COMPARATIVE ANALYSIS OF STUDENTS PERFORMANCE IN ARCHITECTURE DEPARTMENT OF A NIGERIAN UNIVERSITY

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ABSTRACT

The study shows the application of the analysis of variance test in managing students' performance in the department of Architecture, Federal University of Technology, Akure, Ondo State, Nigeria. This study was carried out using a sample of 2nd year architecture students in 2008/2009 academic session and the same set of students in their 3rd year, which is 2009/2010 session. Manual calculation using one-way ANOVA technique was used to find the significant difference between the mean of three related courses (ARC 211-theory of structures I and ARC 212-theory of structures II and ARC 304 - Reinforced Concrete Design). The sampling method used was simple random sampling. Secondary data for this work was retrieved from Architecture department of the University. Interview method was used to find out reasons some students failed. Architect as the chief builder has a duty or responsibility to make sure that building designs are not only aesthetic but structurally stable. The research concludes that the students taking architecture courses: Arc 211, Arc212 and Arc 304 for 2008/2009 and 2009/2010 session are consistent in their performance and should therefore keep up or improve their performance in subsequent courses in the university.

Keywords: Score, Inferences, Significant difference, Variance.

INTRODUCTION

Practicing architecture without a good knowledge of building structures or better still a study of the effects of forces on buildings makes the training incomplete. Architect as the chief builder has a duty or responsibility to make sure that designs are not only aesthetic but structurally stable. This is by far even more necessary in Nigeria where monitoring of urban housing developments is not fully developed, except for few urbanized areas (such as Lagos, Port – Harcourt, Kaduna and Abuja – the Federal Capital city) and the city centres' in the states, much of the hinterland are left to the whims and caprices of the local residents. A common scenario in South – West Nigeria is explained: a resident is threatened by a landlord and the resident having a building under construction is tired of receiving constant harassment, moves into the uncompleted building without sanitary facilities like water, shower or bath and toilet. The surroundings usually lack good roads, electricity and gas facilities. These samples of buildings abound in South West Nigeria.

The department of architecture of the Federal University of Technology Akure aims to produce graduates that are competent, skilled and versatile, capable of understanding the society's need for shelter, and be able to solve pressing environmental challenges (FUTA calendar, 2005). The young minds should be able to tackle developmental challenges such as the Millenium Development Goals (MDG) and more recently the attainment of the Vision 20-2020 - that is, Nigeria plans to attain the twentieth economy in the world by the year 2020. These lofty plans according to the Minister of National Planning; Dr. Samsudeen Usman cannot be achieved without the contribution of well trained built environment professionals (Adediji, 2010). This paper investigates whether the 2008/2009 matriculated students of architecture department are consistent in their performance in three structures based courses in the department.

LITERATURE REVIEW
Why Mathematics all the time? What is special about it? Awoyemi (2007) posits that it is not uncommon to see some students checking out of mathematics classes or disturbing lectures when they don't understand what the teacher is talking about in the class. Some students do not attend classes at all. Such students appear only on examination day for their zero scores. Amazigo, (2000), in Awoyemi (2007) understudied the attitude of students to mathematics in Nigerian schools. The results show that students in Nigerian schools see mathematics as a difficult subject meant for gifted people in the society, the performance in external examinations was always very poor. In a similar study of the attitude of Kaduna Polytechnic students towards mathematics (Awoyemi, 1981, in Awoyemi, 2007) concludes that all efforts should be made by governments both federal states and local government to advice parents and students alike that students who fail to obtain a credit pass in Mathematics at the West African Senior Certificate Examination level has little or no chance of admission into any tertiary institution in Nigeria. In this premise, it should be noted that what applies for mathematics classes may apply for theory of structures classes since it is a mathematics based course. Silently, students fear mathematics based courses.

In comparison with the study of mathematics in the United Kingdom, Morton (2011) informs that:

> Far too many young people do not enjoy mathematics, they give up mathematics in UK because they do not see its relevance in their world or in the potential careers they may choose. Then later on they find they cannot do the subject they want to do at university or get on an apprenticeship because they don't have the   mathematics   qualification.

Some of the outputs that can provide a measure of a university's performance includes but is not limited to the following: "number of undergraduate completions, overall pass rates, and undergraduate students' satisfaction". (Lategan(2008), Toncich(2006) in Olayinka, 2008). In this premise, the pass rate in theory of structure classes is being understudied.

The Architects Registration Council of Nigeria decree 10 of 1969 as amended in 1990, section 17 - defines Architecture as:

> the art and science in theory and practice of design, erection, commissioning, maintenance and management, including coordination of allied professional inputs thereto of buildings, or part thereof and the layout and master plan of such buildings or groups of buildings forming a comprehensive institution, establishment or neighbourhood as well as any organised space, enclosed or opened, required for human and other activities.

The definition above shows that building structures is a cardinal aspect of being an architect, especially the aspect of design and erection of buildings.

Architectural education for capacity building entails change in educational curriculum that reflects the requirements of the modern day. It should also be noted that with the changing ecology of architectural practice as noted by Sa'ad (2001) cited in Abubakar (2012) identified areas of importance in architectural education as "democratization of decision making (globalization); technological innovation (especially information and communication technology); concern for the environment (sustainability) and financial management, architectural schools should be equipped with the desired competencies that will enable them practice not only within their locality, but fit into the global arena". Although building structures developed extensively during the era of the discovery of the reinforced concrete in the 1800s, simple structural calculations especially through trial and error have always been under study as an architectural principle.

Staffing Ratio

The department presently has approval from the Nigerian University Commission in Nigeria (NUC), Architects Registration Council of Nigeria (ARCON) and is presently working on having the commonwealth union of architects (CUA) approval. Usually the full time academic staff is backed up by professionals' working in a 50km radius around the university. The report of the Federal Government Committee on Needs assessment of Nigerian Public Universities however revealed certain inadequacies in the ratio of teaching staff to students: Harvard University, 1:4, NUS 1:12, MIT: 1:9, on the average according to Prof Mahmood Yakubu led committee, "only 43% have PhDs instead of close to 100%", furthermore, instead of 75% of the academics to be between senior lecturers and professors only 44% are within the bracket. The present requirement of the Nigerian Institute of Architects is 1:12 (interview of the Head of Department of Architecture, FUTA, 2012).

Monitoring of Students Progress

Publications, research contracts and prizes are very important to university administrators, nonetheless, Louis Pasteur University in Strasbourg, has emphasized monitoring of students progress as a priority (Cheminat and Hoffert, 1998: as cited in Brennan & Shah, 2000). Monitoring

of students progress begins from their registration for the course through attendance in the classes and their results. Furthermore, noting some lapses or talent in the students could assist the students. Sometimes in the Department of Architecture, FUTA, parents of erring students are called to intervene in the development of their wards. In the end, the Vice Chancellor of FUTA would be happy to have such feedback as expressed his forward to the School of Environmental Technology's Students handbook (2011-2013), "we are proud of the accomplishments of our students and the feedback from employers of labour who have engaged our products over the years. FUTA Graduates have always been in high demand and many of them have really distinguished themselves in their career, both locally and internationally".

Current Teaching Methods

The traditional method of teaching in a classroom was adopted. The content of the course is outlined in the university booklet to define what were to be learned. ARC 211- Theory of Structures I, ARC 212 - Theory of Structures II and ARC 304 - Reinforced Concrete Design. Arc 211, a two unit course discusses tensile, comprehensive, shear stresses and strains in simple structures, Arc 212 also a two unit course is a continuation of Arc 211 and thus it explains basic statics and the application of statics to the determination of reactions, shears and moments. Arc 304, a three units course discusses introduction to the theory and design of simple reinforced concrete structures. (FUTA calendar, 2005). A two unit course is interpreted to mean two hours contact with the students per week.

Analysing Students Examination Records

In the United Kingdom (UK), Assessment and Qualifications Alliance Enhanced Result Analysis website (AQA ERA, 2012) is a public school examination result analysis website, for example General Certificate Examinations (GCE) comparisms within the same subjects for different sets say five years can easily be analyzed with schools having their strengths and weaknesses easily spotted by teachers. The analysis may include identifying trends in a faculty's results year-on-year and against similar schools and colleges, this usually saves time and makes it easy to present to academic teams. The analysis is of importance where the information is shared with students to show where the candidates had not performed well and where a change in focus might be required to achieve the candidates' potential.

Lindfors (2002) discussed the idea of (Korhonen 1999) on the influence of using the Web-based learning environment in the delivery of two courses; Process Control II and Introduction to Control Engineering in the University of Oulu. The paper discusses; students feedback, development of course and teacher, development of learning theories and the development of technology i.e. the use and upgrading of materials on the www. The lack of social contact in a simple web environment is obvious. The feature of presence can be implemented by using closed learning environment programs. Furthermore, according to our experiences, deadlines must be more strictly adhered to when learning in the learning environments (distance learning) than in traditional learning. The

students could do the last exercises in the learning environment even if they were running in all directions to work in summer jobs. The time the teacher worked on the course more than doubled when using new environments. The grades have improved with the use of new learning methods.

Miroslaw (2010) in the evaluation of secondary schools in Poland (and by extension a university) that in the face of modern development and the challenges of modern life a school goes more than just marking and submission of scripts. The lecturer / teacher needs to go a step further, to analyse the scores of a set of students, this should be done yearly. Comparisms could be done across levels or sets of students with the intention of achieving peer review. Analysing students results also make ranking possible. Making it easy to spot weak students and possibly areas where the student / lecturer can make amendments.

RESEARCH METHODOLOGY

A new decade is here (2010 - 2020), there is a need for feedback in the last decade thus warranting a decisive move to check the university courses have fared in the department. The study was initiated at the end of 2009/2010 session. The overall pass rate in three structures based courses in architecture department of the Federal University of Technology, Akure, Nigeria was studied. They are: ARC 211, ARC 212 and ARC 304.

PURPOSE THE STUDY

The purpose of the study is to find out the pass rate of the students of architecture department as a measurement of the performance of the Federal University of Technology Akure.

THE RESEARCH OBJECTIVES

The objectives are to:
1. Retrieve results of students in Arc 211, Arc 212 and Arc 304 from the departmental files.
2. Determine the class population and select a relevant sample.
3. Compare grades of students in Arc 211, Arc 212 and Arc 304 using simple descriptive statistics and the ANOVA technique.

Scope of the Study

The paper examines a class of Eighty Six (86) students offering Arc 211 – Theory of Structures I, Arc 212- Theory of structures II and Arc 304 - Reinforced Concrete Design. The first and second being university courses at year two students and the last is a build up on basic introduction courses in year three of the undergraduate study in the department of Architecture at the Federal University of Technology, Akure, Ondo State, Nigeria.

Data collection, Analysis, Presentation and Discussion

The results for university courses Arc 211 (2008/2009 session), Arc 212 (2008/2009 session) and Arc 304 (2009/2010 session) were retrieved from the departmental files. Ten students were picked through simple random technique without replacement from the list of the students as it appears on

the results. At the end of the exercise, each course had ten samples drawn from the result list. The sample is presented in Table 1. Thereafter the data was analysed using manual calculations for the Anova-1 technique.

Table1: Scores of sampled students in Arc 211, Arc 212 and Arc 304.

Serial number	University Courses		
	Arc 211	Arc 212	Arc 304
S1	40	73	43
S2	72	83	72
S3	53	60	29
S4	50	60	63
S5	62	43	80
S6	68	61	52
S7	66	74	40
S8	76	41	57
S9	74	57	74
S10	62	63	48
Total	623	615	558

Source: Architecture Department, FUTA. (November, 2010)

Table 2: Comparative analysis of students' performance in Arc 211, Arc 212 and Arc 304.

	Arc 211 (2008/2009 session)	Arc 212 (2008/2009 session)	Arc 304 (2009/2010 session)
Nos. of student failures	0	2	5
Students pass rate (%)	100	97.67	94.19
Highest Student Mark	76	95	83
Lowest student Mark	41	18	21

Source: Researchers' computations (2011)

Hypothesis H_0: There is no significant difference between the mean of the scores of the students. This was tested at 0.05%

TABLE 3: One-way ANOVA Table.

Sources of variation	Sum of squares	Degree of freedom	Mean square	F – ratio
Between students' score	251.27	2	125.635	0.65
Within students' score	5180.2	27	191.859	-
TOTAL	5,431.47	29	-	-

Source: Researchers' computations (2011)

The overall pass rate is clearly above average. This is exemplified in table 2, where 100% of the students passed Theory of structures 1, in close comparism, Theory of Structures 2 and Reinforced Concrete Design students had 97.67% and 94.19% respectively. In the same vein, the highest student mark was 95% for Arc 212 as compared to 76% and 83% for Arc 211 and Arc 304 respectively (Table 2).

The question is; what is the next step for the five students who failed arc 304 in 2009/2010 session? Retake in the Nigerian educational system is a thing of the past; carry-over system is very much in place in the Federal University of Technology, Akure. Here, the student concerned has to register and sit for the examination in the next session. From experience, aside from the fact that a student could be ill during the examinations, students that do not attain the mandatory 65% attendance for lectures, attempt continuous assessments or due to lack of dedication to studies, the few students that failed structures courses simply do not have the flare for mathematical based courses.

The interview of the concerned five students who failed ARC 304, at the point of re-registration for the course in the fifth year, of their university training (2010/2011 academic session) reveals that the students attended classes, attempted the continuous assessments and sat for the examination, but failed ARC 411. They were in good health, however one candidate's case is notable, by the time the candidate got to the examination hall it was as if 'he had never studied for the examination at all.'

Critical values of *F* - distribution at 95% confidence level for $v_1 = 2$ and $v_2 = 27$
F critical = 3.35 (Kothari, 2004)
This is far higher than 0.65 (see Table 3) which is the *F*- calculated, therefore H_0 Is accepted. This implies that there is no significant difference between the scores of the students in the three related architecture courses, showing that the few failures are as a result of chance only.

The paper therefore concludes that the students taking architecture courses: Arc 211, Arc212 and Arc 304 for 2008/2009 and 2009/2010 session are consistent in their performance and should therefore keep up or improve their performance in subsequent courses in the university.

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