the test completed.

Business Mathematics course is offered to the first semester Diploma students in Social Sciences. The passing percentage of this course is lower as compared to other mathematics courses. Based on that scenario, this study is conducted to find out the relationship between the diagnostic test results and the overall performance results. The analysis is performed to investigate other factors that influence students' performance.

II. LITERATURE REVIEW

According to [1], diagnostic test is one of the reliable predictor for undergraduate students' future performance. In other study, [2] found that the diagnostic test conducted during the arrival as a first year student provides a strong potential indicator to be successful in the first Calculus class. [3] conducted a diagnostic test to the first year students of Mathematics and Economic course and Mathematics Education course in Universiti Malaysia Sabah. Their study showed that in average students from Mathematics and Economic course achieved higher marks compared to the Mathematics Education course. [4] has conducted a diagnostic test namely as Ujian Kemahiran Asas Matematik (UKAM) for Science Quantitative students in UiTM Shah Alam. Their results showed that the correlation between Additional Mathematics grade and UKAM's results is higher compared to the Modern Mathematics grade with UKAM's results. Furthermore, [5] has shown that there exist a significant relation between the diagnostic test marks and mathematics results of the first semester to the third semester for the Diploma in Science Computer students in UiTM. However, they found that there is no significant relation between the diagnostic test marks and mathematics results of the fourth semester students. In [6], they found that there is a moderate correlation between the background in Mathematics and the final grade in Calculus. However, according to them, Mathematics' background might not be a decisive factor on the performance in Calculus. [7] has compared the mathematical competencies of incoming Engineering students in Ireland and Portugal. They found that the students in both countries perform similarly (sometimes very poor) on questions on logs, fractions, application of

algebra to the real problems, area of circle and equation of line. However, the students have distinct performance in questions on trigonometry, quadratic equations and algebraic functions.

According to [1], the diagnostic test for algebra has a correlation with the performance in introduction to physic subject which has basis of algebra. [8] study proved that the diagnostic test is useful in identifying the weakest and the most capable students in numeracy assessments among first year pharmacy students. Besides that, the subsequent performance can also be predicted based on the diagnostic results. [9] on the first year Chemistry students in Queensland found that the background in Mathematics gives impact to the performance in Chemistry subject. This shows that the results of mathematics diagnostic test not only can be used to predict the performance of mathematics subjects themselves but also to other sciences subjects.

III. METHODOLOGY

The Web Based Online Mathematics Diagnostics Test (WbOMDT) was introduced and implemented in UiTM Cawangan Pahang in June 2014. The results of the WbOMDT, the on-going assessment results and gender are the data collected and analyzed. The on-going assessment result is assumed to represent the students' efforts in learning Business Mathematics. Meanwhile, the final results will be the dependent variable in this study. The respondents of the study are 141 first semester students majoring in Diploma in Business Studies and 66.7% out of them are female students.

The data collected are proven to be normally distributed. Further analysis was done using BMI SPSS version 23. The Pearson's correlation analysis between the final results and the possible factors influencing the performance which are WbOMDT results, gender and the on-going assessment were also checked. Then, the coefficient of determination, R-square value was used to explain the degree of influence.

IV. RESULTS AND ANALYSIS

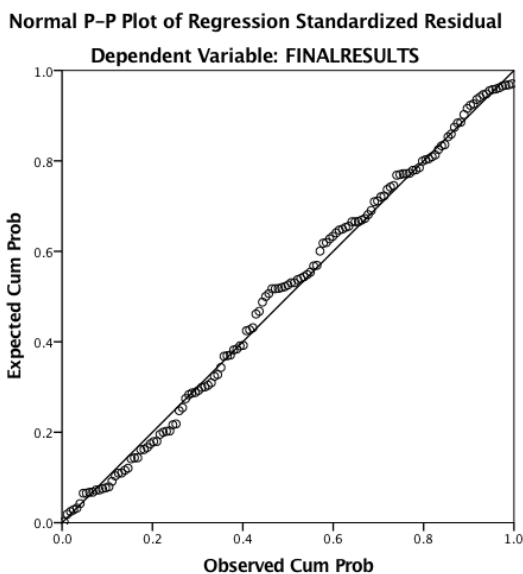


Fig. 1. P-P Plot

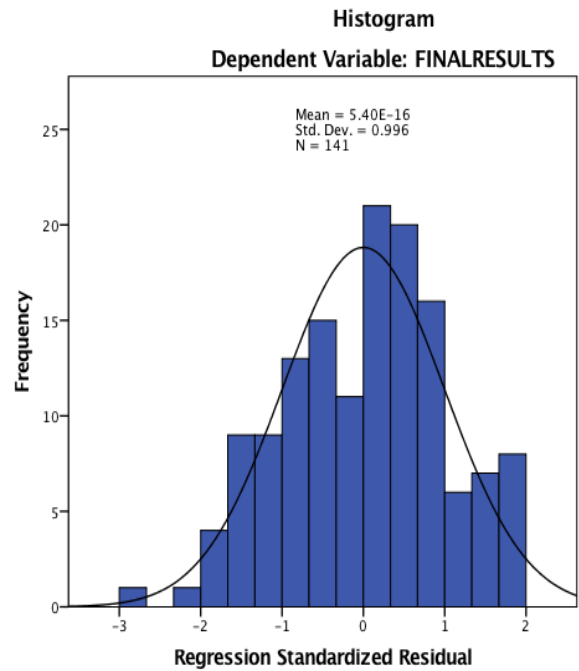


Fig. 2. Histogram

As can be seen in Figure 1 and 2, the p-p plot shows that almost all points fall on the line which signifies that the data are normally distributed. Then it can be concluded that the population are normally distributed and there is no extreme value can affect the result can be seen in both P-P plot and histogram. Further analysis were done after the assumption of normality have been met.

The WbOMDT was implemented at the beginning of the semester to measure the students' competency and eventually help the lecturers by giving an overview about the students' ability. Based on the descriptive analysis in Table 1, the highest score for WbOMDT is 78% while the average scores of the students is only 42.65%, which is very poor. Meanwhile, for the final examination results, the maximum score is 91.49% and the average score is 53.08%. Based on Universiti Teknologi MARA's grading system, students have to achieve at least 50% marks in order for them to pass any courses.

TABLE I. DESCRIPTIVE ANALYSIS

Variables	Minimum	Maximum	Mean	Standard deviation
Final Results	8.95	91.49	53.08	21.59
WbOMDT	18.00	78.00	42.65	13.10
On-going Assessments	4.15	39.83	25.16	8.998

TABLE II. MEAN SCORES ACCORDING TO GENDER

Gender	WbOMDT	On-going assessment	Final examination	Final results
Male	44.14894	25.34128	50.06383	55.38085
Female	41.46316	24.80968	44.18316	51.38021

The WbOMDT results are measuring the initial state of the students' knowledge in Mathematics at the beginning of each semester. As the semester progress towards the end, the lecturers have collected the on-going assessments of each student. In this study, the on-going assessment is the marks given based on the students' effort in keeping abreast with the lesson plan as stated in the course syllabus. The on-going assessments for Business Mathematics course are the marks given based on tests and quizzes, 30 percent and 10 percent respectively. The 100 percent final examination marks represent 60 percent of the overall marks for the course. The ratio of the final results for on-going assessment and final examination is 40:60.

In order to check the relationship between the diagnostics test and the performance of the students' in the course, Table 3 shows the results of the correlation analysis. Based on the analysis, there are significant relationship exist between the dependent variable final results, the WbOMDT results and on-going assessments results.

TABLE III. PEARSON CORRELATION COEFFICIENT

	WbOMDT	On-going assessments	Final Result
WbOMDT	1		
On-going assessments	0.606**	1	
Final Results	0.640**	0.953**	1

**The results are significance, less than 0.01.

The result in Table 4 shows the value of the coefficient of determination between the final results obtained and WbOMDT results. Based on the value, it means that about 41% of the variation in the final results can be explained by the marks obtained through the online mathematics diagnostics test (WbOMDT) results.

TABLE IV. COEFFICIENT OF DETERMINATION

R	R-Square	Standard Error of the Estimate
0.640	0.410	16.641

V. DISCUSSION AND CONCLUSION

The results of this study show that the final results of Business Mathematics course for Diploma in Business Studies students can be explained by the marks obtained from the diagnostic results. The correlation analysis shows that there is significant relationship between on-going assessment results

and the final results. The on-going assessment is including tests, quizzes and written assignments. Based on this result, the students need to perform in the on-going assessment in order to obtain excellent final results. The variation of 41% in the final results explained by the diagnostic test shows that the lecturers should aware about their students competency thus they need to enhance the teaching and learning techniques. Meanwhile, the mean marks of the final results and WbOMDT results show a slight difference between male and female students.

WbOMDT is a tool used to measure the mathematics competency among UiTM students especially in UiTM Pahang. In future, there should be a program conducted by the faculty especially for the students who are not competent in their diagnostic test.

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