

# A Study on the Level of Awareness of Sustainability Concepts in Construction amongst Students: The Nuhu Bamalli Polytechnic Experience

Zaki, Blessed.M. Ibrahim Abubakar Adamu Amina  
Department of Architecture, Nuhu Bamalli Polytechnic, Zaria

Hadiza Lawal Mayere Maikasuwa Tanimu  
Nasarawa State Polytechnic, Lafia

## ABSTRACT

Sustainability aims at improving human life while balancing environmental, social and economic needs. It calls for the comfortability of all constituents of the ecosystem. It is therefore a tool that caters for the present and future activities of man. But the activities of man such as construction has proved to be a major impediment to sustainable development because of its impact on the environment which results to degradation. This paper presents and discusses the results of a survey that was conducted among construction students of Nuhu Bamalli Polytechnic, Zaria, with the objective of investigating their awareness regarding the understanding of sustainable construction concepts. The results of the survey shows that a high percentage of the sample population have heard about sustainable construction but just a few have an understanding of the concepts. It is therefore concluded that there is a pressing need for inclusion of sustainable/green design courses in the education of students of the construction industry, with an attention also on the industry stakeholders to reflect these concepts in their designs and construction because students easily model their works during their training process. The paper recommends a curriculum redesign for construction related courses and a government intervention in making policies that ensure that the construction industry stakeholders adhere to sustainable strategies in their practice.

**Keywords:** Construction Industry; Sustainable Construction; Sustainability; Nigeria; Sustainable Development; Nuhu Bamalli Polytechnic

## 1. INTRODUCTION

Building through the ages have been an important aspect of socio-economic development of human beings . Its continuous provision has brought to mind the growing awareness that it is impossible to separate economic development issues from environment issues. Many forms of development erode the environmental resources upon which they must be based, and environmental degradation can undermine economic development (Adogbo; Chindo 2009). Thus, the construction sector has been the focus of sustainability interest groups. The Construction industry consumes about 50% of world energy and has an important responsibility in decreasing the consumption of energy resources. For any development to be sustainable, it must not neglect the interest of the future generations. Therefore, sustainable development is a model for balancing environmental, social and economic goals (Windapo et al 2010). That is to say, it requires maintaining an acceptable life standard for all people and the capacity of the environment to fulfil the needs of the present and the future without compromising the ability of future generations to meet theirs (World Commission on Environment and Development, 1987). Thus, the concept of sustainable development is used as a basis for enhancing understanding of sustainable construction. Construction activities while meeting societal needs of development, impacts the environment before, during and after the creation of the construction products and these impacts have adverse effects on the environment. There is a need therefore to strike a balance between human requirement and environmental consideration. To strengthen this idea, sustainable construction education is seen as a key to the uncertainties that lie in the future of the construction industry. According to Ahn, Kwon and Pearce (2009), construction programs in the United States have a vital role in sustainable education because they produce construction professionals having knowledge related to sustainable construction. Due to this sustainable knowledge transferring mechanism, it is necessary to include the concept of sustainability as part of construction student education to improve students' attitude toward sustainability. In view of the above submissions, this paper examines the awareness level of students of construction in Nuhu Bamalli Polytechnic, Zaria on sustainability concepts with a view of identifying the issues surrounding their understanding and ways of promoting this sustainable agenda from their level.

### Aim/Objectives of Study

The aim of this research is to outline the idea behind sustainability in construction and to understand the nature of students' knowledge and understanding of these concepts.

The following objectives were fundamental towards achieving the above aim;

- i. To outline and examine the concepts of sustainability in construction.
- ii. Identify the level of familiarity of students with the concept of sustainability in construction.
- iii. To identify ways of influencing students' attitude towards sustainability.

## **2.0 LITERATURE REVIEW/THEORETICAL FRAMEWORK**

### **2.1 Concept of Sustainability/Sustainable Development In The Built Environment**

Sustainability issues has become a focus point for communities and countries, as the earth's resources are under severe pressure due to raising populations and economic expansion (Alsanad, Gale and Edwards, 2011). The Brundtland (1987) commission defined Sustainability as the ability to carry forward or support or maintain for a prolonged period approaching perpetuity. Sustainability means meeting the needs of today without compromising the ability of future generations to meet their needs. It is also perceived to be a goal that allows for the continuing improvement of standard of living without reversible damage to resources we need to survive as species (Lehrer 2001). Hence, 'sustainability' suggests change and improvement that is compatible with environmental, social and other limits, both now and in the long-term future (Gray and Wiedemann, 1999). Sustainable development offers a framework within which the appropriate combination of consumption and preservation can be sought. It is a concept of needs, an idea of limitations, a future oriented paradigm and a dynamic process of change (Shields 2001). These changes are required in all countries as part of a package of measures to maintain the stock of ecological capital, to improve the distribution of income, and to reduce the degree of vulnerability to economic crises. (Brundtland 1987; Mahgoub 1997; UNCHS, 1985). The built environment includes all buildings and living spaces that are created, or modified, by people. In addition to the buildings and spaces themselves, it also includes the infrastructural elements such as waste management, transportation and utility transmission systems put in place to serve this building space (Sarkis, Meade, Presley, 2008). Therefore to achieve sustainability or sustainable development within the premise of the built environment, it is required that the built environment should consist of structures which are of high performance and low environmental impact. This means combining and creating a balance between the attributes which make up sustainability which are; economic, social, biophysical and technical in evolving the built environment.

### **2.2 Construction and the Environment**

Construction industry plays an important and dynamic role in the process of sustainable economic growth and development of any nation and more than 50% of the gross fixed capital budget in Nigeria normally takes the form of construction output (Wase, 2004). Construction usually involves the translation of paper or computer based designs into reality. A team made up of architects, builders, surveyors (that is, quantity and land), engineers and town planners are responsible for making it a reality. But then, construction impacts substantially on our environment and is currently contributing significantly to irreversible changes in the world's climate, atmosphere and ecosystem. Buildings are by far the greatest producers of harmful gases such as CO<sub>2</sub> and this 'eco-footprint' can only increase with the large population growth predicted to occur by 2050 (CIOB, 2001).

### **2.3. Sustainable Construction**

Construction becomes sustainable when sustainable development principles are applied in the construction industry. Construction is one of the largest industries in the world, hence its impact on sustainability is immense. The cities and towns we have built to meet our ever-increasing needs have been inefficiently consuming the earth's resources while failing to serve millions of people. Sustainable construction is a requirement if we want to enable humane and prolonged existence on our planet. (Schwarz 2004). Hence, Tinker and Burt (2004) derived a definition for sustainable construction as 'those materials and methods used to construct and maintain a structure that meets the needs of the present without compromising the ability of future generations to meet their own needs'. The implication for the built environment is that for it to be described as sustainable, then the materials selected in building design and used in its construction must be capable of being replaced, re-used or re-cycled as well as general minimal waste. This essentially means creating a healthy built environment using resources efficiently and ecologically.

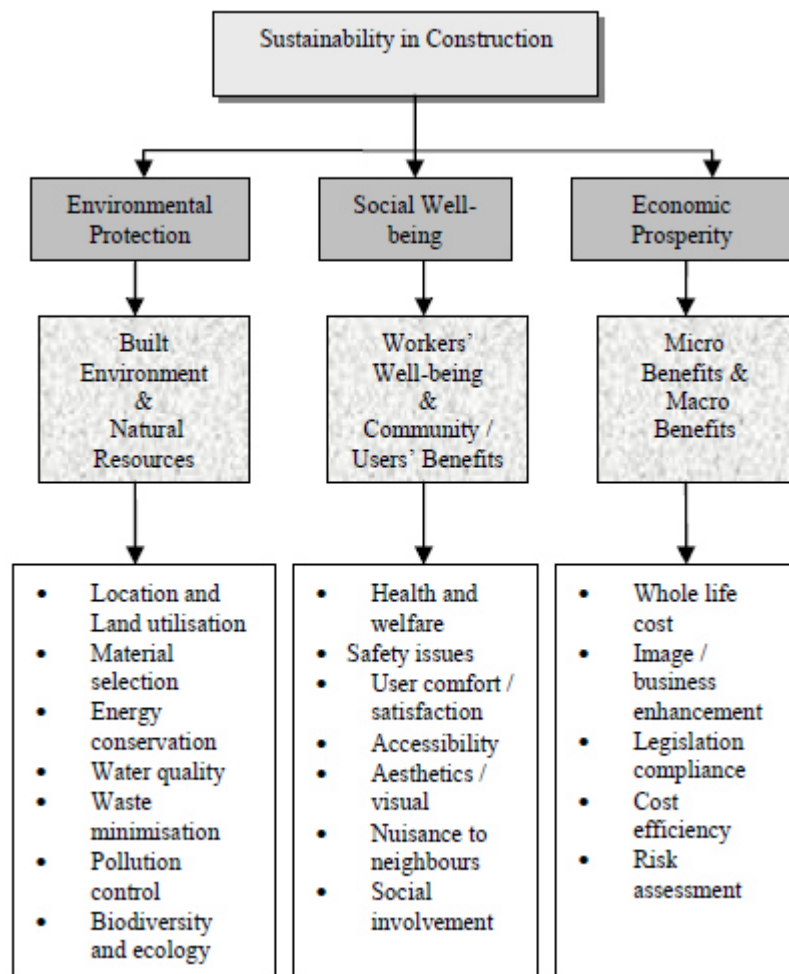


Figure 1: Sustainability In Construction  
 Source: Abidin, 2009.

#### 2.4 Role Of Education In Attaining Sustainability In Construction

The real problem facing humanity today in terms of achieving sustainable development is how to motivate people to change underlying behaviours and activities that are problematic – in this case unsustainability (Nnabuo and Asodike, 2009). Baha, 2005 went further to say that the idea of education for sustainable development has a special role in vindicating how various processes in education, which lie at the heart of promoting change in human behaviour, can be used on a global level to help turn things around.

Education for sustainability is an important part of the journey to live and work in a sustainable manner. Curricula changes to incorporate sustainability education in the built environment disciplines is not a new phenomenon (Raniga, Arcari and Wong, 2010). According to Mead (2001), green education can easily be integrated into programmes either by incorporating green ideas into existing courses or by creating new courses that focus primarily on sustainable ideas. He proffered that a new-approach education system must prepare a student in multi-disciplinary thinking and application to guarantee more sound problem-solving based upon an individual's ability to relate multiple and related issues. Thus, they recommended that the Malaysian Higher institutions need to prepare new professionals who are able to feel comfortable in a multi-disciplinary framework. Ahn, et al (2009) also investigated the level of construction students' familiarity and interest regarding sustainability in the built environment, their ability to identify recognizable sustainable rating systems and factors affecting students' attitude toward sustainability. They found that construction students perceived to have a relatively high level of familiarity with sustainable construction and Leadership in Energy and Environmental Design (LEED) was the most widely recognised sustainable construction rating system by construction students. They also identified some factors like work experience and courses related to sustainable development would affect students' attitude toward sustainability. Thus, the urgency for confronting

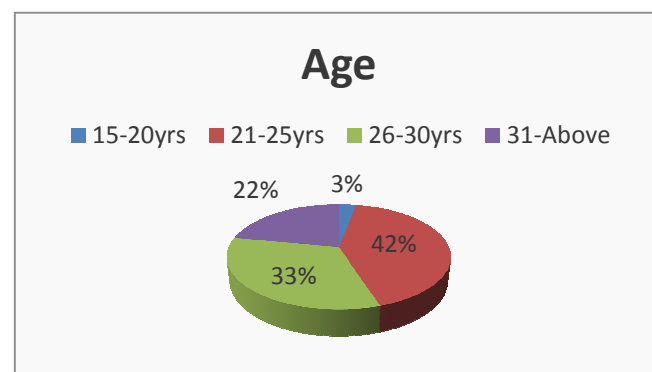
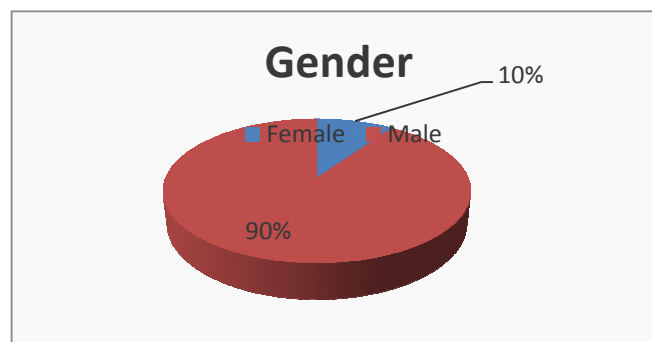
sustainability challenges, opportunities are emerging for different stakeholders who have a significant potential towards providing the knowledge on sustainability to prospective built-environment professionals. Institutions of higher learning are critically important places of knowledge production, knowledge perpetuation and knowledge dissemination. In that context, the university could be, through its teaching and curriculum, promoting and advancing sustainability (Colucci-Gray et al., 2006).

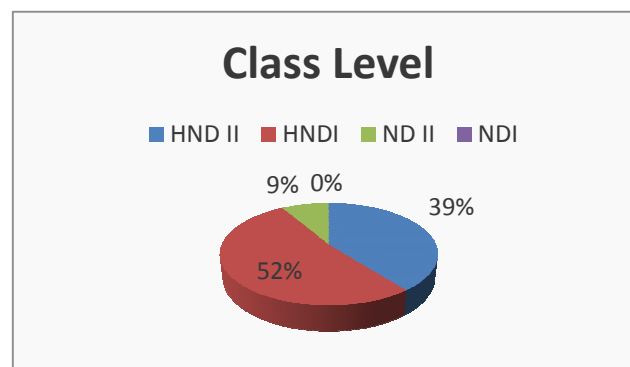
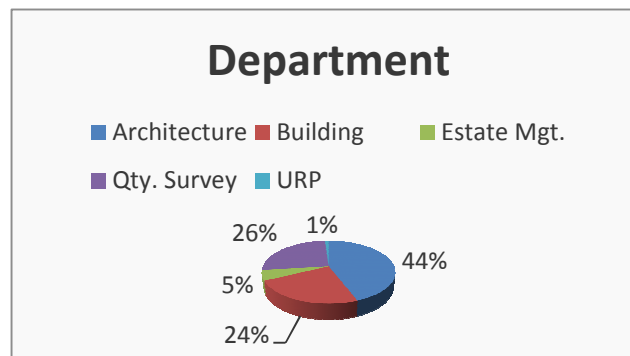
### 3.0 Research methodology

As stated by Abidin (2009), awareness and knowledge are the first stumbling blocks that must be conquered in creating a capable and viable local construction sector. In regards to that, a survey was carried out among students of construction of Nuhu Bamalli Polytechnic, Zaria with the aim of finding their awareness/familiarity level with sustainability concepts in construction. This research is qualitative in nature, which is used optimally for situations which will increase understanding, expand knowledge and explore a phenomenon that has little research done on it (Creswell, 2003). Collection of data was by means of a structured questionnaire instrument. The questionnaires were handed out to the respondents to complete on their own and the researcher was available in case problems are experienced to encourage the respondents to continue with the contribution. The instruction sheet on how to complete the questionnaires was also given to the respondents. A total number of eighty (80) questionnaires were distributed at random by the researchers to students of the construction industry field. Despite the time restraint and the unstable location of students, the response rate was close to 79 percent. From the 80 students, 63 completed and returned the survey material. The responses were analyzed using Mean Item Statistic (MIS). A five (5) point likert scale was used with a mean score of 2.49 and below showing acceptance of the proposed suggestions and a mean score of 2.50 and above considered not acceptable.

### 4.0 Data Presentation And Analysis

#### SECTION I : Demography



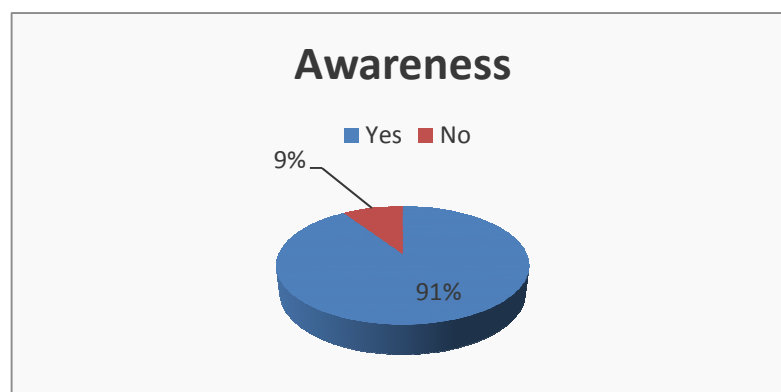


## SECTION II

### Q1. Are you aware of sustainability issues in the construction industry?

This question was designed using the Yes or No response types leaving the respondent to either one of the options. It was revealed that about 91% of the students are acquainted with the issues of sustainability in the construction industry.

Pie chart showing awareness of sustainability issues in the construction industry

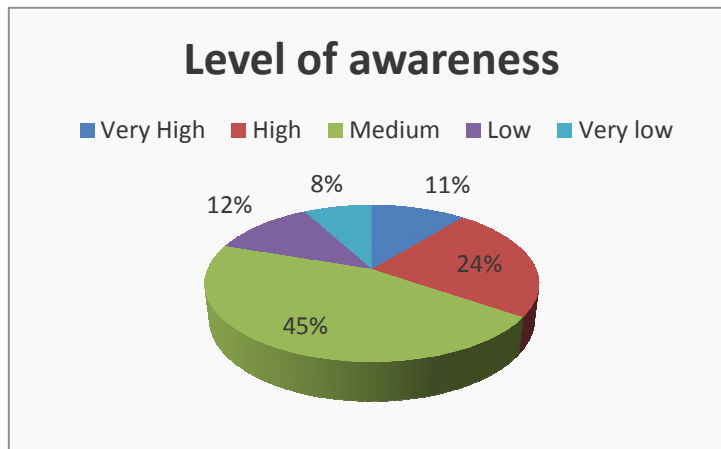


### Q2. Do you agree that sustainability is good for the construction industry.

This question was designed using the Yes or No response types leaving the respondent to either one of the options. It was revealed that about 100% of the students believe sustainability is good for the construction industry.

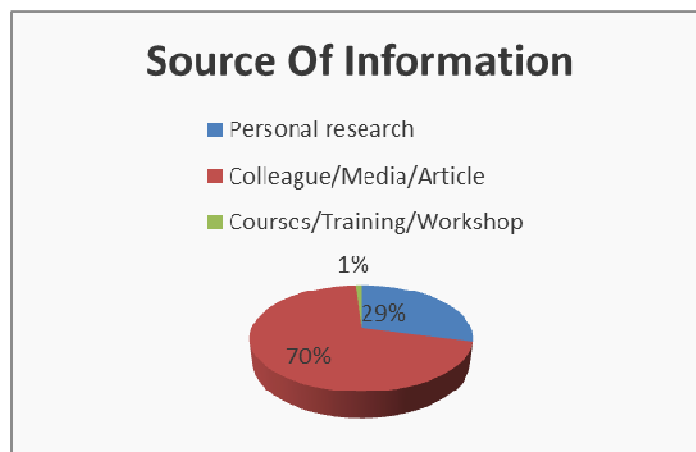
**Q3. How well have you received information on sustainability in construction during your course?**

Pie chart showing level which information on sustainability in the construction has been received

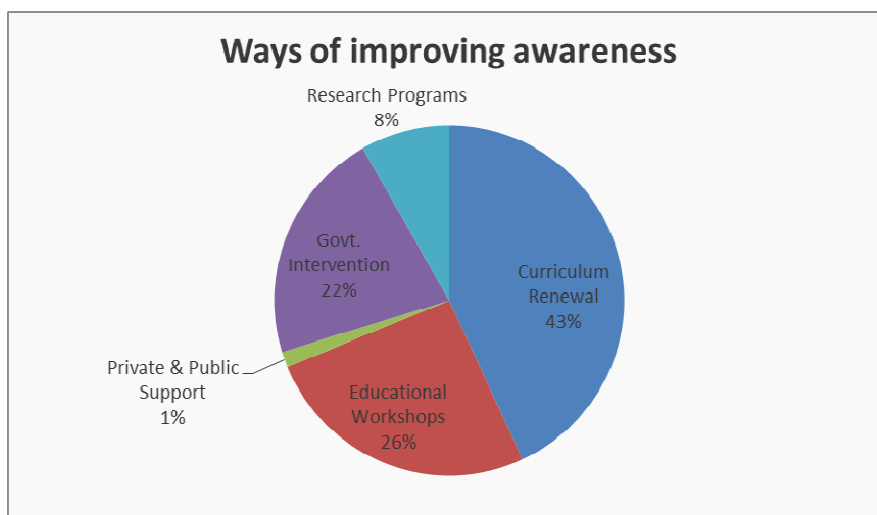


This result shows a high on the medium (45%), signifying that information on sustainability has been moderate.

**Q4. What is your major source of information on sustainability in construction?**



**Q5. What ways do you think the knowledge of sustainability can be improved amongst students of construction?**



**Q6. To what extent do you agree that implementing of the following can help in improving sustainability in the construction industry?**

Table 1: Mean ratings of respondents on extent of agreement with implementing the following in improving sustainability in the construction industry.

<b>a. ENVIRONMENTAL ASPECTS</b>				
<b>S/No.</b>	<b>Item</b>	<b>X</b>	<b>SD</b>	<b>Remarks</b>
i	Develop on environmentally appropriate area	1.45	3.81	Accepted
ii	Maintain biodiversity and ecology of the site	2.10	3.35	Accepted
iii	Conserve building water and cooling power consumption	2.49	2.80	Accepted
iv	Use energy source with low environmental effects	2.16	3.17	Accepted
v	Provide clean and healthy environment	1.91	3.69	Accepted
vi	Use products and material than can be recycled or are biodegradable.	2.19	2.66	Accepted
<b>b. ECONOMIC ASPECTS</b>				
i	Use materials from recycled sources	2.29	2.50	Accepted
ii	Use locally manufactured material	2.63	1.55	Not Accepted
iii	Use durable material	1.65	3.93	Accepted
iv	Implement cost effective measures	2.13	3.35	Accepted
v	Design to attract investors	2.06	3.51	Accepted
vi	Design for less material usage	2.57	1.83	Not Accepted
<b>C. SOCIAL ASPECTS</b>				
i	Respect people and local environment	1.77	4.29	Accepted
ii	Consider occupant health and safety	1.74	4.34	Accepted
iii	Consider quality of life of the occupant	1.76	3.57	Accepted
iv	Analyze building density in the area	2.04	3.14	Accepted
v	Minimize pollution	2.08	2.93	Accepted

The responses from respondents (students) revealed an overwhelming acceptance on the need to implement the above suggestions as contained in all items of the instrument except the use of locally manufactured materials and design for less material usage. There is a strong acceptance of item (i) under environmental aspects; item (iii) under economic aspects and items (i-iii) under the social aspects, thereby suggesting a strong need for the suggestions. Item (iii) under environmental aspects had the lowest acceptance with a mean of 2.49 and a standard deviation of 2.80.

**Q7. To what extent do you believe the following are applicable in the Nigerian Construction Industry?**

Table 2: Mean ratings of respondents on extent of belief the following are applicable in the Nigerian construction industry.

<b>a. ENVIRONMENTAL ASPECTS</b>				
<b>S/No.</b>	<b>Item</b>	<b>X</b>	<b>SD</b>	<b>Remarks</b>
i	Develop on environmentally appropriate area	2.23	3.36	Accepted
ii	Maintain biodiversity and ecology of the site	2.26	3.28	Accepted
iii	Conserve building water and cooling power consumption	2.53	2.84	Not Accepted
iv	Use energy source with low environmental effects	2.30	2.74	Accepted
v	Provide clean and healthy environment	2.11	3.48	Accepted
vi	Use products and material than can be recycled or are biodegradable.	2.55	1.76	Not Accepted
<b>b. ECONOMIC ASPECTS</b>				
i	Use materials from recycled sources	2.31	3.18	Accepted
ii	Use locally manufactured material	2.24	3.05	Accepted
iii	Use durable material	1.84	3.23	Accepted
iv	Implement cost effective measures	1.83	3.03	Accepted
v	Design to attract investors	2.00	3.07	Accepted
vi	Design for less material usage	2.46	1.99	Accepted
<b>C. SOCIAL ASPECTS</b>				
i	Respect people and local environment	1.85	3.64	Accepted
ii	Consider occupant health and safety	1.78	3.83	Accepted
iii	Consider quality of life of the occupant	1.93	3.45	Accepted
iv	Analyze building density in the area	2.04	3.82	Accepted
v	Minimize pollution	1.90	3.59	Accepted

The responses from respondents (students) revealed a general acceptance on the applicability of the above suggestions as contained in all items of the instrument except the use of products and material that can be recycled or are biodegradable and conserve building water and cooling power consumption. Item (vi) under economic aspects had the lowest acceptance rate.

**5.0 CONCLUSION**

Conclusively, it can be said that sustainability requires the application of broad principles and critical thinking to support a process of continuous learning where the practitioner bears a responsibility to build on and apply their learning from one project to the next. Also from the study, it shows that while students may consider sustainability as an important consideration for the future, they do not really understand the tools and concepts



currently available to assist the sustainability goals. They also believe that general knowledge of sustainability and sustainable construction is good for the Nigerian construction industry and providing general knowledge of sustainable construction and sustainability into their curricula prepares them for the future by incorporating sustainability at the core level of their thinking and practice. The study further shows that to drive the construction industry to the path of sustainability, individual firms must take up the challenge of operating in a sustainable way because students easily model their works.

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