

PREDICTIVE VALIDITY OF DIFFERENT ENTRY MODES ON THE MATHEMATICS ACHIEVEMENT OF TERTIARY STUDENTS IN OGUN STATE

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Abstract

The study focused on how students' performance in mathematics could be predicted based on different entry modes. The population was made up of all graduating students from a University of Education and a Polytechnic in Ogun State during 2014/2015 academic session. All graduating students (253) of the Department of Mathematics were used for the study. The grade point average of students obtained at the end of their study from the institutions were collected. In addition, the information about the entry mode and sex were collected from students' file. Three research hypotheses were tested using ANOVA and t-test statistics at 0.05 level of significance. Results revealed that only 2.3% of students' achievement in mathematics could be explained by their entry mode and that students do not differ significantly in their academic achievement based on the mode of admission with $F_{(2,250)}$ of 2.951. However, there is a significant difference in the mean mathematics achievement of male and female students admitted based on their entry mode at 0.05 level of significance with $t_{(31)} = 3.52$ and $t_{(118)} = 5.461$ for Unified Tertiary Matriculation Examination (UTME) and direct entry (DE) respectively. It is recommended that there should be no discrimination in the admission policy against any form of entry mode by the university or polytechnic authority.

Keywords: Predictive Validity, Entry mode, Grade point average, Pre-Degree, Academic Achievement

Introduction

Education is universally recognized as one of the instruments for social, political, scientific and technological development. Society therefore cannot afford to toy with the education of its citizenry as this will result in a snail pace development. (Azikiwe, 2000). Higher education provides the skilled manpower needed to transform the resources within that country into wealth. This is achieved when higher education provides the right quality of training and skills required at the right quantity (Azikiwe, 2000). University admission in Nigeria is very competitive owing to the high number of applicants vying for limited slots. As a result, admissions were confirmed on the candidate obtaining good grades.

Universities have come under increasing performance scrutiny as they are expected to play a critical role in national development efforts (Cheesman, Simpson & Wint, 2006). Part of the success of the educational process is measured in the quality of students' academic performance while at university. A university is as good as the quality of her graduates. It is common practice that the quality of graduates is measured using academic performance and the quality of a university is the quality of her graduates (Ali, 2003). One indicator of a student quality is the entry qualification, though it is one among many other factors that influence academic performance. A number of studies have been carried out to identify and analyze the numerous factors that affect academic performance. Among such are student factors (attitude, individual differences, physical health and readiness and expectations); home, cultural, and institutional factors (school type, population, discipline, personnel interactions, admission and examination or evaluation policies) (Ali, 2003).

Nwana (1990) had shown that university undergraduates' academic performance cannot be accurately predicted from School Certificate Examination or General Certificate Examination and Joint Matriculation Examination (UTME). Okwilagwe (2001) reported that

SSCE (a secondary school performance) is a potent predictor of undergraduate academic achievement as it exerted a direct and significant positive influence on undergraduate grade point average (GPA) which seems to reveal its stability in establishing predictive validity over time than its counterpart the UTME. Agbonifo and Dimowo (1985) showed in their studies that UTME scores correlated significantly and positively with first year undergraduate performance. This implies that students with high scores in UTME also obtained high scores in university examinations in the first year while Abe (2003), Oluwatayo (2003, 2007) and Adonis (as cited in Alonge, 2005) showed that GCE Advanced level results could predict students' academic performance at Polytechnics and University levels.

Abe (2003) reported that SSCE showed negative prediction to the academic performance among the engineering students. Aminu, Asabe and Suleman (2002) showed that SSCE, Grade II Teachers' Certificate and Advanced level certificate significantly predicted university undergraduate performance. Long (as cited in Farounbi, 2014) observed that the performance of direct entry students in degree examination in Agriculture was better than those admitted through the preliminary programme. Such disparity in performance was not observed among their counterparts in the Faculty of Science in the same year. Majasan and Bakare (as cited in Farounbi, 2014) reported that direct entry students performed better academically than those admitted through preliminary programme.

Sear's study (as cited in Farounbi, 2014) observed that there was a relationship between entry qualification and students' overall performance in final degree result. He observed that most of the candidates that were admitted into the university with GCE Advanced level (A/L), with 12 points or more, had First Class or Second Class Upper Division while only 24% of those admitted with GCE Ordinary level made Upper Division level. Jimoh and Durotolu (as cited in Omede, 2003) studied the relationship between the entry qualifications of National College of Education (NCE) students with

their performance in education courses. They considered WASC/GCE, Grade II and pivotal Grade II as entry certificates: They observed that there was no significant difference in the performance of students admitted into NCE programme through preliminary programme compared to that of direct entry students.

Akabue (as cited in Farounbi, 2014) studied the predictive validity of four entry qualification into the Teacher Training Colleges (TTC). He considered West African School Certificates (WASC), and Primary School Leaving Certificate (PSLC) without teaching experience. He observed that those that were admitted with WASC performed significantly better than others at both Federal and State papers examination. Abdullahi (2003) investigated the linear correlation between JAMB examination result and first year university examination, and observed that JAMB scores in Physics, Chemistry and Economics correlated with university scores in the same subjects. He observed that JAMB scores in Biology and Geography showed no linear correlation with the scores in the first year university examination. Lots of these researches had been carried out over the space of ten years and are based on other subjects apart from Mathematics. Again, gender is a moderating factor that could play a role in the academic performance of students. Haist., Wilson., Elam., Blue., and Fosson (2000) in their study reported that gender is one of the factors that significantly affects students' academic performance. Haist *et al.* showed that men performed better than women in certain settings while women outperformed men in other settings. However, Alton-Lee and Praat (2001); Martin, Gonzalez, & Kennedy (2003) indicated that female students are outperforming their male counterparts at all levels of the education system and attaining higher qualifications. Nonetheless there might have been changes in environmental condition of the institutions which may affect the academic performance of students, hence this study is set to examine how graduating students' performance in Mathematics could be predicted based on different entry modes.

Statement of Problem

The academic performance of students admitted into the universities has been an issue of great concern to researchers and all those who are interested in the education industry. There are minimum entry requirements that candidates must possess before they can be admitted into degree programmes in the universities. The requirements are met for both the pre-degree, UTME and Direct entry candidates. Candidates are expected to possess National Examination Council (NECO), West African School Certificate Examination (WASCE), Senior School Certificate Examination (SSCE) or its equivalents with credits in five (5) subjects (including English language and Mathematics) relevant to their course at not more than two sittings.

It is assumed that all those admitted into the university irrespective of the mode of entry will be able to cope with the academic rigors but contrary to this expectation, some drop out on the way without graduating from the university. Some change their courses and others spend extra year(s) before graduating and some end up with pass and Third Class degrees. This scenario shows that performance may be a function of the mode of entry.

Purpose of the Study

The purpose of this study was to examine the predictive validity of different entry modes in the performance of students in Mathematics.

Research Hypotheses

The following research hypotheses were postulated to guide the study:

H₀₁ - There is no statistically significant difference in the mean academic achievement of graduating Mathematics students based on their mode of entry.

H₀₂ - There is no statistically significant difference in the mean academic achievement of male and female students who are

admitted into the university through unified tertiary matriculation examination.

H₀₃ – There is no statistically significant difference in the mean academic achievement of male and female students who are admitted into the university through direct entry admission.

Methodology

An ex-post facto survey design using the existing data that could not be manipulated were used for the study. The population for the study was made up of all graduating students of a University of Education and a Polytechnic in Ogun State during 2014|2015 academic session. All graduating students (253 students) in Department of Mathematics from the two institutions were purposively selected taking note of their entry mode. The grade point average of students obtained at graduation from the institutions were collected and used for the study. Data obtained were analyzed using ANOVA and t-test statistics. All hypotheses were tested at 0.05 levels of significance.

Results of the Findings

Research Hypothesis 1: There is no statistical significant difference in the mean academic achievement of graduating Mathematics students based on their mode of entry.

The grade points average of graduating students were collected and used for the study. It was analyzed by finding difference in the mean mathematics achievement of graduating students in the three groups using ANOVA. The results are presented in Table 1

Table 1: Descriptive Statistics of Students' Achievement Based on entry mode

Mode of Entry	N	Mean Grade Points	Std. Deviation	Std. Error
UTME	120	2.99	0.90	0.0822
Pre-Degree	100	2.86	0.86	0.0860
Direct Entry	33	2.95	0.73	0.1271

Table 1 shows the mean grade point average for each category of entry mode and standard deviation of the academic achievement of students based on their modes of admission into the university. The mean and standard deviation were $M = 2.99$, $SD = 0.90$ for UTME; $M = 2.86$, $SD = 0.86$ for Pre-degree; $M = 2.95$, $SD = 0.73$ for Direct Entry; Levene test of homogeneity is performed and the result is shown in Table 2

Table 2: Test of Homogeneity of Variances

Levene Statistic	df ₁	df ₂	Sig.
2.951	2	250	.054

The result in Table 2 shows no significant difference, hence equality of variance is assumed. A one-way between groups analysis of variance was conducted to explore the impact of mode of entry on the grade point average obtained by graduating students of Mathematics. There were three modes of entry under consideration: UTME; Pre-Degree and Direct. The result is presented in Table 3.

Table 3: ANOVA Test of between Subject effect Dependent Variables: Performance

Source of Variation	df	Sum of Squares	Mean Square	F-ratio	Sig.
Between groups	2	212.25	106.125		
Within Groups	250	8987.86	35.951	2.951	0.054
Total	252	9200.11			

Table 3 revealed no statistically significant difference at the $p < .05$ level in the grade point average obtained by graduating students of Mathematics for the three modes of entries $F(2, 250) = 2.951, p > .05$. The actual difference in mean grade point between groups was quite small. The effect size .023, calculated using eta squared was small according to Cohen (1988). Therefore, students do not differ significantly in their academic achievement based on the mode of admission into the university. Any physical differences observed amongst the mean academic achievement of students who are admitted into the university through unified tertiary matriculation examination, remedial programme and direct entry admission might have arisen from sampling errors or any other variations in the study.

Research Hypothesis 2: There is no statistically significant difference in the mean mathematics achievement of male and female students who are admitted into the university through unified tertiary matriculation examination.

Table 4: Descriptive Statistics and T-test Statistic of Male and Female Students Admitted through Unified Tertiary Matriculation Examination

Sex	Mean	Variance	SD	N	df	t-value	Sig.
Male	3.49	0.6889	0.83	80			
Female	2.4	0.94	0.97	40	118	5.461*	.00001

*Significant, $p < .05$

Table 4 shows the result of an independent-samples t-test conducted to compare the academic achievement of male and female students admitted through UTME. There was a significant difference in the grade point average for male ($M = 3.49, SD = 0.83$) and female ($M = 2.4, SD = 0.97$) with $t(80) = 5.461, p = 0.05$. Therefore, the null hypothesis is rejected. This implies that there is a significant difference in the mean academic achievement between male and female students who were admitted into the university through unified tertiary matriculation examination at 0.05 level of significance. The result shows that male students who were admitted into the university

through unified tertiary matriculation examination performed better than their female counterparts who were equally admitted into the university through unified tertiary matriculation examination.

The effect size calculated using eta squared was 0.20175 which implies that 20.2 per cent of the variance in the academic achievement of students admitted through UTME could be explained by their gender.

Research hypothesis 3: There is no statistically significant difference in the mean academic achievement of male and female students who are admitted into the university through direct entry admission.

Table 5: Descriptive Statistics and T-Test Statistic of Male and Female Students Admitted through Direct Entry

Sex	Mean	Variance	SD	N	df	t-value	Sig.
Male	3.4	0.64	0.80	20	31	3.52*	0.00136
Female	2.5	0.44	0.66	13			

*Significant, $p < .05$

Table 5 shows the result of an independent-samples t-test conducted to compare the academic achievement of male and female students admitted through Direct Entry. There was a significant difference in the grade point average for male ($M= 3.4, SD= 0.80$) and female ($M= 2.5, SD= 0.66$) with $t(31) = 3.52, p = 0.00136$. Therefore, the null hypothesis is rejected. This implies that there is a significant difference in the mean academic achievement between male and female students who were admitted into the university through Direct Entry at 0.05 level of significance. The result shows that male students who were admitted into the university through Direct Entry performed better than their female counterparts who were equally admitted into the university through Direct Entry. The effect size calculated using eta squared was 0.286 which implies that 28.6 per cent of the variance in the academic achievement of students admitted through DE could be explained by their gender.

Discussion of Findings

There has been much controversy as to which category of students performs better in the university examination and to which mode of admission more emphasis should be placed in the University admission. Table 2 revealed no statistically significant difference at the $p < .05$ level in the grade point average obtained by graduating students of Mathematics for the three modes of entries $F(2, 250) = 2.951, p > .05$, therefore we fail to reject the null hypothesis. The findings of this study showed that there was no statistically significant difference in the mean academic achievement of graduating students based on the mode of admission into University of study. This implies that any difference observed amongst the mean academic achievement of students who were admitted into the University of study through unified tertiary matriculation examination, pre-degree programme and direct entry admission were such that might have arisen from sampling errors or any other variations in the study. The finding of this study corroborate the findings of Ezema (2006) and Long (as cited in Faroumbi, 2014) who compared the results of direct entry students, unified tertiary matriculation examination students and pre-degree students and reported that for the five academic sessions studied there was no significant difference between the cumulative grade point average of the three groups of students based on the mode of entry into the university.

Nonetheless, the findings of this study show that 2.3% of the variance in the Mathematics achievement of graduating students could be attributed to the mode of entries (as revealed by the eta square of 0.02307). Several factors may have contributed to non-significant difference in the mean academic achievement of the three groups of students. Among such factors may include the submission of Mgbake (2006) who states that students' academic success is largely a function of the amount of efforts put into study and not necessarily as a result of mode of entry into the university. In addition, Agada (2007) affirms that students' study techniques among other factors influence their

academic achievement in universities. Commenting on this, he stated that achievement of qualitative education and in fact success in all worthwhile endeavours requires effort. He reported that students ought to put more efforts in their academic activities which include concentration in their studies, frequent revision of work already done and diligence in doing assignments. Sequel to this it could be observed that there is a time for everything under the sun and hence the time that students spend while in training in school is the time to work hard so as to achieve a better learning outcome.

The results of the hypotheses 2 and 3 indicated that the two null hypotheses were rejected at $p < 0.05$ level of significance. This therefore implies that there was a statistically significant difference in the mean academic achievement of male and female students who were admitted into the university through direct entry, and unified tertiary matriculation examination admissions at 0.05 level of significance. The academic achievement of male students was higher than that of their female counterparts based on the three modes of admission.

Conclusion

Based on the results of the study, it can be concluded that there is no statistically significant difference in the mean mathematics achievement of students who are admitted into the university through unified tertiary matriculation examination and direct entry. Therefore, students do not differ significantly in their performance based on the mode of admission into the university. However, when gender is considered, there is a statistically significant difference in the mean mathematics achievement of male and female students who were admitted into the university through direct entry admission and unified tertiary matriculation examination. Hence the mean academic achievement of male students is higher than that of their female counterparts irrespective of the mode of admission into the university.

Recommendations

Based on the findings of this study, it is recommended that there should be no discrimination in the admission policy into tertiary institution and equal opportunities should be given to all students irrespective of the mode through which admission is being sought. Secondly, attempt should be made to reduce the academic achievement gap between male and female students in universities.

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