Correlation of Admission Metrics with Eventual Success in Mathematics Academic Performance of Freshmen in AMAIUB's Business Curricula

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Abstract:
This is a correlational study research design, which aimed to determine the correlation of admission metrics with eventual success in mathematics academic performance of the admitted 177 first year students of Bachelor of Science in Business Informatics and 59 first year students of Bachelor of Science in International Studies. Using Pearson's product-moment correlation, results showed that there is a significant moderate positive linear relationship between the programmatic admission test scores and Mathematics academic performance of the students in both programmes. The results of the study established the validity of the method for the existing AMAIUB programmatic admission test conceptualized, prepared and implemented by the University. Thus, Programmatic admission metrics tend to predict the eventual success in Mathematics academic performance of freshmen in AMAIUB's Business Curricula.
Keywords: admission test scores, mathematics academic performance, business curricula

1. Introduction

Many students enter post-secondary institutions without adequate preparation for the level and quality of work required in courses and programs. Gensler, C. (2004) pointed, "*it is an opportunity and a challenge to identify these students through placement testing and help them achieve their academic goals*". Shiyue, He. *et al*, (2015) stated that, "*there have been increases in the numbers of first- and second-year students who repeat a subject, take a leave of absence from school, or withdraw from it*". In AMAIUB college admission test scores were used to determine whether students must first be placed in a remedial Mathematics before they are allowed to advance in any university-level required mathematics courses, (Calucag, L. & Petilos, G., 2012).

Historians claim that mathematics can trace its origin back about 6000 years to the Middle East, (Power, C., 1989). Mathematics is a significant part of business curriculum and has a key role in the development of a modern high technology economy. Excerpt from the speech delivered by Dr. Con Power, Director of Economic Policy, and Confederation of Irish Industry at a seminar on "MATHEMATICS", "*the business community fully recognizes the dynamic role which education plays in the development of a modern industrial economy and recognizes the centrality of mathematics for this purpose within the education process*". The important role which mathematics plays in the curriculum needs to be continuously reinforced.

Shiyue, He. *et al*, (2015) noted that, "there had been few studies focused on the correlations between the subjects for the entrance examination and all academic achievements of the first year and graduation". In their recent study showed no significant negative correlations between mathematics test scores for the entrance examination and academic performance in many subjects. Similarly, the study of Gensler, C. (2004), results revealed "non-significant median correlation of Student Scores on achieving the 80% Cut score and Scores on the First Math Exam". However, in the study of Morgan (1989), Laing, Engen and Maxey (1987) pointed out that "*the strongest relationships linked mathematics and natural science coursework with the corresponding American College testing (ACT) subscales*". In addition, Morgan, R. (1989), cited that "Mathematics coursework was related most strongly to Scholastic Assessment Test -mathematical performance".

A Correlation study conducted by Manto, J. (2006) revealed that, of the 20 students who took the Computerized Placement math test, little, if any relationship was found between the overall scores of the students in the program and Computerized Placement math test grades. According to Paulos (2016), in one of his articles in the ABC News, "*most studies found that the correlation between Scholastic Assessment Test (SAT) scores and first-year college grades is not overwhelming, and that only 10 percent to 20 percent of the variation in first-year GPA is explained by SAT scores*". Consider the previous studies and readings, every college or university deem necessary to conduct a correlation study on the admission test and academic performance of students.

Captured from the Chairman's message "*AMAIUB work towards achieving a common goal, that is, to embody excellence in all its noble endeavors*",(Aguiluz, A. V, 2015), the researchers were motivated to conduct a study on the Correlation of Admission Metrics with Eventual Success in Mathematics Courses of AMAIUB's Business curricula.

2. Methods and Procedures

This study used the correlational study research design, which is appropriate when two quantitative variables are from the same group of subjects and wants to determine the relationship between the two variables – a similarity between them, not a difference between their means. It is prospective in the sense that it measures the strength of a linear association between the admission grades and the academic grades in mathematics courses.

The subjects of the study were 177 first year students of Bachelor of Science in Business Informatics (BSBI) and 59 first year students of Bachelor of Science in International Studies (BSIS) who took the AMAIUB admission test and admitted between first trimester and second trimester of Academic Year 2015-2016. There were two admission tests used from the data gathered, 112 BSBI students used the old AMAIUB admission test during the first trimester while 65 BSBI students used the Programmatic admission test during the second trimester. On the other hand, 40 BSIS students used the old AMAIUB admission test during the first trimester while 19 BSIS students used the Programmatic admission test during the second trimester. Students, who were dropped, withdrawn, repeated the course and no final examination were excluded from the study. The scores of the students were culled from the Admission test results, Remedial Math, and College Algebra grade sheets during the first trimester and second trimester of Academic Year 2015-2016. The admission test scores and mathematics academic performance were converted using a scale of one to 100.

The instruments used were results of the old admission test, programmatic admission test results and mathematics grade results of the students who participated in the study. The old admission test focused on the general mathematics competencies required to enter in the University while the Programmatic admission test focused on both general mathematics competencies required to enter in the University and the mathematics competencies required in the Business Curricula. Many Colleges used valid standardized test instruments to make important decisions, (Raykovich, T., 2003). The AMAIUB Programmatic Admission Test manifested high validity and reliability. Methods of Classical test theory were used in the analyses of the data: Cronbach's alpha, Guttman coefficient, Kuder-Richardson, KR20, Item analysis, difficulty index, and discriminatory index. The reliability coefficient was found to be high reliability of the whole instrument. This indicates the viability of the instrument to be adapted as a mission test for the prospective college students, (Calucag, L. & Tabalan, D., 2016).

The current study, SPSS Statistics for Windows was used. The study also adapted the Kolmogorov-Smirnov test to examine whether or not data are normally distributed. In addition, scatter plots were used to identify outliers for all items. Pearson's product-moment correlation coefficient was calculated to determine correlations between the admission test scores and mathematics academic performance. The significance level was $p < .05$.

3. Results and Discussion

Correlation between Admission Test Scores and Mathematics Academic Performance
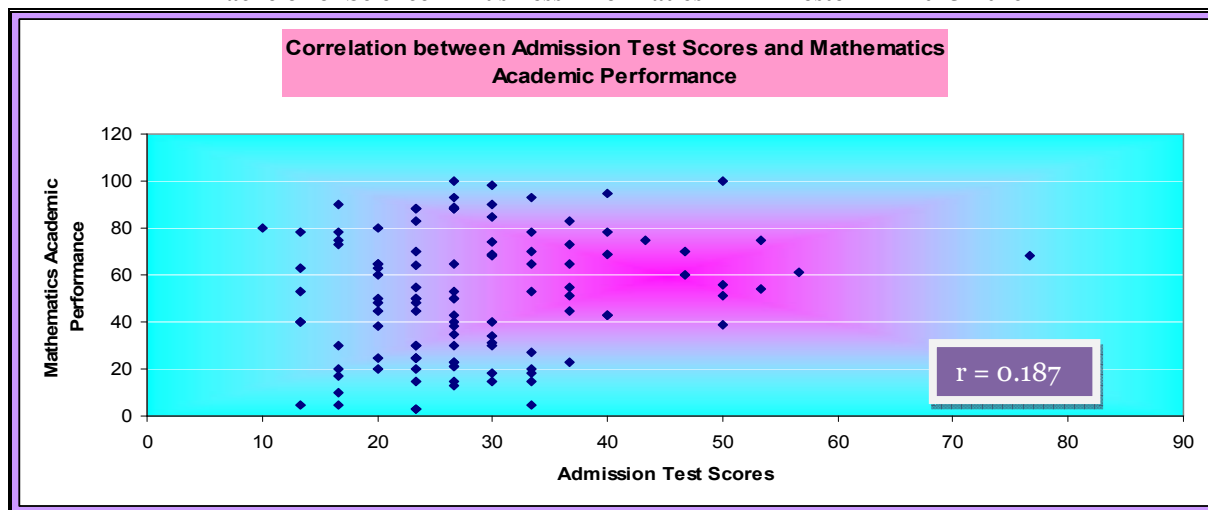### Bachelor of Science in Business Informatics 1st Trimester AY 2015-2016

Fig.1 Correlation between Admission Test Scores and Mathematics Academic Performance
Bachelor of Science in Business Informatics 1st Trimester AY 2015-2016

Figure 1 presents the correlation between the admission test scores and Mathematics academic performance of Bachelor of Science in Business Informatics (BSBI) students in the first trimester AY 2015-2016. The correlation coefficient of $r = 0.187$ indicates that there is a small positive linear relationship between the admission test scores and Mathematics academic performance of the students. A positive correlation indicates that an increase in Admission test score reliably predicted an increase in the Mathematics academic performance. Of the 112 admitted students who completed first year math courses, the higher the admission test score earned, the better the student tended to do on their first year math courses. How students scored in their math admission test seems to influence their first year math courses. In addition, the AMAIUB admission metrics tend to predict the eventual success in Mathematics academic performance of Bachelor of Science in Business Informatics.

		Mathematics Academic Performance
Admission Test Scores	Pearson Correlation	.187
	Sig. (2-tailed)	**.048***
	N	112

* Correlation is significant at the 0.05 level (2-tailed).

The table above displays data on the correlation between admission test scores and Mathematics academic performance of the BSBI students in the first trimester AY 2015-2016 was found to be statistically significant at the 0.05 level of significance ($r = 0.187$; $p = 0.048$). This result may indicate that students' mathematics competencies in the admission test scores are directly related to the first year mathematics competencies. Thus, the Admission test score is a reasonable predictor of the Mathematics academic performance of the first year students of Bachelor of Science in Business Informatics at AMAIUB.

Correlation between Programmatic Admission Test Scores and Mathematics Academic Performance of Bachelor of Science in Business Informatics 2nd Trimester AY 2015-2016
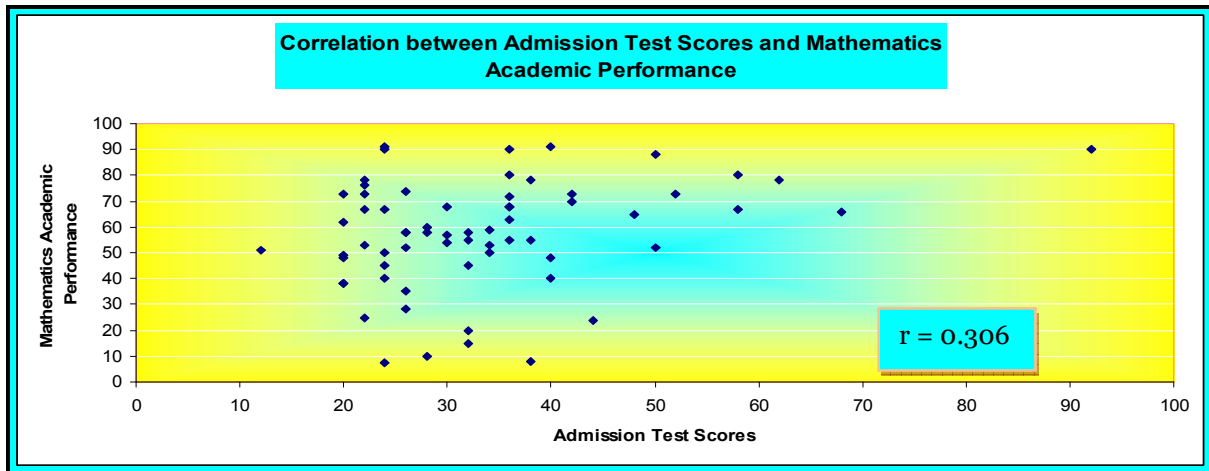

Fig.2 Correlation between Admission Test Scores and Mathematics Academic Performance
Bachelor of Science in Business Informatics 2nd Trimester AY 2015-2016

Figure 2 presents the correlation between the programmatic admission test scores and Mathematics academic performance of Bachelor of Science in Business Informatics (BSBI) students in the second trimester AY 2015-2016. The correlation coefficient of r = 0.306 indicates that there is a moderate positive linear relationship between the admission test scores and Mathematics academic performance of the students. A positive correlation indicates that an increase in Admission test score reliably predicted an increase in the Mathematics academic performance. Of the 65 admitted students who completed first year math courses, the higher the admission test score earned, the better the student tended to do on their first year math courses. How students scored in their math admission test seems to influence their first year math courses. In addition, the AMAIUB programmatic admission metrics tend to predict the eventual success in Mathematics academic performance of Bachelor of Science in Business Informatics. Considering that, the Programmatic admission test focused on both general mathematics competencies required to enter in the University and the mathematics competencies required in the Business Curriculum.

		Mathematics Academic Performance
Admission Test Scores	Pearson Correlation	.306
	Sig. (2-tailed)	**.013***
	N	65

* Correlation is significant at the 0.05 level (2-tailed).

The table above displays data on the correlation between admission test scores and Mathematics academic performance of the BSBI students in the second trimester AY 2015-2016 was found to be statistically significant at the 0.05 level of significance (r = 0.306; p = 0.013). This result may indicate that students' mathematics competencies in the admission test scores are directly related to the first year mathematics competencies. The findings of the present study corroborate with Morgan (1989) presents "data concerning the relationship of particular mathematics courses to the mathematics section of the SAT". Binkley and Jackson (1979) as cited by Morgan "explored the relationships between level of coursework and SAT performance based on samples of over 10,000 examinees". Mathematics coursework was related most strongly to SAT-mathematical performance. Furthermore, in the study of Morgan (1989), Laing, Engen and Maxey (1987) pointed out that, "demonstrated a general relationship between more coursework and improved ACT (American College Testing Program) performance". The results of the previous studies by different researchers and the present study established that the AMAIUB programmatic admission test scores is a reasonable predictor of the Mathematics academic performance of the first year students of Bachelor of Science in Business Informatics.

Correlation between Admission Test Scores and Mathematics Academic Performance
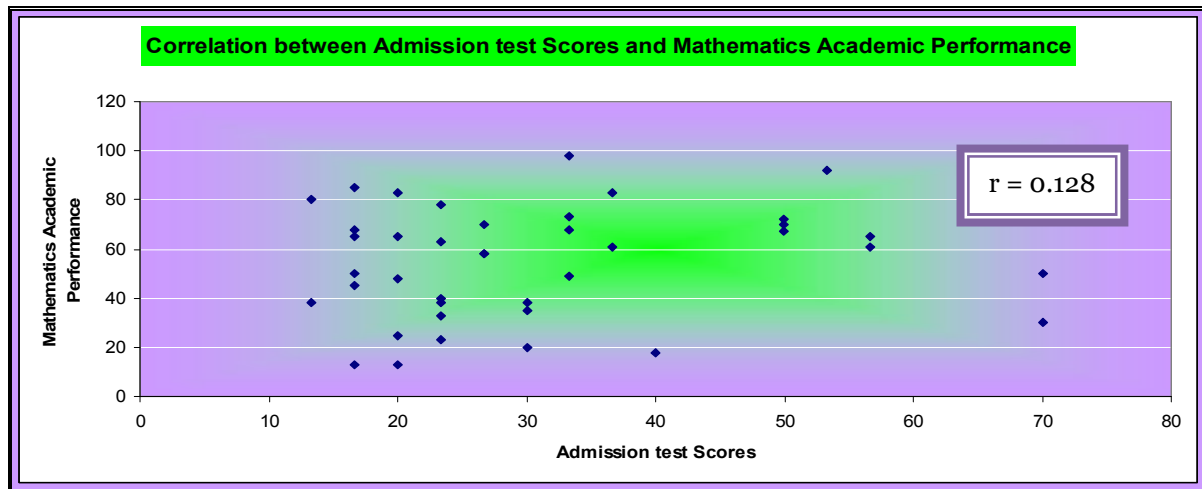**Bachelor of Science in International Studies 1st Trimester AY 2015-2016**

Fig.3 Correlation between Admission Test Scores and Mathematics Academic Performance
Bachelor of Science in International Studies 1st Trimester AY 2015-2016

		Mathematics Academic Performance
Admission Test Scores	Pearson Correlation	.128
	Sig. (2-tailed)	.432
	N	40

Figure 3 presents the correlation between the admission test scores and Mathematics academic performance of Bachelor of Science in International Studies (BSIS) students in the first trimester AY 2015-2016. The data showed a slight positive correlation (r = .128; p = .432), but was found not to be statistically significant at the .05 level. Based on this data, it can be concluded that little if any relationship exists between admission test scores and mathematics academic performance of students in the programme. Only 40 BSIS students were considered in the study, so this data must be looked at with caution. Based on this conclusion, it is recommended that data continue to be collected and looked at in the future to determine if there is a relationship between the admission test scores and Mathematics academic performance of BSIS students.

Correlation between Programmatic Admission Test Scores and Mathematics Academic Performance of
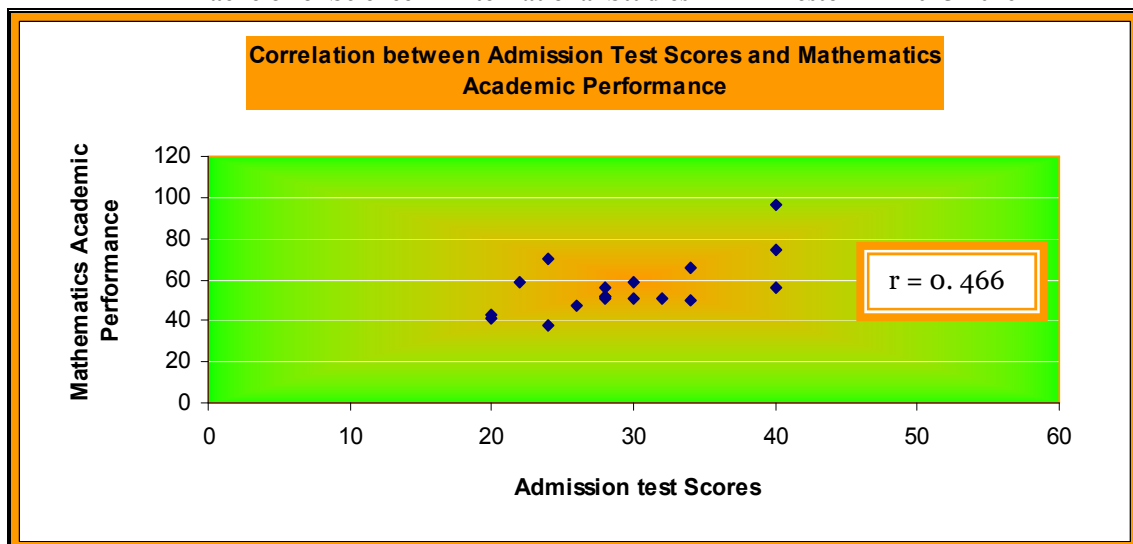**Bachelor of Science in International Studies 2nd Trimester AY 2015-2016**

Fig.4 Correlation between Programmatic Admission Test Scores and Mathematics Academic Performance
Bachelor of Science in International Studies 2nd Trimester AY 2015-2016

Figure 4 presents the correlation between the programmatic admission test scores and Mathematics academic performance of Bachelor of Science in International Studies (BSIS) students in the second trimester AY 2015-2016. The correlation coefficient of r = 0.466 indicates that there is a moderate positive linear

relationship between the admission test scores and Mathematics academic performance of the students. A positive correlation indicates that an increase in Admission test score reliably predicted an increase in the Mathematics academic performance. Of the 19 admitted students who completed first year math courses, the higher the admission test score earned, the better the student tended to do on their first year math courses. How students scored in their math admission test seems to influence their first year math courses. In addition, the AMAIUB programmatic admission metrics tend to predict the eventual success in Mathematics academic performance of Bachelor of Science in International Studies. Considering that, the Programmatic admission test focused on both general mathematics competencies required to enter in the University and the mathematics competencies required in the Business Curriculum.

		Mathematics Academic Performance
Admission Test Scores	Pearson Correlation	.466
	Sig. (2-tailed)	**.044***
	N	19

* Correlation is significant at the 0.05 level (2-tailed

The table above displays data on the correlation between admission test scores and Mathematics academic performance of the BSIS students in the second trimester AY 2015-2016 was found to be statistically significant at the 0.05 level of significance ($r = 0.466$; $p = 0.044$). This result may indicate that students' mathematics competencies in the admission test scores are directly related to the first year mathematics competencies. The findings of the present study corroborate on the findings of (Morgan, 1989; Binkley and Jackson, 1979; Laing, Engen, and Maxey, 1987) that there is a relationship between the mathematics achievement and using college admissions testing data. Similarly, correlation between AMAIUB programmatic admission test scores and Mathematics academic performance of the BSBI students was found to be statistically significant at the 0.05 level of significance. The results of the previous studies by different researchers and the present study established that the AMAIUB programmatic admission test scores is a reasonable predictor of the Mathematics academic performance of the first year students of Bachelor of Science in International Studies.

4. Conclusions
The results of the study established the validity of the method for the existing AMAIUB admission test conceptualized, prepared and implemented by the University. It is necessary to place importance on students' scores for the Mathematics test in the admission test as the scores may indicate their academic performance after admission. The researchers assumed that students who are able to achieve a high admission test score are adequately prepared to achieve high academic performance in mathematics. There is a moderate significant positive correlation on the admission metrics and mathematics academic performance of BSBI students. AMAIUB programmatic admission metrics tend to predict the eventual success in Mathematics academic performance of Bachelor of Science in Business Informatics. On the other hand, there is non-significant slightly positive correlated on the old admission metrics and mathematics academic performance of BSIS. However, there is a significant moderate positive correlated on the programmatic admission metrics and mathematics academic performance of BSIS. AMAIUB programmatic admission metrics tend to predict the eventual success in Mathematics academic performance of Bachelor of Science in Business Informatics.

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