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Understanding Building Structures by Architecture Students: An Antidote to Collapse of Buildings in Nigeria

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Abstract- ***The rate at which buildings collapsed in Nigeria is alarming and worrisome. There is no collapsed building in the country without casualties such as lost of lives, properties and resources. There are many factors that are responsible for this occurrence and one of these factors is lack of better understanding of Building structures by the Architecture students when in school studying Architecture and later become chief Builders, leaders of building construction or project managers when they pass out since it is the accumulated knowledge acquired when in school that will be applied when on site. However, this factor as important as it is totally neglected. The understanding of students in these courses has been observed to be poor and contribute to incessant building collapsed in Nigeria. The study therefore looks at the variables that may assist the Architecture students to understand the courses thoroughly in order to reduce collapsed buildings in Nigeria. The study employed multi – stage sampling procedures, a descriptive survey that involved the use of questionnaire. The research approach adopted for this study was quantitative. Five universities were purposively selected and sampled. Data collected were analysed based on the information obtained from completed questionnaire and analysed using descriptive statistics such as frequency counts, percentages, Likert scaling, and Chi-square. The result of the analysis revealed the variables that can enhance the students to really understand Building structures very well both in theory and application of knowledge. These include high JAMB score, excellent grades in Mathematics and Physics, attending classes regularly and punctually and create interest in the courses. Possession of relevant textbooks and calculator are compulsory and a must for every student to have so as to solve structural problems that may lead to collapse of buildings in Nigeria, The study concluded that if all these variables are properly addressed, it will assist the students to settle down, concentrate and have in-depth knowledge, better understanding and application of Building structures knowledge in order to reduce incessant collapse of buildings in Nigeria.***

Keywords: ***Understanding, Building structures, Architecture students, Collapsed buildings***

I. INTRODUCTION

The study of Architecture encompasses many courses among which are Building structures courses (Oyadokun *et al.*, 2023). Many students of Architecture find these courses difficult due to its abstraction, wrong perception and little understanding about the courses; because it contains calculations, formulas and structural requirements (Oakley and Bailey, 2013, Oyadokun *et al.*, 2023).

Aside the traditional engineering – based approaches, some teachers of the courses have employed various methods such as test quiz, case study and practical examples to teach the courses for better understanding of the students. Despite all these, research still acknowledges a decline in students' interest and performance in the courses (Henri, Frewer, Amato, Thilakaratne & Trinidad, 2004). Afolami *et al,* (2013), Afolami (2014) observed that many of the methods of teaching Building structures in Nigeria universities for the student to understand the courses are gradually turning obsolete with adverse effects on students' performance thereby creating problems of integrating the knowledge into Architectural designs. Gyula (2003) also noted the conscious efforts made by Structures teachers for the students to integrate the knowledge into their Architectural designs to yield better understanding, yet, all to no avail.

There are three basic reasons why Architecture students find it difficult to really understand and integrate knowledge of Building structures into Architectural designs as observed by Vassigh (2005) which leads to poor understanding of the courses and contributes to collapse of buildings in Nigeria especially when they have finished from school and moved to the building firms or industries to practice. These reasons include Building structures

curriculum as well as methods of teaching and the instructional tools.

Many students of Architecture seem to find the courses difficult due to the highly technical nature of the courses which leads to poor understanding. To some, the courses look abstract and irrelevant to the study of Architecture, and some believe that the structural designs are the responsibility of structural Engineers; thereby, create a lukewarm attitude toward the courses and these have negative effects in understanding the courses to the extent that a graduate student from Architecture cannot produce a structural detail of a simple building from foundation to the roof. This is a serious concern to the researchers because it contributes greatly to the collapse of buildings in Nigeria because one cannot give out what you don't have especially when one get to the field facing construction challenges.

There are many requirements that the students of Architecture most possess so as to understand and perform better in Building structures so, the need for this study in order to have better understanding in Building structures so as to reduce collapse of buildings in Nigeria.

II. LITERATURE REVIEW

2.1 Why Building structures in Architecture

Architecture is the art and science of designing and erecting buildings and other physical structures, ensemble of buildings, according to certain rules and proportions depending on the character and destination of the constructions.

Creativity in Architecture designs and structural solutions seem to have symbiotic relationships, both are inseparable because each has an effect on the function of the other (Robinson, 2001, Oyadokun *et al.*, 2023). During the era of the Beaux – Arts, students were told by their teachers to concentrate on Building designs and ignore the Structure and that Engineers were always in charge. This attitude was a primary factor to the decline and fall of the Beaux – Art system.

School of Architecture was established in the United States of America (USA) around 1925 A.D. according to Salvadori (1947) when Joseph Hudnut (1886 - 1968) brought Walter Gropius (1883 - 1969) to Harvard. Since the beginning of that year, school had been re – thinking their programs to bring mathematics, mechanics and the science of structures into sharper focus and into a clearer relationship with the design of space. New concepts of Structures in Architecture were introduced and these brought freshness and creativity to Architecture and Structures were raised from a superficial aspect of building to the grammar of Architecture. Salvadori (1947) became one of the most articulated spokesmen for this new kind of Structure in Architecture, as a lecturer and a Professor in the school of Architecture at New York. Since then, Building Structure became an integral part of Architectural designs and the designs of these structures were primarily the responsibility of the Architects. Architect designed buildings and structures and it is the professional and ethical responsibilities of every practicing Architect to be competent in the matter concerning structural designs; therefore, the design of these structures is primarily the task of Architects.

The major reasons why students of Architecture study Building structures according to Aniza *et al*., (2010) and Oyadokun *et al.*, (2023) include:

1. To solve structural problem: The students need to know how to solve structural problems, understand structural possibilities and limitations, understand how to determine the distribution of stresses and compute beam and column sizes for a simple class of buildings. They are to find it convenient to design and prepare construction documents for small buildings without utilising the services of an engineering consultant.
2. To see building as structural systems: The relationship between structural and material choices, their implications on Architectural designs proposal and to perceive Structure as contributing to Architectural designs are very important in building designs and constructions (Chistiane, 2013). Students of Architecture who want to acquire broad technical competence in Structure, materials applications and methods of construction, need better understanding of basic fundamentals of how Structure works as well as concepts and theories of Structure to do all these (Sineed, 2012).

3. To learn various aspects of building structural elements, connections and to integrate Building Structure into Architectural designs: To ensure that students design building that are structurally efficient, structures that can withstand any stress or strain and to design structures that are stable, rigid, functional, durable and fulfill structural requirements. In addition, to be able to incorporate structural design learning with applied design skills. (Sandaker, Eggen and Cruvellier, 2011).
4. To talk intelligently to engineering consultants: With the extent to which the engineering profession takes over the task of designing structures for buildings, the students should be able to discuss structural design issues with Engineers in as much as the Architects are the leaders of the design team. It will be very difficult to exercise this leadership role which involved the coordinating of all the designs and engineering works, specialists without possessing the basic knowledge about each area of building construction. It will be also difficult to successfully collaborate with Engineers on large scale projects without wide knowledge of basic principles of Building Structure. Students of Architecture need to know at a minimum, the essential vocabulary of Building Structure terms such as moment, shear, deflection, settlement in buildings and so on. Beyond that, insight into the behavior of structure is necessary unless they want to risk losing control over some basic decisions.
5. They need a basic qualitative understanding of structural theory in order to design rational buildings: Structure offers the Architecture students information about the beauty of construction, how the construction lives and resists the pressure of gravity. It fosters students structural design sensitivity to equip their abilities to analyse design boldly and express structural choice as part of Architectural designs.

Students are expected to achieve certain competencies, define as a combination of knowledge, skills, attitudes that enabled them to work and be able to professionally approach each set of structural problems in a professional manner (Vjeran *et al*., 2012) and to prepare them for the future challenges in building industries.

2.2 Building Collapse in Nigeria

Building collapse refers to the sudden failure of a structure (building) resulting in partial or total disintegration of its elements rendering it completely destroyed (Oke, 2016). It can also refer to a total or significant failure of a structure in the building falling down completely or in parts.

Building collapse in Nigeria has become a reoccurring tragedy with immense socio-economic applications. The incidence has escalated into a national concern especially in densely populated urban areas such as Lagos, Abuja, Plateau and Port Harcourt to mention a few. It usually leads to significant loss of life, property damage, environmental disruption and displacement of countless Nigerians, from residential apartments to high rise buildings (Ayedun *et al*., 2016).

The phenomenon of building collapse is not new in Nigeria but it becomes more pronounced in recent decades due to rapid urbanization. It has become both a technical and humanitarian crisis, raising urgent question about safety, ethics and professionalism in the nation's construction industries (Ede, 2019). Unfortunately, warnings often go unheeded until disaster strikes as seen in recent high- profile incidents (Oladapo, 2022). Majority of collapsed buildings are either under construction or recently completed (LASBCA, 2022).

2.3 Notable Collapsed Buildings in Nigeria

In 2022, sixty two (62) buildings collapse cases were reported nationwide with Lagos accounting for twenty (20) incidents. In 2023, fifty two (52) buildings collapsed with Lagos seventeen (17) incidents and in 2024, twenty one (21) cases were reported with Lagos five (5) incidents. Altogether, one hundred and thirty five (135) building collapsed between 2022 and 2023 with at least twenty six (26) people died.

Some of notable collapsed buildings in Nigeria are depicted in Table 1.

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Table 1: Notable Collapsed Buildings in Nigeria from 2021 - 2025

S/N	Name	Town	Year	Number of Death
1	21 storey building, Ikoyi	Lagos	2021	45
2	3- storey building, Ebute meta	Lagos	2022	10
3	Oniru building, Victoria Island	Lagos	2022	02
4	Grarinpa plaza building	Abuja	2022	03
5	Ebenezer church, Okpanam	Delta	2022	03
6	Secondary school building	Abuja	2023	20
7	Ibadan residential building	Ibadan	2023	03
8	2-storey building, Ebute meta	Lagos	2023	01
9	Private school building, Jos	Plateau	2023	13
10	Molete building	Ibadan	2023	06
11	Saints Academy college, Busa Buji, Jos	Plateau	2024	22
12	Federal capital building	Abuja	2024	07
13	Residential building, Olunloyo	Ibadan	2024	10
14	Mid-rise building, Sabon Lugbe	Abuja	2024	07
15	Shopping Plaza, Onitsha	Anambra	2024	06
16	3-storey restaurant building, Ojodu, Berger	Lagos	2025	05
17	Port- Harcourt waterfront Preference for calculator	Rivers	2025	05

Source: Authors Compilation, 2025

2.4 Causes of Building collapse in Nigeria

There are many causes of collapse of building in Nigeria. These include:

1. Widespread use of substandard and inferior materials to reduce cost, poor architectural designs and supervisions, negligence by professionals and engagement of unqualified personnel in construction projects.
2. Systematic corruption in the construction and regulatory bodies, ignoring official stop-work orders and exceeded approved floors poor drainage and climatic conditions on structural integrity.
3. Overloading of structures and unauthorized alterations, demand for cheap houses, inadequate soil testing especially in waterlogged or swampy areas, unapproved structures and weak regulatory enforcement.
4. Poor reinforcement practices and structural designs, foundation failure, lack of maintenance and corruption.
5. Poor understanding of Building structures when in school studying Architecture.

2.5 Remedies

a. Strict enforcement of building codes and regulations, thorough soil and site investigations, mandatory soil testing quality assurance, engagement of qualified and licensed professionals, use of high quality building materials and public enlightenment.

b. Regulatory compliances, building approval, proper maintenance of buildings, avoidance of unauthorized modifications, regular site inspections, strengthening professional ethics and accountabilities, effective urban planning and policy reforms.

c. Emergency preparedness and rescue infrastructures, blacklisting and penalizing unprofessional, sanction and punishment of culprits, use of advanced technologies and digitalization of building approval process.

d. Sound and better understanding of Building structures, properties, behavior and strength of building materials.

III. METHODOLOGY OF RESEARCH

The study employed multi – stage sampling procedure and a descriptive survey that involved the use of questionnaire. It focused on data obtained from Architecture students of five selected public universities (accredited universities by NUC and

ARCON) in Southwestern Nigeria where Architecture is offered. The research approach adopted for this study was quantitative.

Seven hundred and two (702) students formed the population of this study, that is, one hundred and two (102) students from LAUTECH, eighty nine (89) students from OOU, two hundred and forty five (245) students from FUTA, one hundred and seventeen (117) students from OAU and two hundred and forty five (245) students from UNILAG. The sample frame and sample size of the study were the same. The distribution is depicted in Table 1.

Table 1: Population of the Study

S/N	Name of University	Duration	Level	Number of students sampled	Total number of students sampled
1	Federal University of Technology, Akure (FUTA)	5yrs	400	125	245
			500	120	
2	Ladoke Akintola University of Technology (LAUTECH), Ogbomoso.	5 yrs	400	47	102
			500	55	
3	Obafemi Awolowo University (O.A.U), Ile Ife.	4yrs	300	62	117
			400	55	
4	University of Lagos (UNILAG), Lagos.	4yrs	300	72	149
			400	77	
5	Olabisi Onabanjo University (O.O.U), Ago - Iwoye.	5yrs	300	45	89
			400	44	
	Total				702

Source: Authors Compilation, 2023

The total number of questionnaire distributed was seven hundred and two (702) and the total feedback was five hundred and forty one (541) representing 77.1% as shown in Table 2 below

Table 2: Questionnaire Distributed and Retrieved

S/N	Name of University	Duration	Level	Questionnaire Distributed	Questionnaire Received	Total Distributed	Total Received
1	Federal University of Technology, Akure (FUTA)	5yrs	400	125	80	245	172
			500	120	92		
2	Ladoke Akintola University of Technology (LAUTECH), Ogbomoso.	5 yrs	400	47	45	102	100
			500	55	55		
3	Obafemi Awolowo University (O.A.U), Ile Ife.	4yrs	300	62	45	117	95
			400	55	50		
4	University of Lagos (UNILAG), Lagos.	4yrs	300	72	52	149	102
			400	77	50		
5	Olabisi Onabanjo University (O.O.U), Ago - Iwoye.	5yrs	300	45	33		
			400	44	39	89	72
	Total					702	541

Source: Authors Compilation, 2023

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Data collected were analysed based on the information obtained from completed questionnaire. The data included the number of students with distinctions (A – grade), number of students with good grades (B -- grade), number of students with credits (C – grade), number of students with passes (D – grade) and number of students with failure (F – grade) with score scale (Table 3).

Table 3: The Classification of Grades

Performance Classification	Level of Performance	Score Scale
Distinction (A)	70% and above	5
Good (B)	60% - 69%	4
Credit ©	50% - 59%	3
Pass (D)	40% - 49%	2
Failure (F)	Below 39%	1

Source: Authors Compilation, 2024

Data collected was analysed based on the information obtained from completed questionnaire using descriptive statistics such as frequency counts, percentages and Likert scaling and Chi-square.

IV. FINDINGS AND DISCUSSIONS

A wide spectrum and complex combination of factors account for why students understand well or not in their learning experiences. Taking every of these factors into account is nearly impossible. The factor ranges from the physical through social, economic, psychological and cultural processes and produces outcomes that are as disparate in pattern as the spectrum of human habits and thoughts.

Nevertheless, in both objective and subjective ways, the measurable aspects of both the tangibles and the intangibles variables have been cautiously selected for analysis in this study.

The variables selected for discussion under qualities and requirements therefore include: Age, Monthly pocket money, JAMB score, O' Level result combination, O' Level Mathematics result, O' Level Physics result, Class attendance, Motivator, Previous training in Architecture, Previous Architectural qualification, Possession of calculator and Preference to calculator. The measurement of these eleven (11) variables led to the opinion formed on the variables outcome in understanding Building structures as shown in Table 4.

Table 4: Summary of Variables Outcome

S/N	Variables	Outcome		Comment
1	Age	<16 years	>=16	Adequate
		3.4%	96.6%	(96.6%)
2	Monthly pocket money	<N25,000	>N35,000	Not adequate
		72.1%	16.9%	(16.9%)
3	JAMB score	<250 marks	>300marks	Adequate
		84.7%	1.0%	(84.7%)
4	O' Level result combination	Qualified	Not qualified	Adequate
		99.7%	0.3%	(99.7%)
5	O' Level Mathematics result	'C' and 'B' grades	'A' grade	Adequate
		87.1%		
			11.8%	(87.1%)
6	O' Level Physics result	'C' and 'B' grades	'A' grade	Adequate
		90.6%		
			8.8%	(90.6%)
7	Class attendance	Always	Not always	Adequate
		91.2%	8.8%	(91.2%)
8	Motivator	Self interest	Motivated	Adequate
		70.5%	29.5%	(70.5%)
9	Possession of textbooks	Non/Partial	Posses	Not adequate

		68.5%	31.5%	(31.5%)
10	Previous training in Architecture	None	Posses	Adequate
		77.2%	22.8%	(77.2%)
11	Possession of calculator	No	Yes	Adequate
		15.6%	84.4%	(84.4%)

Source: Authors Computation, 2024.

From Table 4, age is a factor of maturity, physical and mental strength for the ability to withstand the rigor of education of higher learning. It follows that; however brilliant they are, students too young for University education may not find it very easy to cope, especially Building structures courses that have some difficulties in understanding. For this reason, in the study, a benchmark of sixteen (16 yrs) years was taken to screen maturity among the sampled students of Architecture across the universities in the Southwestern Nigeria in line with National Universities Commission (NUC) regulation. The assumption is that, students less than age of sixteen were too young and the higher the percentage of students older than sixteen, the more matured and prepared for Building structures courses they are.

Majority (96.6%) of the Architecture students were sixteen (16) years and above, therefore, they were matured enough to undergo any university courses including Building structures. Only few (3.4%) were below sixteen years. On the ground of age therefore, students of Architecture across the selected universities were matured.

For monthly pocket money of students, this section reacts to the hypothesised that; affluence guarantee comfort and the more comfortable the students are, the more he or she would be able to take care of the basic physiological needs and be mentally stable otherwise, learning would be difficult (Oyadokun, 2023). Theory has it that there are levels of need for a fruitful pedagogy. The chief and the most basic is the physiological need. This translated to proper feeding, clothing, basic transportation and the general comfort. These basic conditions can only be satisfied when a student has an averagely good financial cum economic base. This economic base is measured in this study through the average total income accruable to the sampled students on monthly basis.

The study observed a difference that is significant at alpha level of 95% (X^2 = 68.108, degree of freedom (df) = 20.0, probability value (p-value) = 0.000). Majority (72.1%) of the students had monthly income below twenty-five thousand naira (<N25,000) only, which is less than a thousand naira (<N1000) per day. This would definitely affect the students adversely due to economic meltdown and lockdown in Nigeria. It would also affect them physically, psychologically, and academically in terms of needs and well-being such as feeding, clothing, transportation, acquiring textbooks, drawing instruments and other materials. Only few (16.9%) of the students had monthly income above thirty-five thousand naira (>N35,000) which was above a thousand naira (>N1000) only per day. Students can only settle down to read, understand and do well academically especially Building structures when they are averagely balanced financially.

Studying the understanding of students in Building structures should include an analysis of the entrance prerequisites. There can be pretty much variations in admission path from student to student. While some of the students combined their West African Examination Council or any other Ordinary level (secondary school) result equivalent to that of the Joint Admission Matriculation Board (JAMB); some used ‘A’ level results such as IJMB, some entered the University through a Pre-Degree program, some came in through ‘Direct Entry’ and some through transfer from another University. In all of these, JAMB and the secondary school Ordinary Level at one time or the other is indispensable to any admission into any course in the university, without prejudice to Architecture.

At some instances, JAMB was not required if the student went through a pre-degree or ‘A’ level program as a prelude to admission into the university. On this note, this study considered it appropriate to evaluate the JAMB scores and O’ level requirements that were used to admit the

students of Architecture into the universities selected.

From Table 4, only (1.0%) of the students performed excellently well by scoring more than 300 marks out of 400 marks while majority (84.7%) scored less than 250 marks. In between 250 and 300 marks were few (14.3%). This was not good for a discipline like Architecture that involves courses with calculations such as Building Structures courses. The adverse effect of this was poor understanding of the courses coupled with poor delivery when practicing.

For students seeking admission into Architecture, Mathematics and Physics are compulsory subjects to be taken in JAMB entrance examinations, these subjects are key knowledge needed to excel in Building structures in order to be informed and prepare for calculation courses, therefore, students with high marks (at least 250 marks) in JAMB examinations should be admitted into Architecture.

O' level subjects combination for admission into Architecture becomes essentially the first among the necessary discussions on the ground that, the background training of the students admitted into the department of Architecture has a deep impact on the student's ability to cope with further trainings in the department. Students who have idea of the orthodox methods of calculations and who is versatile in the prerequisite subjects leading to studies in Architecture are hypothesised here to be more likely to perform well and not seeing the courses especially, the Building structures courses as strange or why the courses in the training of Architecture.

In general, English, Mathematics and Physics are compulsory subjects for admission into Architecture with any other two subjects from social and pure science subjects such as Chemistry, Biology, Economics, Geography, Technical Drawing, Fine Art.

A cursory examination of the sampled Architecture students across the Southwestern Nigeria Universities against the general observation of the poor understanding in Building Structures points to some prerequisite subject lapses. In the study, it is plausible that only a few (0.3%) Architecture students were not qualified for admission due to deficient in Physics or Mathematics which is considered important to understanding the courses. Majority (99.7%) of the students had the normal basic science subjects to excel the courses in all selected universities.

With chi square value (X^2) of 39.922; degree of freedom of 16 and p-value of 0.001; it would be observed that; at the confidence level of 95%, the admission requirement into studying Architecture varies across the selected universities. This implies that if O' Level subjects have any influence on the performance of students in Architecture courses especially the Building Structures, then, strong cases should be made for streamlining the subjects so that the basic knowledge requirement for studying Building structures would be ensured.

It becomes necessary to evaluate the grades made by the students in subjects involving calculations in their secondary school leaving examinations. One of the subjects considered most relevant to this analysis is Mathematics. Grade 'E' has the lowest value and the values graduate to 'A' which is the maximum; so, having scores that put you on A grade depicts that you have a better performance in the calculation subject and the farther away from 'A' grade you are, the less your performance as shown in Table 3.

The majority of students across sampled universities fell within grades 'C' (47.1%) and 'B' (40.0%) in Mathematics. This connotes that only a very handful (11.8%) of the students had excellent performance in Mathematics in secondary school certificates. With the picture of the students' performance in Mathematics, one can hardly expect an better outstanding in the courses; being a subject involving calculations but reverse is the case.

In the same vein, the O' level results of the students were evaluated on the subject of Physics; following the same assumption as for the evaluation of performance in Mathematics. The similitude in the nature, philosophy and thinking associated with teaching and learning of Physics and Building structures is high. This is what put Physics in the front above other science subjects when preparatory subjects towards courses are evaluated. Again, majority of the students had 'C' (52.1%) and 'B' (38.5%). While it very true that most, if not all of these students had an acceptable grade for admission into the department, only very few (8.8%) can be

said to be excellent or outstanding in Physics prior to the teaching and learning of courses in Architecture. This will definitely affect the understanding of the students in the courses that need sound knowledge both in Physics and Mathematics.

One or a combination of truancy, poor interest, non-participation, social loafing and so on, can all be mighty hindrances to good performance in any subjects or courses, including Building structures. This study is sensitive to the importance of regular attendance to classes, in the ability of a student to stay focused in the accumulation and application of relevant knowledge of Building structures in Architectural designs. Many (91.2%) of the sampled students were reported to be regular attendees of Building structures classes. It is displeasure to observe that only few (8.9%) students do not attend courses regularly (Table 4).

The attitude of the students would in one part be dependent upon their inspiration or motivation to study the courses. The belief here is that students who have longed for the opportunity to study Architecture would grab it with both hands when he or she gets it. However, students who just happened to find themselves in the department may show off their frustrations by inadvertently putting up poor attitudes to learning. Some students were motivated by someone who probably forced his or her beliefs on them while some developed real interest in becoming an Architect.

Thus, the more the proportion of students who have developed real interest personally to become an Architect, the better the attitude will be at learning Architecture even when it gets to a tougher subject such as Building structures. On the other hand, those who had probably been persuaded by others might not have a full commitment to the discipline of Architecture and may be put off especially when things get a little tougher with the courses.

It was gathered that most (70.5%) of the students fought to be in the department because they were interested in studying Architecture prior to their admission. Nevertheless, the rest almost thirty percent (29.5%) came on the persuasion from one of these: father, mother, uncle or guardian. Hence, if there is any poor understanding in the courses in any of selected universities, this study hypothesises that the first set of suspects would come from these almost thirty percent students.

Motivation would be causative of certain positive attitude or academic behaviors. One of the ways to understand if a student is having the right motivation is turning many things except academic virtues into alternatives forgone. Issues like regular attendance in classes prompt submission of assignment, extra-classroom consultations and so on; all of which may be difficult without possession of textbooks. In this study, the concern is actually the students' understanding in Building structures therefore, the textbooks considered more relevant are the ones on Building structures courses or at least related to it.

Reliably, only relatively few Architecture students (31.5%) had Building structures textbook across the selected universities in Nigeria (Table 4). The Chi-square analysis shows that the case is worse in some universities than others (X^2 = 41.649; p-value = 0 .000). The ability of the students to buy textbooks may be connected with affluence level of parents, availability, cost of textbooks and other factors.

Previous training in Architecture can be obtained by different means, either formal or informal. It is considered formal if it is done in an organised institution and attracts a certificate in an accredited school. It is informal if it is learnt from a roadside artisan or places other than an organised certificate awarding institution. Informal previous training in Architecture includes draughtsman training, masonry, landscape and so on. There is the possibility of trainings prior to entrance into the university on the ground that, aside the informal trainings, some of the students had been to Polytechnics, Technical schools and others; and had obtained certificates that was a part of the prerequisites that got them admitted into the university.

Without recourse to formality therefore, some (22.8%) of the Architecture students have had some form of Architectural training prior to their university education. In one way or the other, it is expected that this category of students will be better positioned to perform better in Architecture which may also enhance their performance in Building structures. Nonetheless, some 77.2% had no form of training in Architecture prior to university schooling

and can be at a disadvantage to do better in Building structures.

To further understand the calculation ability of the sampled students, preference for having calculating machines was investigated. The intention was to see how many of the students had enough dexterity to tackle calculations using calculators. It thus follows that, students who have calculators and knows its application may be proficient with Mathematics and Physics calculations. This can be a helping factor to understand the courses.

With the Chi-square (X^2) value of 6.290, degree of freedom of 4 and the p-value of 0.179, it may be concluded that the possession of scientific calculator is the same across the selected universities of Nigeria (Table 4). In other words, most (84.4%) of the students were found having scientific calculators regardless of which university they were. One may infer that possession of calculator is a norm as majority of students across the sampled school has it. It is regarded as an indispensable tool in the courses by the students.

There is possibility that students without the calculators were financially incapable and borrow from the ones who had. Nevertheless, the popularity of calculator among students may be seen as their readiness for the calculations which the courses required in Architecture. From another angle however, it may mean a high level preparedness to learn Building structures courses.

V. CONCLUSION

The result of this study has shown what are needed and required for the students of Architecture to understand Building structures better when in school in order to reduce collapsed of buildings in Nigeria. These include adequate pocket money, high marks in JAMB examination, excellent grades in O' level results in Mathematics and Physics, regular attendance in Building structures classes and have relevant textbooks with calculation machines (scientific calculator) in order to solve problems in the theory of structures, structural analysis and also solve problems arising in designs which can lead to collapse of buildings.

This will definitely assist the students to settle down, concentrate and have in-depth knowledge of basic structural principles, theories and simple versions of structures such as the span limits and economics based on design requirements when in school studying Architecture. They should be able to demonstrate mastery of what they have been taught in school and not only to study and remember facts but to be able to practicalise what they have been taught when in school.

With better understanding of Building structures, it will assist them to be able to communicate well with Structural Engineers when in field and not just accept anything, A good Architect with better understanding of Building structures should be able to apply the accumulated knowledge from his or her reservoir of knowledge acquired in school when the needs arise, especially when handling life projects in order to avoid collapsed of buildings.

Furthermore, good understanding, sound theoretical and intuitive knowledge in the courses are the keys to becoming good Architects and to drastically reduce building collapse in Nigeria. They should be able to analyse structural system of a simple building before leaving school; otherwise, they become half-baked graduates, incompetent, unqualified Architects and this will surely contribute to collapse of buildings in Nigeria.

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