

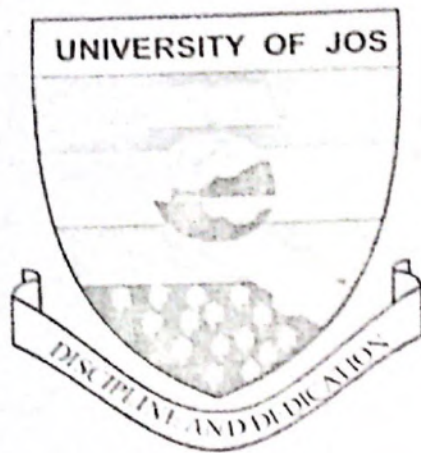


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TABLE OF CONTENTS

- Constraints and Motivators for Teachers' Continuing Professional Development (CPD): A Comparative Study Of English And Nigeria Primary Schools
Adagiri Stella, Ph.D
- Breve Incursion Dans L'univers Erotique Du Roman Africain Francophone De Nos Jours
Akimou Assani
- Information and Communication Technology (ICT) And Decision-Making In Universities In North-Central Geo-Political Nigeria
A. T. Alabi, Ph.D. & O. P. Akinnubi, Ph.D.
- Islamicology: Educational Concept
Huud Shittu, Ph.D
- Secondary School Teachers Preferences of Special Needs Student Implications for Teacher Education In Cameroon
Endeley Margaret Nalova, Ph.D
- ✓ Analysis of Students' Progressive Performance on the Basis of Mode of Entry Into Mathematics Degree Program of the Federal University of Technology Minna
Dantani Ibrahim Wushishi, Ph.D & Bashir Ahmad Usman
- Viewing The Effects of the Jos Crisis Through Poetic Lenses
Jeno-Mary Enighe, Ph.D
- Strategies for Implementing Inclusive Education In The Nigerian Educational System
Iheme Maryann Ugochi & Egwim Getrude
- The Effects of a Training Programme on the Wait-Time Of Basic Primary Five Science Teachers' Questions

Chollom A Grace	125
Assessing the Achievement of Privatization Policy on Government Business Organizations in Nigeria: A Case Study of NITEL	
Hassan Ibrahim Abubakar	141
Social Studies and Family Life Education as a Basis For National Transformation	
Orapuu Nnenna Obureke & Umaru Ruth James	147
An Appraisal of Continuous Assessment Competencies of Secondary School Teachers in Mubi Zone of Adamawa State, Nigeria	
A. Yusuf Mustapha, Ph.D & Hwala Isaac Tumba	159
Effects of Committee System on Principals' Administrative Effectiveness in Senior Secondary Schools in Ilorin Metropolis	
A. T. Alabi, Ph.D. A.I. Mustapha & A. Y. Abdulkareem Ph.D.	167
Development of Moral Values among Prospective Mathematics Teachers: Implications for Mathematics Instruction in the Secondary School	
Thomas D. Bot (Ph.D)	179
Bridging Educational Gaps through Distance Education: A Prescription For Developing Nations	
Oluremi Eyitayo Oni (Ph.D)	199
A Linguo-Stylistic Analysis of George Orwell's Animal Farm	
Nimram Mary Daniel	210
Some Grammatical Problems in Expository Essays of Some First- Year Engineering Students of University of Agriculture, Makurdi	
Ochigbo Ambrose Adaje	223
The Role of Marketing in Rural Tourism Development In Nigeria	
Benson- Eluwa, Virginia & Joshua L. Kajang	233

Examining Coping Strategies of Widows In Twenty-First Century of Nigeria

Naomi G. Bot (Mrs)

CONSTRAIN

25 PROFESSIONA

EN

Education as A Catalyst For Development: A Case For The Nigerian Girl-Child

Barry Akila Katu

26

The Place of Distance Learning In Nigerian Adult Education

Oluremi Oni, Ph.D

27

A Study of Challenges Faced By Female Executive Producers In Kanywood

Safiyyah A. Adam

28

Democratic Governance, Economic Reforms and Poverty Alleviation Strategies in the Fourth Republic in Nigeria

Anuga J. A. & Dashe Y. B

30

The Concept and Determinants of Positive School Climate

Funmilola Adeyanju, Ph.D & Olukemi K. Oyetubo, Ph.D

32

ABSTRACT

*This paper
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**ANALYSIS OF STUDENTS PROGRESSIVE PERFORMANCE ON
THE BASIS OF MODE OF ENTRY INTO MATHEMATICS DEGREE
PROGRAM OF THE FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA**

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Abstract

This study examined the progressive performance of students by mode of entry into the mathematics degree program of the Federal University of Technology, Minna. The data collected for the research was a secondary data. Three hundred and seventy five students of the Mathematics Department (375) from DE, PD and UME modes of entry in the Federal University of Technology, Minna were sampled for the study. A five year period from 2006 to 2010 progressive performance rating of 553 male (73%) and 205 female (27%) students were sampled. Simple random sampling technique was used. Two research questions were raised and two hypotheses were formulated and tested based on the research questions. Statistical softwares named minitab 14 and spss 19 were used to analyze the data using two, three way analysis of variance (ANOVA). The result of the research showed a significant difference in the students' progressive performance over the five years sampled for the study. Although gender is not significant in the study, a little difference in means value was observed though highly negligible. Finally, the progressive performance of Mathematics DE, PD and UME shows that the students for DE and PD exhibit higher progressive performance in the attainment of the degree

program. It was therefore recommended that emphasis should be given to pre-degree results and there should be preference for pre-degree over UTME and Post UTME as modes of admission into the Mathematics degree program of the Federal University of Technology, Minna.

Background to the Study

The critical importance of education in the development of high quality human resources especially in an increasingly technology-driven world economy has been recognized by the Nigerian government as explained by the National Planning Commission (NPC, 2005). However, the declining quality of the Nigerian educational system has prompted many educators to raise concern on the future of the country. It is apparent that the distinct quality of the education system of advanced nations of the world distinguished them economically, socially, scientifically and in technology. The abysmal performance of students, therefore, at the final year examinations conducted by various examination bodies is a clear testimony that the education industry in Nigeria is in problems.

Nothing underscores the issue of poor performance in the education industry in Nigeria than the percentage failures in secondary schools examinations. The West African Examinations Council (WAEC) 2009 results, according to Waecdirect.com, show an overall poor performance with only 26% clinching five credits including English and Mathematics. Thisday Newspaper of 9 April 2009 also reported that according to information released by the same WAEC in 2008, 77% of candidates failed to make the credit grade in Mathematics and only 35% managed to get credit grades in English. The paper reported that over the past ten years, the national average of passes hovers around 32% for Mathematics and 40% for English. In the 2010 WAEC results, only 24.94% of the candidates passed with five credits including Mathematics and English. Interestingly, experts in education have argued that 40% failure level at the school certificate would be problematic for the nation's long term scientific and technical development. But a failure rate of up to 77% is catastrophic.

Tertiary institutions in Nigeria are not immune from this poor performance syndrome; it therefore appears that students find it difficult to learn science at all levels of education (Christian, 2010). Performance at the tertiary level has been faced with lots of criticism. Many educators fault the admission procedures and quality of graduates produced by universities in Nigeria. In his keynote address delivered at the first education summit of Oyo State held in Ibadan, Okebukola (2006) decried the quality of graduates produced in Nigerian universities especially in the last four years and thumbed down the quality of those that would graduate in the next three years. Similarly, Adebayo (2007) commented that the non-inclusion of any of the nation's universities in the world best 500 universities is unsavoury and worse still, Nigeria ranked number 44 after Ghana, Kenya and South Africa in the ranking of African universities.

The Nigerian University Commission (NUC) 2004 assessment study on labour market expectations of graduates from Nigerian universities revealed that there were scores of unemployed graduates roaming the streets and more embarrassingly, those who were lucky to secure employment had to undergo remedial training in order to bridge the huge knowledge and skills gap left over from university training. This tends to negate the tenet of university education which is essentially an industry established to produce quality graduates for national development.

It is worthy to note that there are various levels of education recognized by the National Policy on Education (FRN, 2004) such as the primary, secondary and tertiary levels. It is also on record that these levels of education produced high quality students and graduates especially in the 1960s. Daisi (1997) affirmed that many graduates from the nation's universities have distinguished themselves in their areas of specialization so much that some of them are now professors in the best universities across the globe. However, recent studies show that there are problems bedeviling the industry at all levels especially in science teaching. Science and technology, according to Bakie (2000) is a complex human activity that culminates in the production of a body of universal statements which serve to explain the observable behaviour of the universe or part of it, and

have predictive characteristics, while technology can be viewed as the application of the principle of science for the benefit of mankind.

Background of the Study

Undoubtedly, no nation can march towards scientific and technological advancement without good performance in mathematics at all levels. This is so because mathematics has been identified to be in the forefront of human civilization. Consequently, the persistent failure of students in mathematics is not just an impediment to gaining admission into higher institutions but also a serious factor hindering the nation's collective development because mathematics is the language of both science and technology (Bakie, 2000). In today's world, greater emphasis is being placed on information and communication technology (ICT) and since mathematical methods pervade literally every field of human endeavor, poor performance in mathematics should not be condoned. Although various factors have been adduced for the poor performance of students in mathematics which includes, among others, the language and method of presentation of problem has persisted.

Although Nigeria as a developing nation appears to have been prepared to resolve the issue of development in science, technology and mathematics through her policy on education which provides for 60: 40 admission ratio in tertiary institutions in favor of science, technology and mathematics (Federal Republic of Nigeria, 1998), the problem of female participation in science, technology and mathematics (STM) and related subjects was considered still a source of worry as it is difficult in the present day society to address the issue of national development without recourse to the gender factor. Due to the rise in global consciousness both at the grassroots and policy levels regarding the impact of gender issues in education and national development, no nation can afford to ignore the gender factor in matters regarding national development and STM education.

Notwithstanding this however, available statistics have shown a clear imbalance in Nigerian education in the representation of females at all levels. At the primary school level, the gender percentage of females is only 5.3%, while it is only 5% at the

secondary school level. However, at the university level, it goes up to 15%, with females constituting 35% of the total number of students enrolled in universities (NUC, 2010). A closer analysis of the disciplines in which females tend to enrol also reveals that they are critically underrepresented in engineering and technology courses and are somewhat overrepresented in arts and education courses. In the colleges of education, females account for 55% of the total enrolment. This slight advantage at the lower levels of the teaching profession is not replicated at the university level where only 12.4% of the academic staff are women. Since women account for 51% of the population of Nigeria, there should be a more aggressive policy to rectify the imbalance in their representation as staff and as students in higher institutions.

Although several factors have been identified as contributing to the deteriorating state of teaching in secondary schools in Nigeria, according to a special report of *Weekly Trust* (2011), the sorry state of the educational sector is not restricted to a particular level of the system but cuts across. Even though several factors have been identified as contributors, according to the paper, the issue of corruption, unqualified personnel, under funding, amongst others, have contributed immensely to the state of crises in the educational sector. Statistics released by the Federal Ministry of Education reveal that the country from 2006 – 2010 allocated less than ten percent of the national budget to education (*Weekly Trust*, 2011). This is a far cry from the twenty six percent recommended by the United Nations Educational, Scientific and Cultural Organisation (UNESCO). This was considered a bad omen for the educational sector. The percentage share of education to overall federal fiscal allocation since 1999 to 2010 shows a clear low level of fiscal allocation to the sector. This certainly affects the implementation of government policy on education in the country and in particular the Universal Basic Education.

In Nigeria the university is regarded as the single most important industry for the production of high-level manpower and the capstan of the entire educational system. It was observed that enrolment in Nigerian universities doubled every 4 to 5 years in the 1960s, 1970s, and 1980s. It slowed down somewhat in the 1990s

growing at an average rate of 12% system-wide and approximately doubling over the decade of the 1990s. Currently, most Nigerian universities admit candidates into science courses on the basis of their performance in either the Universities Matriculation Examination (UME) conducted by the Joint Admissions and Matriculation Board (JAMB), Advanced Level Examination or its equivalent in relevant science subjects, for Direct Entry (DE) into 200 Level or the Pre-degree Science (PDS), strictly controlled by the universities.

Prior to the introduction of post-UME screening tests in most Nigerian universities, much blame was placed on the JAMB-conducted UME as the major clog in the wheel of academic quality of the undergraduates. For example, Akper and Fagbongbe (1999) pointed out that JAMB has curtailed the ability of various universities to control the number and character of successful applicants to the universities thus depriving universities of the power to determine the quality of the entrants that should be admitted. Okebukola (2005) pointed out that the JAMB-conducted UME is not the only contributor factor to academic deficiencies of the entrants but also the non-degree programmes mounted by some universities, particularly the pre-degree programme coupled with lack of adequate instructional materials for teaching and researching. Similarly, Oyebode (2005) identified some fundamental problems militating against academic quality to include faulty admission procedures, over enrolment into the various courses and non-availability of resources for teaching which have deprived the entrants of benefiting essentially from university education.

The main objective of the admission system is to determine candidates who would likely do well in the university. The quality of candidates admitted into any higher institution affects the level of research and training within the institution, and by extension, has an overall effect on the development of the country itself, as these candidates eventually become key players in the affairs of the country. Due to the increasing gap between the number of students seeking admission and the total available admission slots, there has been a corresponding increased pressure on the process. This pressure has led to rampant cases of admission fraud and related problems.

The foregoing suggests that Nigerian universities have not identified the most desirable mode of selecting quality entrants into the various degree programmes. In view of the above therefore, this study attempted to find out the difference between the progressive performance of students admitted into FUT Minna first degree program through PD and those admitted through UME and DE programs of the Joint Admission and Matriculation Board (JAMB).

Statement of the Problem

Various stakeholders in the education industry have expressed serious concern over the academic performance of students admitted into Nigerian universities. However, due to the absence of feedback on performance of PD students admitted into the mainstream degree programmes, it became difficult to determine the strengths and weaknesses of the programme. There are also no existing empirical bases for augmenting the PD program and assessing the instructional intake of the PD students at the mainstream of the university degree programmes for better improvement of the PD program. Although similar work was done by Momoh and Gbodi (2003), the work was limited to only 500 Level students of the Federal University of Technology, Minna. Consequently the relationship between the progressive performances of Preliminary Degree (PD) students of the Federal University of Technology, Minna as compared to those who gain admission into the university through other modes are not known. This study therefore investigated the performance of students by mode of entry into the Mathematics degree programs of FUT, Minna.

Purpose of the Study

The purpose of the study is to find out the difference between the progressive performance of students admitted into FUT Minna first degree program through PD and those admitted through UME and DE programs of the Joint Admission and Matriculation Board (JAMB). The following objectives were addressed:

1. To find out whether there is any difference in the progressive performance of students admitted into the Mathematics degree program of the Federal University of Technology, Minna based on their mode of entry into the university.

2. To find out whether there is any difference based on gender in progressive performances of students admitted into Mathematics degree program of the Federal University of Technology, Minna.

Research Questions

To guide this study, answers were sought to the following research questions:

1. What is the difference between the progressive performance of PD, U.M.E. and D.E Mathematics students admitted into Bachelor of Technology (B.Tech) degree program of the Federal University of Technology, Minna?
2. What is the difference between the progressive performance of male and female PD, UME and DE Mathematics students admitted into the Bachelor of Technology (B.Tech) degree program of the Federal University of Technology, Minna?

Null Hypotheses

The following null hypotheses were formulated based on the research questions raised and were tested at $P \leq 0.05$ level of significance.

- H_1 : There is no significant difference between the progressive performance of PD, UME and DE Mathematics students admitted into the Bachelor of Technology (B.Tech) degree program of the Federal University of Technology, Minna
- H_2 : There is no significant difference between the progressive performance of male and female PD, UME and DE Mathematics students admitted into the Bachelor of Technology (B.Tech) degree program of the Federal University of Technology, Minna

Scope and Delimitation

The study covered the Mathematics Department of the School of Science and Science Education, Federal University of Technology, Minna Niger State. The students randomly selected in the department covered those admitted from 2006 to 2010 academic session involved 100, 200, 300, 400 and 500 level results of the randomly selected students.

Methodology

The design adopted for this research was ex-post-factor since the data used were already available without any manipulation. Ex post factor is a Latin expression that literally means something that occurs after the fact. The design is a non experimental research technique in which pre-existing groups are compared on some dependent variables. The independent variable in this case is not manipulated or controlled because it is already fixed (Awotunde, Ugodulunwa, & Ozoji, 1997). The evaluator in this case is not involved in the selection or placement of individuals into comparison or control groups. This non experimental research is similar to an experiment because it compares two or more groups of individuals with similar backgrounds who were exposed to different conditions as a result of their natural histories (Lammers and Badia, 2005).

Format for the Research Design

Table 1.0 Ex-Post Facto Design Layout

Group Treatment	Dependent Variable
G1 T	X
G2	X

- G1 - Group 1
- G2 - Group 2
- X - Treatment Condition

The students' cumulative grade point averages (CGPA) at the end of each of the five levels for the five years under study were collected in the subgroup of pre-degree, UME and DE students. The collection of the data was done through the use of the university software used for recording students' transcripts.

The study population was made up of all students admitted into the SSSE of Federal University of Technology Minna from 2006 to 2011 academic sessions. All together they were 5294 students

admitted into the department during the years under study. Out of 5294 admitted into the school during the years under review, 758 were admitted into the Department of Mathematics. The breakdown of total from 2006/2007 to 2010/2011 is as follows:

Table 2.0 Five Years Population of Admitted Students into School of Science and Science Education Federal University of Technology, Minna

YEAR	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
POPULATION	772	1061	1803	857	

Source: Admission Office of Federal University of Technology, Minna

Table 3.0 Five Years Population of Admitted Students into Department of Mathematics of Federal University of Technology, Minna

YEAR	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
POPULATION	166	175	219	77	121

Source: Examination and Records office of FUT

Mathematics department was sampled for the research study. A year period from 2006 to 2010 progressive performance rating was used. Out of this number, seventy five (75) transcripts for each of the three modes were used in the department, totaling three hundred and seventy five (375). Simple random sampling was used for the sampling of students' transcripts into the three modes under study.

The students' academic transcripts records (SATR) at various departments were used as the instrument to collect the data of the students as data for the study. The data was a secondary data. Therefore, the students' examination results in the department were used for the study. These transcripts were collected through the use of the Federal University of Technology, Minna Result Processing Software (FUTRPS).

The admitted students' data were collected by the researcher from the Examination and Records Office of the university. The CGPA data were likewise collected from the sampled departments through the FUTRPS from each of the department under study. The students' records were personally screened by the researcher with the help of examination officers of the respective departments.

The data obtained were analyzed statistically using two way and three way analysis of variance (ANOVA) test with correlation coefficient to establish the significant difference in the progressive performance of the students using the mode of DE, PD or UME of UT, Minna. Statistical software named Minitab 14 and SPSS 19 was used to analyze the data using two, three way analysis of variance (ANOVA). Abdussalami (2008) stated that the two-way ANOVA allows researcher to test three hypotheses, one each on the two independent variables and the third hypothesis of a new concept called the interaction, while the three-way ANOVA allows a researcher to test the simultaneous effect of three independent variables on the dependent variable. For this study, our independent variables are year of entry, mode of entry and gender in respect to the progressive performance of the students in the Federal University of Technology, Minna.

RESULTS

Data Presentation and Analysis

In this section the researchers considered the grand mean of the progressive performance of randomly selected students of the Mathematics Department of the Federal University of Technology, Minna within the period under review.

4.0.1) There is no significant difference between the progressive performance of PD, UME and DE Mathematics students admitted into the Bachelor of Technology (B.Tech) degree program of the Federal University of Technology, Minna

Table 4.0 Two-way Analysis of Variance (ANOVA) for the difference between the progressive performance of PD, UME and DE Mathematics students admitted into the Bachelor of Technology

(B.Tech) degree program of the Federal University of Technology, Minna

Source of variation	D	Sum of Squares	Means Square	F _{cal}	P
YEAR	4	0.3699	0.092496	3.94*	0.046
	2	0.75120	0.375601	16.15*	0.002
Mode of entry	8	0.18603	0.023254		
Error Total	14	1.30722			

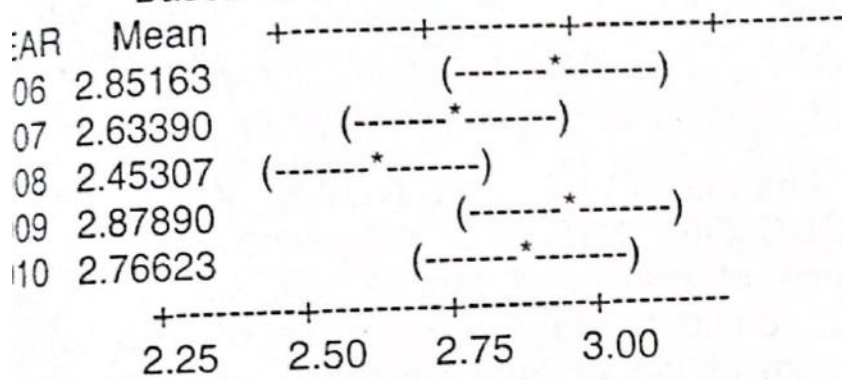
*Significant at $P < 0.05$

From table 4.0 above, since the years p-value = 0.046 is less than $\alpha = 0.05$ there is sufficient evidence against the null hypothesis (H_0) and we conclude that there is significance difference between the year progressive performance of the students from the Department of Mathematics during the five years from 2006 to 2010. This shows that the performance of students randomly selected over the years are different in their performances in the Department of Mathematics Federal University of Technology, Minna. This is further substantiated from the mean value of their progressive record in which the 2007 which is 2.87890 is greater than the other years, followed by 2006 with 2.85163. 2008 has the least mean value of 2.45307.

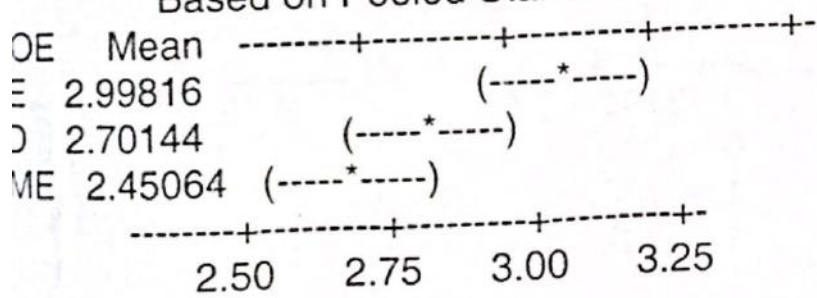
Similarly, since the mode of entry p-value = 0.002 is less than $\alpha = 0.05$ there is sufficient evidence against the null hypothesis (H_0). We shall reject the null hypothesis and accept the research hypothesis and conclude that there is a difference between the students' progressive performance of the Department of Mathematics based on their mode of entry. From the mean of entry of students admitted into the department through the DE, PD and UME, the diagram shows a significant difference. Students admitted through direct entry had a higher mean performance rating of 2.99816 followed by those admitted through the university pre-degree program with 2.70144 and a difference of 29.7% between those admitted through the DE and PD

ograms and 54.8% between those admitted by the DE and UME
ograms.

Individual 95% Confidence Intervals for Mean
Based on Pooled Standard Deviation



Individual 95% Confidence Intervals for Mean
Based on Pooled Standard Deviation



From the mean above, those that were admitted through DE had a mean of 2.99816 followed by those admitted after attending the remediation study with the Centre for Remedial and Extra-Mural studies. The difference could be due to the additional qualifications of the students on entry; for instance, those that were admitted through DE would have obtained either National Diploma or Nigeria Certificate in Education (NCE) or Higher National Diploma (HND) in the field of their study as well as those that were admitted through the pre-degree (PD) of the university.

Furthermore, the R^2 of 85.77% implies that there is high correlation = 0.86 between the year and mode of entry in the university to the department of Mathematics.

Ho. 2: There is no significant difference between the progressive performance of male and female PD, UME and DE Mathematics students admitted into the Bachelor of Technology (B.Tech) Degree program of the Federal University of Technology, Minna. The data in table 6B (see Appendix B) was analyzed using Minitab, a three-way analysis of variance (ANOVA) was carried out as in table 6B.

Table 4.1 Three-way Analysis of Variance (ANOVA): SCORE versus YEAR, GENDER, MODE OF ENTRY for difference between the progressive performance of male and female PD, UME and DE Mathematics students admitted into the Bachelor of Technology (B.Tech) Degree program of the Federal University of Technology, Minna.

Source of variation	df	Sum Squares	Means Square	F _{cal}	P
YEAR	4	0.83191	0.20798	3.48*	0.024
GENDER	1	0.06790	0.06790	1.14	0.298
MODE OF ENTRY	2	1.50136	0.75068		0.000
ERROR	22	1.31302	0.05968	12.58*	
TOTAL	29	3.71418			

* Significant at $P < 0.05$

From Table 4.1, the p-value for years which is 0.024 is less than $\alpha = 0.05$ there is thus sufficient evidence against the null hypothesis and we conclude that there is thus significant difference between the progressive performance of male and female students over the years. That is, the performance of both male and female students over the years for the study are not the same.

It is observed that the p-value for gender is 0.298 which is greater than $\alpha = 0.05$ there is no evidence to reject the null hypothesis, we shall accept the null hypothesis and conclude that there is no significant difference in the progressive performance of the students admitted into the Department of Mathematics based on gender.

Although, the mean of the male was higher than the female with 0.095 differences, it is very negligible.

Similarly, since the p-value for mode of entry is 0.000 which is less than $\alpha = 0.05$, there is sufficient evidence against the null hypothesis. We shall reject the null hypothesis and accept the research hypothesis that there is significant difference between the mode of entry by gender. This shows that those admitted by DE had a mean of 3.0115, and then PD a mean of 2.7181 and UME is 2.4640.

Summary of Findings

The following submissions below are the summary of findings for this research:

1. There is significant difference between the progressive performance of PD, UME and DE Mathematics students admitted into the Bachelor of Technology (B.Tech) degree program of the Federal University of Technology, Minna.
2. There is no significant difference between the progressive performance of male and female PD, UME and DE Mathematics students admitted into the Bachelor of Technology (B.Tech) Degree program of the Federal University of Technology, Minna.

The study was designed to compare the progressive performance of students by mode of entry into mathematics degree programs of the Federal University of Technology, Minna. The conclusion drawn from the findings in this work is that there was significant difference in the students' progressive performance by mode of entry over the five years sampled for the study. It was observed that at 5% level of significance, both Mathematics PD, DE and UME Bachelor of Technology degree students of the Federal University of Technology, Minna are significant. Gender is not significant in the study, thus being male or female does not show any difference in the progressive performance. A little difference in means value was observed though highly negligible such that it could not contribute to it being significant. The correlation between the independent variables (years, mode of entry and gender) and the dependent (program), for sciences is very high with $r = 0.94$ for the sciences and $r = 0.65$ for Mathematics. Finally, the progressive performance of Mathematics DE, PD and UME

bachelor of technology of the Federal University of Technology Minna shows that the students for DE and PD exhibit high progressive performance in the attainment of the degree program.

Conclusion

The conclusion drawn from the findings in this work is that there was no significant difference in the students' progressive performance in the mode of entry over the five years sampled for the study. Momoh and Gbodi (2003) in a case study of 500 Level students of the Federal University of Technology, Minna, observed that PD students are academically better than the UME students in engineering but poor in other schools. This was attributed to subjects usually taught to the students at the Pre-Degree level, which do not include subjects like Geography, Economics and Biology that are required in other degree programs of the university.

Recommendations

It is no gainsaying the fact that learning any science course at degree level requires sound entry qualifications. For Nigeria therefore to realize her developmental goals in science and technology, quality entrants into science courses in Nigerian universities must be meticulously selected using valid and credible entry modes so that those selected might have expected academic competencies to pursue the chosen courses.

Furthermore, available records have shown that the incessant poor performances in secondary school examinations continue to hamper development in many communities due to non enrolment of students into higher institutions, consequently the need for the following recommendations:

1. Universities such as the Federal University of Technology Minna should establish a centre for remedying poor students academically as part of community service to the host community. It is believed that this will increase the enrolment/intake of the host communities into the universities.

2. It was found out that students that pass through an institution higher than the secondary school are better exposed to more challenging rigors of study and therefore stand better chances of performing better than those coming directly from secondary schools. Consequently, entry in to universities through preliminary degree should be considered the best means even above the UTME.
3. Students that pass through the remedial programme get acquainted with the university environment even before they get enrolled into the system. This usually gives them a higher advantage due to their familiarity with higher institutions than those coming directly from the secondary school. The preliminary degree programme should therefore be considered the best means of orientation for students coming newly from the secondary school into universities.
4. State governments should be made to invest in the running of the preliminary degree programmes in collaboration with universities within their domains as this will raise the educational standard of the immediate community thereby enhancing development of high quality human resources in the country.
5. Since it has been established based on the findings of this research, that students admitted through DE and PD exhibit higher progressive performance in the attainment of the degree program, it is therefore recommended that the pre-degree results only should be used in admitting students into the Schools of Science and Science Education.
6. It is likewise recommended that the Centre for Preliminary and Extra Mural Studies be relocated out of the university premises to enable the students concentrate more on their studies.

uggestions for Further Studies

o provide more research data and information for determining the effect of mode of entry into universities as well as determine the strengths and weaknesses of the PD Programme, further research that will cover other departments and schools as well as other variables such as age of the students is suggested.

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