ENTRY QUALIFICATIONS AND ACADEMIC PERFORMANCE OF ARCHITECTURE STUDENTS IN BUILDING STRUCTURES

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Abstract

A prerequisite for admission into higher education in Nigeria is meeting the criteria set by the National Universities Commission (NUC). Apart from obtaining acceptable scores in the unified matriculation examinations, candidates are also expected to obtain at least credit grades in some subjects at the end of their secondary school education. For architecture these prerequisite subjects include physics and mathematics. However, there have been debates in recent times as to the relevance of these prerequisites to students' academic performance after admission. This has been necessitated by suggestions that university students' performance do not always reflect their pre-admission academic performance. It is in the light of this that this paper examines the correlation between the scores of students of architecture in some admission prerequisite subjects (mathematics and physics) and building structures - a core course for the study of architecture in Nigerian universities. The study adopts a combination of primary and secondary data. Data were obtained through literature survey, archival retrieval of students' records and augmented by discussions with course tutors and students. Quantitative data was analyzed using the SPSS (version17) while content analysis was used for qualitative data. This paper found that except for the second semester of the second year of architecture studies, there exists no correlation between admission qualification and academic performance of students. However, it found that female students outperformed their male counterparts in all the semesters. It is hoped that the outcome of this paper will inform university admission policy especially for architecture and ensure that the best candidates are given opportunity to study.

Keywords: building structures; performance; prerequisite; students.

1   INTRODUCTION

Higher education is very crucial for the socio-economic and technological development of any country. It provides the skilled manpower needed to transform the resources within that country into wealth [1]. This is achieved when higher education provides the right quality of training and skills required at the right quantity. Over the years, the number of persons applying to enter universities in Nigeria has been on the increase. However, just a fraction of these applicants are admitted each year. University admission in Nigeria is very competitive due to the high number of applicants vying for limited slots. It is thus expected that only the best will be admitted since academic merit is the major criteria used for admission.

Initially, each university handled its admission process autonomously. As a result, there was variance in the criteria used as each university adopted what was considered most appropriate for it. However over time, the need to harmonise admission processes across the country was realised. Consequently the Joint Admissions and Matriculation Board (JAMB) was established to coordinate and standardize university admission processes in the country. The board conducted its first unified examination in 1978.

Each course was given a cut-off mark which varied from one university to another. Meeting the prescribed cut-off mark for a course in a particular university thus qualified a candidate to be provisionally admitted. Admissions were however confirmed on the candidate obtaining good grades in prescribed subjects (which vary from course to course) at the end of their secondary school education. Results accepted are those organized by the West African Examination Council, (WAEC) and National Examination Council (NECO). The current practice now includes a post-JAMB assessment of candidates by the universities where they have been given provisional admission.

Over the years, there have been concerns about the correlation between the pre-admission qualification of students and their academic performance in the university. This appears to be a global source of concern in view of the ongoing debates and studies on the issue in different countries [1, 2, 3, 4]. This paper thus contributes to the debate by examining the relationship between pre-admission

qualification and academic performance of architecture students in Covenant University - a private university located in Otta, Ogun State, Nigeria..

2 LITERATURE REVIEW

Literature review revealed a wide interest in academic performance of pupils and students at primary, secondary and teriary levels of education in different parts of the world. [1] investigated factors affecting academic performance at the secondary level in Pakistan. [2] studied academic performance of biochemistry undergraduate students in the West Indies. [5] studied factors affecting children with attention deficit/hyperactivity disorder. [6] examined the academic performance of architecture students in Nigerian polytechnics vis a vis their entry qualifications. Although this paper also investigates the correlation between pre-admission qualifications of students of architecture and their academic performance, its focus is on students studying architecture in a Nigerian private university. Another significant difference between the two papers is the methodology adopted. While the previous compares results across four polytechnics for one academic session, this current paper utilises panel data to examine performance of a particular set of students over time.

Focus is on tertiary education because pursuit of higher education is the pre-occupation of many people across the world [4]. This is because attainment of higher education raises the social status of individuals and their households [7]. It is also seen as a veritable gateway to access better employment and related income. Higher education also enhances a country's socio-economic development [7]. However, many students admitted to higher institutions are unable to achieve this dream. A major reason advanced for this is poor academic performance of students concerned. Although academic performance of students has long been a subject of enquiry, there does not yet seem to be a consensus as to its definition. [8] views academic performance or achievement as how well a student accomplishes his or her tasks and studies. According to [9] performance is manifestation of knowledge, skills, concepts, and understanding and ideas. Within the academic environment, it is a student's ability to demonstrate mastery of what he has been taught. It is the capacity of the student not only to study and remember facts but also to be able to communicate such knowledge when required, especially under examination conditions.

Several literature like [7] suggest that grades in various tests is the most well-known measure of academic performance. Thus scoring certain grades in examinations indicate candidates' ability and mastery of the course content in which they are examined. However, [10] argues that grades ought not to be the only measures of academic excellence since grades may be influenced by factors such as attendance and instructor prejudice. [2] opines that poor academic performance at tertiary institutions (which is often measured by grades) result in high levels of attrition which ultimately reduces graduate throughput thereby increasing the cost of training a nation's labour force. This cost is born by both government and the students' families or sponsors. [2] therefore suggests the need to identify factors that affect student performance. There is also need to find other ways of measuring academic performance to reflect students' capabilities.

Several studies have focused on factors that may influence academic performance. Some of the factors identified from literature include socio-economic status of students' households; home environment; personal characteristics of students (including self-esteem and attitude); the school personnel; tutors' teaching styles; class size; quality of teaching; the social structure including relationship with peers, parents' involvement in their child's education; gender; aptitude; motivation and entry qualifications and prerequisites [2,11,12]. [1] found that the socio-economic status and parents' education do not only have a significant effect on students' overall academic achievement but also their performance in specific subjects like mathematics and English language. Explaining the impact of socio-economic characteristics on academic performance, [13] elaborates that socio-economically weak parents lack the capacity to meet the financial demands of their children's education, a situation which compels the children to struggle through school and consequently perform below their fullest potential [14]. [2] opines that the effect of these factors may differ as a result of contextual peculiarities due to culture, institution, course of study and the like. For instance, [15] found that the effect of low socio-economic endowment, for instance, is most evident at the post-secondary level. Use of prior academic performance in selecting students appears to be a global trend as documented by [2], [16] and others. This is in view of studies like [17], [18] and [19] whose studies showed that previous performance affects future performance.

According to [20] a vital step in helping students perform better is in understanding what particular factors they are encountering. This is because students' experiences vary greatly. Identifying stressful

factors is needful since stressful academic situations reduce the working-memory available to attend to a task's information processing requirements and to control its execution [11]. [12] opines that the more working-memory capacity people have, the better their performance on academic tasks such as problem solving and reasoning and therefore stresses the need to understand how people with more or less working-memory are affected by the types of high-stakes situations in which academic performance often occurs. [2] notes that a good match between students' learning preferences and instructor's teaching style has been demonstrated to have positive effect on student's performance. Noting that a number of students are multimodal he advocates use of teaching styles to meet the needs of students which he has classified as:

i   Visual learners: students who prefer information to be presented on the whiteboard, flip charts, walls, graphics, pictures, colour. Probably creative and may use different colours and diagrams in their notebooks.

ii   Aural (or oral)/auditory learners: prefer to sit back and listen. Do not make a lot of notes. Students may find it useful to record lectures for later playbacks and reference.

iii Read/write learners: prefer to read the information for themselves and take a lot of notes. These learners benefit from given access to additional relevant information through handouts and guided readings.

iv   Kinesthetic (or tactile) learners: these learners cannot sit still for long and like to fiddle with things. Prefer to be actively involved in their learning and thus would benefit from active learning strategies in class.

3   RESEARCH METHOD

This paper focuses on data obtained from the architecture students of the Covenant University, Otta, Nigeria admitted in the 2009/2010 academic year. The main criteria for selecting students for this study was availability of complete set of information required of them. Consequently, only 38 of the students (comprising of 23 males and 15 females) were found eligible for the study. Data on students were retrieved from reliable archival records within the university system.

The first step was the comparative weighting of all the results to harmonise and eliminate differences in the grading systems. Grade D7 in WAEC/NECO representing scores of 45-49 corresponds to grade D at the university and is weighted 1. Grades C6 and C5 representing scores of 50-54 and 55-59 respectively are weighted 2 to correspond with grade C at the university. Similarly, grades C4 (60-64) and B3 (65-69) are weighted 3 and B2 (70-74) and A1 (75-100) are weighted 4 in line with the university grading system. Students' grades in mathematics and physics in WAEC or NECO examinations were used as a measure of their pre-admission qualification. This is because they are the two compulsory subjects required for admission to the architecture programme in the country. The average weighted pre-admission qualification for each student was obtained by taking the average weighted scores in both mathematics and physics.

Students' academic performance in the Department of Architecture is measured by their performance in the course Building Structures. This course has been chosen because of its high similarity to mathematics and physics which involve calculations and performance of materials. As a core and prerequisite course, students take different Building Structure courses each semester from their second academic year to the fourth year. The university operates a semester system consisting of two semesters per academic year.

Data obtained is analysed using SPSS (version 17). Analysis included frequencies and correlation (including cross-tabulations) analyses. To retain anonymity of students concerned, a coding system has been adopted.

4   RESULTS AND DISCUSSIONS

The frequency analyses show that 60.5% of students studied are males while 39.5% are females. For mathematics, 28.9% of students have a weighted score of 2 while 39.5% and 31.6% have weighted scores of 3 and 4 respectively. In physics however, only 10.5% of the students have a weighted score of 4. While 42.1% of them had a weighted score of 2 the remaining 47.4% had a weighted score of 3. Examination of the aggregate weighted score for each student (comprising of weighted scores obtained in mathematics and physics) revealed that 21.1% and 31.6% have aggregate weighted

scores of 2 and 2.5 respectively. While 26.3% have a weighted score of 3, 15.8% scored 3.5. Only few of the students, representing 5.3%, scored 4.

Results of analysis carried out on the weighted results of the first semester of their second year in the university reveals that half (50.0%) of the students have a weighted score of 4 in the course Building Structures. About a quarter (26.3%) of the students scored 3. While 15.8% of the students scored 2, 5.3% and 2.6% of the remaining students scored 1 and 0 respectively. In the second semester, percentage of students with weighted aggregate of 4 dropped appreciably to 31.6% while those with weighted score of 3 increased to 34.2%. Those scoring 2 dropped marginally to 13.2%, while students scoring 1 and 0 significantly rose to 14.7% and 5.3% respectively. Examination of the average weighted scores of students in Building Structures at the end of the second year showed that only 28.9% have weighted score of 4. The other results are as follows: 13.2% of the students scored 3.5; 23.7% scored 3; 10.5% scored 2.5; 5.3% scored 2; 7.9% scored 1.5 and 10.5% scored 1 or less.

Result of students in Building Structures in their third year appears less impressive. Only 10.5% had a weighted score of 4. Another 21.1% scored 3 while performance of 28.9% of the students is weighted 2. Majority of the students (39.5%) weighted scores were 1 or less. In the second semester, performance of 26.3% of the students is weighted 4 while 21.1% scored 3. Out of the remaining, 18.4% scored 2, while 21.1% and 13.2% scored 1 and 0 respectively. Analysis of students' results in Building Structures of their third year of study, revealed that performance of 10.5% is equivalent to less than 1 weighted average score. Out of the remaining students, 23.75% have a weighted average score of 1; 5.3% have a weighted average score of 1.5; 7.9% have a weighted average of score of 2; 23.7% have a weighted average of 2.5; 10.5% have a weighted average score of 3; 7.9% have a weighted average score of 3.5 and 10.5% have a weighted average score of 4.

Analysis of weighted scores results obtained by students in Building Structures in the first semester of their fourth year shows that percentage of students with weighted score of 0 increased significantly to 21.1%. However, majority of the students' (28.9%) obtained the highest weighted score of 4 followed by 26.3% who obtained weighted score of 3. The remaining 18.4% and 5.3% obtained weighted scores of 2 and 1 respectively. A significantly different level of performance was recorded by the students in their second semester of the fourth year as indicated by frequency analysis. While percentage of those with weighted score of 0 rose marginally to 23.7%, percentage of those with weighted score of 1 rose sharply to 28.9%. Only 10.3% of the students obtained a weighted score of 4. While 23.7% obtained a weighted score of 3, 13.2% obtained 2. Examination of the average weighted scores in Building structures for the fourth year shows that although only 2.6% have a weighted score of 1, 23.7% have a weighted score below 1. 10.5% of the students have a weighted average of 1 and 1.5 respectively. Out of the remaining students, 21.1% obtained an average weighted score of 2.5; 10.5% obtained an average weighted score of 3; 13.2% obtained an average weighted score of 3.5 and 7.9% obtained an average weighted score of 4.

Analysis of students' overall performance in Building Structures for the six semesters spanning three academic years showed that only 3.2% of them have an average weighted score of 4. Those with an average weighted score below 4 but not less than 3.5 represent 19.4% of the students. About a quarter of the students (25.9%) obtained a weighted score below 3.5 but not less than 3, while 22.7% have a weighted score less than 3 but not lower than 2.5. Average weighted performance of 13.0% of the students fall within a range of 2>2.5 while 9.6% have an average weighted score within the range 1.5>2. The remaining 6.4% of the students obtained an average weighted score below 1.5 but not less than 1.

Data was subjected to pearson correlation analysis to determine the effect of pre-admission qualification on students' performance in Building structures. Results showed that there was no significant relationship between the two variables except for the second semester of the second year results. Average scores of students in both mathematics and physics were found to significantly affect their performance in structures at the second semester of their second year in the university (correlation = 434; p = 0.007). Further cross-tabulation analysis revealed that most of those who performed well in mathematics and physics at the pre-admission stage also performed well in the second semester of the second year.

This finding suggests that there exist other factors which affect student performance in structures especially in other semesters except the second semester of the second year. Examination of the course content and discussions with the course tutors showed that being the introductory level to Building Structures, the course content at the first semester of the second year in the Department of Architecture in Covenant University is more theory-based and as such has little semblance with either

mathematics or physics which involve more calculations and reasoning. In the higher classes (third and fourth years) students are required to more painstakingly engage in the rigours of advanced reasoning, calculations and applications which Building Structures demand. It does appear that many students lack the right match between aptitude and attitude for such rigorous analysis and are therefore unable to effectively cope. Discussions with students showed that several of them consider the course too abstract and complicated. Other factors which may have affected performance of students in other semesters include poor attendance, distractions, health challenges, financial stress and family circumstances.

Apart from students' performance in the first semesters of their second and third years respectively, results also showed significant relationship between gender and students' performance in Building Structures. The p values ranged between 0.001 and 0.009. Cross-tabulations results showed that generally, the female students performed better than their male counterparts in all the semesters. This finding is in line with that of [21] who also found that female students performed better than male students and attributed this partly to higher level conscientiousness and class attendance among female students.

An explanation for this finding could be the general pressure on female architecture students to perform having found themselves in a field of study generally considered a male preserve. Generally, it was found that attendance record of female students is higher than that of the male students. Class attendance encourages students to listen to lectures, participate in class activities, (including tests and other forms of continuous assessments) and perhaps seek for clarifications where necessary. On the other hand, it could have what [21] referred to as 'domino" effect which leads to poor performance, increased drop out possibilities and social vices.

5   IMPLICATIONS OF STUDY

A major outcome of this study is the need for more investigations. This paper has only examined one set of students. Further work is needed to examine more sets of students in order to have more conclusive results and unveil the emerging trend, if any. It will also be useful to segregate data along gender lines in order to ascertain if gender influence academic performance as suggested in literature. Although this study suggests that female architecture students perform better than their male counterparts, the data set is considered small for generalisations. It should serve as a pointer to further investigations especially since literature is divided on the impact of gender on students' academic performance. In addition, it will be interesting to extend the study to other pre-requisite courses in architecture like architectural studio or using the composite performance of students as encapsulated in their cumulative grade point aggregate, (CGPA).

The finding that there is no serious relationship between pre-university admission performance in mathematics and physics and academic performance in Building Structures of students of architecture suggests the need for a more appropriate criteria for selecting prospective students into undergraduate architecture programmes in Nigerian universities. Such selection criteria should also attempt to match their aptitude with their attitude, the synergy of which will equip students to cope with the rigours of architectural study. Students need to develop the dexterity and analytical prowess needed for Building Structures.

Nevertheless, findings of this study should be helpful to all stakeholders in the university education system. For the policy makers, it should guide in the review of current admission guidelines to more appropriately align with the demands of specific courses of study like architecture. For parents of students, it suggests the need to support their admission seeking children with other skills and competencies that will help them through their course of choice. In addition, there has to be a positive attitude to the course by students as may be demonstrated by better class attendance and participation in class activities. Course tutors on their own part should adopt pedagogic styles that demystify the course and make it less abstract. In addition, academic and non-academic programmes which generate and sustain interest of students should be explored in order to retain students and improve academic performance.

6   CONCLUSIONS

This study investigated the correlation between the university entry qualifications (using weighted scores in mathematics and physics) and academic performance in architecture (using grades in Building Structures) of a set of students from a private university in south-west Nigeria. The results of

the study suggest that apart from the second semester of the second year, there is no significant correlation between the variables investigated. It may therefore be concluded that aptitude in mathematics and physics is not sufficient to carry students beyond the second year of study as far as Building Structures is concerned. Another conclusion emanating from this study is the superior performance of female architecture students in Building Structures in comparison to their male counterparts. This study is not conclusive and as such the need for more studies to identify the real factors affecting academic performance in Building Structures cannot be over-emphasised, considering the pivotal role it plays in the training of architects.

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