Sustainable Driven Architectural Institutional Framework; the Backbone for an Improved Tropical Environment in Nigeria

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Abstract

Architects over the years have been the major custodians of space organization in the environment. Their training process is guided by an institutional framework geared towards improving the environmental qualities of a space. Hence, the tropical architectural institutional framework is structured towards training architects for functional tropical environmental space organization. This research through the methods of conceptual analysis of literature and case studies of a reputable school of architecture in Nigeria and another in the United States reveals that the Nigerian architectural institutional framework for architectural training, though well structured, is lacking in some major sustainable development course training elements. The research focused on sustainability as the basis for achieving a functional environmental institutional framework for the Nigerian schools of Architecture. The research aimed at proposing strategies for integrating sustainability training into the intellectual developmental structure of architects, thereby enhancing quality and better service delivery in terms of improved space organization for the tropical environment. The research recommends that sustainability training be incorporated into the intellectual training of architects. It concluded that the tropical environment in which Nigeria is a subset can only be better improved when there is an understanding of the biotic and abiotic elements making up the environment and how these elements could be sustainably organized so as not to compromise future environmental capabilities.

***Keywords**: Architects, Space organization, Institutional framework, Tropical environment, Sustainability*

Introduction

The term institutional framework according to Wiktionary (2012) is the systems of formal laws, regulations, and procedures, and informal conventions, customs and norms that shape socio-economic activity and behaviour. The institutional framework for architectural practice in Nigeria came into formal existence on April 1st 1960 with the birth of the Nigerian Institute of Architects (NIA). Although architectural training was introduced into the country in 1947 through the establishment of the Yaba College of Technology and The Nigerian College of Arts, Science and Technology located at Ibadan in 1952, but there was no formal Nigerian institutional framework overseeing its affairs. The Nigerian Institute of Architect (NIA) is an

association of independent professional architects with the aim and objective of fostering friendship amongst members, cater for their welfare and establish mutual support and cooperation amongst them. The policy making body of the institute is the Executive Council and their activities are carried out through the Committees of Council which include: Board of Architectural Education, Practice Committee, Internal Affairs Committee, Publications and Library Committee, Disciplinary Committee, Student Affairs Committee, Admission Committee, Female Architects of Nigeria (FAN), Archibuilt Committee and Finance Committee. The Executive Council is headed by the President who takes the chair at all meetings and general assembly (Architects Registration Council of Nigeria, 2015).

In 1969, the Nigerian Government took a bold step to promote the development and growth of Architecture in Nigeria by establishing the Architects Registration Council of Nigeria (ARCON). The council is mandated to set a bench mark for the training and practice of Architecture in Nigeria. Over the years, the Architects Registration Council of Nigeria (ARCON) has lived up to expectation in addressing these mandates in collaboration with other stakeholders, which has contributed to the economic development of Nigeria. A cooperate entity known as the Association of Consulting Architects Nigeria (ACANigeria) also came into existence, which is a professional body representing consultant architects in private practice in Nigeria, with an aim to represent the architectural practices, registered with Architects Registration Council of Nigeria (ARCON). In pursuit of an improved architectural institutional framework for architectural practice and physical development of the country through architectural training, the Association of Architectural Educators in Nigeria (AARCHES) came on board. This is an independent professional association affiliated with the Academic Staff Union of Nigerian Tertiary Institutions and in close cooperation with the Nigerian Institute of Architects (NIA) and other professional bodies (Arayela, 2000).

Statement of Problem
Despite the achievements of the Architects Registration Council of Nigeria (ARCON), in collaboration with the Nigerian Institute of Architects (NIA), and the other Architectural bodies earlier mentioned, there is a bigger challenge in achieving contemporary physical development goals of the country. These goals are primarily the goals of sustainable development. So there is a need to fuse the issues of sustainable development into the institutional framework for architectural training and practice so as to enhance contemporary physical development goals of the country.

Scope of Study
The study focuses on the institutional framework for Architectural Schools in Nigeria and the goals of sustainability as an essential part of this framework. The focus is on the intellectual development of future architects on contemporary developmental issues because the future of architectural practice and physical development of Nigeria lies in the hands of those functionally empowered to bring positive developmental goals into reality.

Aim and Objectives of Study
The study aims at proposing strategies of integrating sustainability training into the intellectual development of architects so as to improve the institutional framework for architectural practice and consequently contemporary physical development of Nigeria.
Its objectives include:
- To carry out a case study on the architectural course training structure of a reputable

school of architecture in Nigeria;
- To analyse the present state of sustainability in Nigerian Architectural education system;
- To study sustainability integration strategies employed by some developed countries;
- To examine some obstacles to achieving sustainability training of architects in present times;
- To propose ways of integrating sustainability elements into the training framework of Nigerian Schools of Architecture.

Conceptual and theoretical issues

An Overview of Architectural Training in Nigeria
Architectural education in Nigeria has experienced dramatic turn-around over a period of time since it was introduced into the country in 1947 with the establishment of Yaba College now Yaba College of Technology, Lagos State. The next college of architecture, Nigerian College of Arts, Science and Technology located at Ibadan in 1952, was later relocated to Zaria, in the present Kaduna State in 1955. It was later to form the core Faculty of the present day Ahmadu Bello University, (ABU), Zaria in 1962. At the onset and within this period, only diplomas in Architecture were awarded to students. The diploma being awarded qualified the students upon graduation to be exempted from Parts I and II of RIBA (Royal Institute of British Architects) Professional examinations; but only to sit for the final exams before being certified a registered architect. In essence, the Nigerian architectural education was tailored after the British education and to a larger extent in line with the curriculum of the colonial masters. The link with RIBA was maintained till 1968, when the course program was again restructured into two-tier, with the offer of the Bachelor of Science (B.Sc.) and Master of Science (M.Sc.) degrees in Architecture. The University of Nigeria, Nsukka was established in 1962, thereby making it to be the second university offering architecture in the country. In 1970, the University of Lagos, Akoka, Lagos established the Department of Architecture, thereby making it the third university department. Presently, the number of Departments of Architecture in Nigeria has increased to twenty-four universities and twenty-two polytechnics / colleges of technology, with the recent establishment of several private institutions of higher learning thereby totaling forty six (Maina, 2008).

Present State of Sustainability in Nigerian Architectural Education
Presently, the majority of current architectural education neatly skips any examination of how societies maintained themselves (in a more or less sustainable state) in the past and what sort of built environment this generated. In the current world situation where a number of resources that are essential for the current western lifestyle, such as oil for energy and phosphorous to grow food, have a known life, it would seem vital that the architects of the future should be learning to define the future through understanding how societies in the past have learned to live within the limited resources available to them. (Vale and Vale, 2009).
Nigerian architectural education at present, the closest to a consideration of what the future might be like is presented in some type of course, often optional or peripheral, with the word "sustainable" in its title. Some of these courses raise the issue of resources and this often leads to the study of buildings that use solar energy for heating and cooling. Seldom do these courses explore architecture for a society living without fossil fuels and other non-renewable resources. Students are not being asked to design buildings that use only renewable resources,

and rarely is the whole architect/client relationship examined in such a context. The assumption of architectural education is that the current economic model will still exist in a sustainable future and that buildings will be procured in the same way as now, it is just that they will more or less face the sun for winter heating and may have a grass roof for summer cooling. Currently, in the Nigerian architectural education, inclusions of sustainability aspects are fragmented relying heavily upon individual efforts of lecturers that are familiar and inclined towards the subject matter. There is a need to review the existing curriculum to significantly include the worthy aspects of sustainability in the courses content and delivery mode.

Integrating Sustainability Training into the Future Architect
In the United States of America, for example, the American Institute of Architects is at present seeking to inject ecological literacy and sustainability principles into architecture education. It is also worth noting that, in the USA, sustainability has been added since 2004 to the 'Conditions for Accreditation for Professional Degree Programs in Architecture', with a particular emphasis on the "understanding of the principles of sustainability in making architecture and urban design decisions and in the creation of healthful buildings" (NAAB, 2004). The US Educators Practitioners Network is also closely working with the Society of Building Science Educators, the AIA Committee on the Environment, and the AIA Sustainability Discussion Group to generate a Carbon Neutral Design Resource for educators and professionals (Boake, 2008). This resource will provide invaluable practical guidelines that will support the process of design and planning of carbon-neutral projects, including case studies that illustrate successfully constructed buildings and an extensive bibliography of available software and tools (Wasley, 2007). Concurrently, in the United Kingdom, to address current pedagogical and professional challenges and facilitate discussion between academics, designers and representatives from qualification bodies, in 2008 the 'Designs on the Planet' workshop series was set up as a forum by Oxford Brookes University, the University of Nottingham and Cardiff University, with the primary aim of contributing to the development of environmental responsibility as a creative factor in the practice and pedagogy of architecture (Stevenson, et al., 2009). The workshop series was sponsored by the Centre for Education in the Built Environment (CEBE) and supported by the Royal Institute of British Architects (RIBA), which is at present working with the UK Architects Registration Board (ARB) to review existing criteria for qualification so as to meet contemporary professional demands and legislative requirements (e.g. the Code for Sustainable Homes, DCLG, 2007).

Environmental awareness campaign in government, schools, adults, community and leaders' programs to encourage participation of all in sustainability.

In Nigeria, environmental awareness is not a prominent feature of education programs in institutions of primary, secondary or higher learning. However, its presence helps to mainstream environmental education programs into schools as a regular part of the curriculum, increase public environmental awareness and demonstrates a commitment to environmental protection. Environmental education can be integrated into existing disciplines or it can be taught as a subject as early as primary school as well as in adult education programs and this will foster environmental responsibilities amongst students. Awareness raising campaigns are found to be successful when they are targeted at specific groups because information can be tailored to the activities, needs and challenges of the group.

Additionally, involving organizations and communities in environmental protection and enforcement can create a sense of stewardship towards the environment, ease hardship through the collaboration and provide a forum for new ideas and greater participation. Awareness can be raised amongst children who are taught about the need to conserve water and instilling the next generation with an environmental consciousness at a very early age. This awareness raising is also observed to permeate into the workplace. Employees are seeing the advantages of working in improved environments which equates to working in a sustainable building. Employers recognized the effects of working conditions as it will have a trickledown effect within the workplace especially in the productivity of staff. Leaders can play an influential or even decisive role in how people act. Education of leaders can assist in facilitating the implementation of sustainable buildings. As a global concern, over the last two decades literature talked about the missing link between architectural education and professional practice (Elnachar, 2010). The print, broadcast, and Internet media can be a powerful ally in educating the public on environmental matters. The government has to work with the media to broaden the environmental interests amongst the public. The involvement and participation of celebrities in media campaigns has been found to be an effective way of increasing understanding of the importance of environmental issues and enforcement.

Implementing sustainable principles and green buildings in courses in Nigerian Schools of Architecture

In Nigeria, the National Universities Commission, National Board for Technical Education, Architects Registration Council of Nigeria and the Nigerian Institute of Architects are yet to approve sustainability as part of the knowledge to be acquired in Nigerian schools of Architecture. Sustainable issues and Sustainable development have not been incorporated into the curriculum in a systematic way, where it has been introduced. Although there were some inputs integrating sustainable issues and development, but these are piecemeal and do not give exposure to the students in broader perspectives. The education is only limited to single course with isolated topics based on the knowledge and interests of the lecturers. New curricula, courses and techniques are needed for whole architectural education emphasizing on how buildings are developed and designed, and how interdisciplinary teams can be used to maximize energy efficiency, reduce resource waste, and improve the environmental quality of the buildings being constructed and re-connecting them to the natural environment. A typical four to six years architectural training in Nigeria focuses on the required range of skills and creativity in design, managerial, media, and technical expertise with core subjects or courses ranging from design, technology, history, theory, practice and environmental behavior. The success of sustainability in design and in the built environment relies on how institutions of higher learning respond to the ideas generated as a result of widespread interest in sustainable development. If sustainability is to become an essential aspect of society and economic development then it has to become an essential part of education (Samad and Rahman, 2007).

Studies show that a complete integration of sustainable development across the curriculum, i.e. in all modules and parts of relevant subjects and activities through all phases is needed in encouraging sustainable practices in civil engineering fields (Shafii, 2007). The fundamental idea is that when sustainability is to become essential for all activities within society and all sectors of economy, it cannot remain as an isolated field of expertise but must form mindset for everyone. A sustainable environment's program should consist of an interdisciplinary set of courses spread throughout various university departments, such as Architecture,

Anthropology, Agriculture, Biology, Botany, Building, Civil Engineering, Estate Management, Urban and Regional Planning, English, Economics, Forestry and Natural Resources, Geography, Humanities, Landscape Architecture, Philosophy, Political Science, Psychology, Quantity Surveying and Sociology. The sustainable environment's program's broad scope offers students comprehensive exposure to the close relationships between the environment and every field of human endeavor (Shafii, 2008).

Schools of architecture should take a proactive role in promoting ecological literacy through aggressive advocacy for green building projects in their own institutional communities. Also, assessing the state of ecological literacy in architectural education as part of a long-term effort to inject sustainability principles into architecture education and present a mosaic of current activities as the basis for an ongoing discussion of the future of environmentally progressive architectural education. There is a real need of reorienting architectural education towards sustainability so that architects are trained to have a clear understanding of how their role interacts with others to bring about good buildings and designs in many contexts. Information and Communication Technology (ICT) is today one of the most critical tools in architectural education. New ways to deliver instruction are now available, with the resulting ability to reach students in many ways other than the traditional classroom setting. Changes in research tools and methodologies in many disciplines and professions have resulted from the spread of information technology throughout the disciplines. New computerized studios such as design methods, Computer Aided Design (CAD) visualization, paperless architectural studio and the virtual design studios have been introduced in many architectural schools as new ways of practicing and teaching architectural design. Recent developments to computer networks are offering further opportunities for collaborative work and knowledge transfer at the global scale.

Obstacles to Architectural Training in a Sustainable Age
Many of the barriers to sustainable outcomes in the property sector in Nigeria are related to government at all levels, infrastructure, funding and learning. Direct barriers include lack of awareness, lack of skills (translating awareness into action), and the time and cost of pioneering new approaches. Indirect barriers to sustainability initiatives in architectural education in Nigeria include inadequate funding and planning in setting up departments of architecture, limited expertise (lecturers) on sustainable buildings available, lack of inspiring prototypes to counterbalance prevalent non-sustainable lifestyles, unawareness of environment crisis, shortage of studio spaces, lack of workshops, laboratories and equipment to teach courses of high technological input, inadequate number of books and journals on sustainable buildings, lack of technical courses that support sustainable design studios inside the classroom, the question of aesthetic and high cost of sustainability outside the classroom. Other obstacles include inadequate managerial and administrative staff, unresolved ambiguity around defining sustainability principles, efforts often lack linkage to one another.

Materials and methods

Case Study 1: Federal University of Technology, Akure, Ondo State, Nigeria
The case study used for this study is the Department of Architecture, located in the School of Environmental Sciences in the Federal University of Technology, Akure, (FUTA) in Ondo state, Nigeria.

Objectives of the School of Environmental Sciences

- Provision of education that ensures the attainment of professional skills requisite to effective shaping, reordering and articulation of the built environment;

- Promotion of academic excellence and research opportunities appropriate to the development of national resources and technological skills in meeting emerging national demands; and

- Provision of linkages between theory and practice through active participation in the practical aspects of the disciplines and providing continuing education to practitioners.

Program Philosophy of the Department of Architecture

The overall philosophy of the training program in the Department of Architecture in the Federal University of Technology, Akure is to produce competent, skilled and versatile graduates capable of understanding the society's need for shelter and translating this need into an appropriate built environment. The program also seeks to ensures the technological capability of the graduates to face a broad spectrum of challenges of the environment for human and other activities especially through self-reliance. The products of this program would be capable of practicing on their own or be engaged in the industry and the public sector.

Program Duration: The duration of the program shall be 5 academic sessions for UTME and 4 academic sessions for Direct Entry students. If a student fails to graduate within the normal 5 academic sessions, he/she will not be allowed to exceed a total of 7 academic sessions. At the end of the 5-year program, the student will be required to continue for one and a half sessions to obtain the Master of Technology degree, M. Tech. Architecture to enable them attain full professional status.

Table 1: Federal University of Technology Akure Architectural Course training Outline
Source: www.arc.futa.edu.ng

YEAR	COURSES
First Year	Graphic Communication 1 & 2
	Free Hand Sketching 1 & 2
	Introduction to Architecture
	Art Appreciation
Second Year	Architectural Design 1
	Architectural Graphics 1 & 2
	Introduction to Building Components and Methods 1

	History of Architecture Workshop Practice (Crafts) Theory of Structures 1& 2 Building Materials
Third Year	Architectural Design 2 Building Components and Methods 2 Visual Design/ Modelling Workshop Building Structure; Reinforced concrete design Workshop Practice(Crafts) Building Services 1 Village Survey History of Architecture 2 Building Materials 2 Applied Climatology Building Economics 1
Fourth Year	Architectural Design 5 Landscape Theory Construction Detailing (Building Components and Methods) History of Architecture 2 Building Services 2 Building Structure (Steel and Timber)
Fifth Year	Advanced Studio Design Landscape Theory Building Components and Methods 4 Comparative Studies of Built Forms History of Architecture 4 Interior Design Building Services 3 Housing Seminar Building Law Tourism and Recreation Final Year Student Project
POST GRADUATE PROGRAMS	Post Graduate Diploma in Architecture (PGD, Arch) Master of Technology in Architecture (M. Tech) Master of Landscape Architecture (M. L. Arch) Master of Architecture (M. Arch) Master of Philosophy in Architecture (M. Phil.) Doctor of Philosophy in Architecture (Ph.D)

Table 2: Federal University of Technology, Akure, Architectural Design Training Pattern. *Source: www.arc.futa.edu.ng*

100 level	Philosophy of Design
200 level	Residential Design
300 level	Institutional Design; Industrial Design
400 level	Urban Renewal' Student Industrial Training
500 level	Housing issues; Mass Housing
M. Tech 1	Selected Institutional design
M. Tech 2	Master Thesis on a particular Architectural concept/ issue
M. Phil	Seminar-based research oriented program for both theoretical and Practical issues.
Ph. D	Research focus on a particular Architectural issue

Case Study 2: University of South California (USC), School of Architecture, United States.
A school of Architecture located in Los Angeles, California, United States. The USC School of Architecture demonstrates its commitment in bringing academic excellence and professional development through individualized mentoring programs, career guidance and active engagement through the USC Architectural Guild. As the nation's most distinguished architecture professional alumni organization, the Guild has provided philanthropic support to enhance and promote the school's top priorities including scholarships, professorship and school's programs. Los Angeles is world-renowned for its vibrancy and the University of Southern California is a premier research institution. Both providing the USC School of Architecture with an unparalleled context for the study of Natural, built and technological environments. Students actively participate in the city and its culture, studying notable architecture and landscape through first-hand experience. Student design projects often reflect this interactive engagement by creating work that directly examines issues of the city, engaging in real world issues of architecture, landscape architecture, building science and heritage conservation (USC School of Architecture, 2015).
Presented below is the course training outline for the USC School of Architecture

Table 3: USC School of Architecture, Course training Outline *Source: https://arch.usc.edu/courses*

YEAR	COURSES
First Year	Architectural Design 1 Architecture: Culture and Community Fundamentals of Design and Communication
Second Year	Architectural Design 2 Visualizing and Experiencing the built Environment Building Science World History of Architecture Computer Applications in Architecture Building Structure and Seismic Design Design for Thermal Atmospheric Environment The Architects Sketch book
Third Year	Architectural Design 3 Principles of Spatial Design

	History of Architecture: Contemporary Issues Building Science Shelter Digital Tools for Architecture Design of Building Structures Design for the Luminous and Sonic environment Place and Culture Ecological Factors in Design Architectural Studies: Expanding the Field
Fourth Year	Architectural Design 4 Topics in Modern Architecture in South California Global Studies in Architecture Advanced Computer Application Design Foundation Computer Transformation Architectural Technology Perspective in History and Theory in Architecture Designing with natural forces Architectural Sustainability tools and Methods Visual Communication and Graphic expression New Forms and Concepts Digital Architectural Photography Light Color and the character of Material Field studies in Architecture Field studies in urbanism Field studies in Tectonics Furniture Design Mixed Use Development Process
Fifth Year	Comprehensive Studio Support and Enrichment Architectural Design 5 Graduate-Architectural Design-Principles Graduate-Architectural Design-Site Theories of Computer Technology Seminar; Building Systems Seminar; Advanced Structures Contemporary issues in Architecture Global History of Architecture Advanced Environmental Systems Advanced Surface Tectonics Sustainability in the Environment Urban Landscapes and Buildings Housing and Community design for an aging Structural design and analysis Professional practice Urban Housing Landscape Architecture practice The Natural Landscape Urban Plant Ecology : Environmental perspectives Urban Landscape: Process and Place Topics in landscape Architecture: Issues and Practices Urban Nature Fundamentals of Heritage Conservation Conservation Methods and Materials Sustainable Conservation of the Historic built environment Urbanism Seismic Design

	Thermal Environment Lighting Design Sustainable Building and Environment using LEED metrics Exhibition, Environment and Event Philosophy of Technology
Sixth Year	Post Graduate Program

Table 4: USC School of Architecture, Sustainable Development and Architectural Design Training Pattern *Source: https://arch.usc.edu/courses*

YEAR	COURSES
First Year	Architectural Design 1
Second Year	Architectural Design 2 Building Science Design for Thermal Atmospheric Environment
Third Year	Architectural Design 3 Building Science Place and Culture Ecological Factors in Design
Fourth Year	Architectural Design 4 Designing with natural forces Architectural Sustainability tools and Methods
Fifth Year	Architectural Design 5 Advanced Environmental Systems Advanced Surface Tectonics Sustainability in the Environment Urban Landscapes and Buildings Landscape Architecture practice The Natural Landscape Urban Plant Ecology : Environmental perspectives Urban Landscape: Process and Place Topics in landscape Architecture: Issues and Practices Urban Nature Fundamentals of Heritage Conservation Conservation Methods and Materials Sustainable Conservation of the Historic built environment Thermal Environment Sustainable Building and Environment using LEED metrics Exhibition, Environment and Event
Sixth Year	Post Graduate Research

Research findings

Studying the above training structure, the Architectural training pattern of the Department of Architecture has a peculiar framework presented below:

- **Architectural Course training**; which equips students in ability to handle designs of different types with the framework of concept, philosophy and principles of design
- **Architectural Industrial training**; which equips students with exposures to practical applications in the architectural practice world. Realistic design approaches and site construction experiences
- **Professional Architectural training**; which equips upcoming architects in practical applications of design solutions to various Architectural design and urban issues.

- **Research Training**; which equips architects in the areas of Architectural philosophy and research methodology, studying architectural trends and developing new solutions and approaches.

The structure for the Nigerian Case Study (Federal University of Technology, Akure) provides a basis for continuous training, which is an institutional backbone for any form of development. What is lacking in the course training outline are courses relating to sustainable development which can be clearly seen in the course outline table extracted from the second case study (University of South California, School of Architecture, United States) as presented in Table 4 above.

Also from Table 4 above it can be seen that there are twelve highlighted courses focusing directly on environmental sustainability at the Bachelor's degree level (First year – Fifth year) including the major architectural design courses, but the Nigerian School of Architecture case study focuses majorly on Architectural design of different facilities at the Bachelor's degree level with specialized sustainable environmental courses not included in the course program.

Recommendations

- All stakeholders within the society, government, accreditation and regulatory bodies, professional bodies, educational institutions, lecturers, students and the general public should cooperate and be committed at all levels to achieve sustainability as a unified goal.
- A systematic policy in Nigeria is essential, one that concentrates on all three important parts of an educational system: well-defined goals, planning in accordance with these goals and the assessment of programs to refine goals.
- There is the need to cooperate with other groups, provide networking and cluster opportunities for architectural schools, lecturers and students, support schools in their growth from awareness through to leadership in education for sustainable development, foster empowerment in sustainability program and focusing on student involvement.
- There is the need to integrate sustainable concept in design thinking in ideological level, methodological level and the practicing level. This hierarchical multi-layer approach can help to formulate a value-based design philosophy for introducing sustainable design laboratory/studio and sustainability related syllabuses to the architectural education. Developing a sustainable design curriculum should be part of the focus and a long term goal of architectural sustainable thinking in education worldwide since the architect's fundamental responsibility is to create environmentally responsive designs, creating connections between people and aspects of place. This demands perceptual and analytical abilities pertaining to ecological wisdom and practical means essential to create a built environment that would fit a triplet system of social, economic and environmental attributes.
- Literal cooperation and participation between academic and practical expertise is essential to incorporate sustainability concepts within the educational process. Sustainability has many approaches so it is necessary to introduce the Value Engineering, train students on how to utilize this managerial methodology to organize

their green building design thinking. Sustainability as a continuing cyclic concept requires feedback action which encourages introducing post occupancy evaluation to the architectural profession. This will enable future architects propose designs and architectural solutions to challenges facing the world e.g. climate change, environmental destruction, social disintegration, poverty, natural resource exhaustion, and financial instability.

- Incorporation of sustainable theoretical and design studio teaching/practical courses, and interdisciplinary courses, relating to sustainable development in the architectural education curriculum. This should require students to work on and analyze real life environmental problems relating to water and energy systems at different scales either on the campus itself or in the community at large. This implies a review of the present curriculum of the architectural education and the need to specifically bridge the gap between the academic environment and the professional practice world which will infuse in the prospective architect what the school could not give through Student Industrial Work Experience Scheme (SIWES).

- Adequate research, human, financial and time resources devoted to sustainable architectural education.

- Architectural educators and professionals should promote sustainable architecture through direct experiential learning, using appropriate methodologies, tools and techniques and must continually evolve and disseminate the knowledge base of sustainability through exemplary research and architectural practice. The knowledge base must be widely disseminated in a manner that is easily accessible to students, educators, practitioners and the general public via a web portal or online sustainable search engine.

- Generate and perpetuate a dialogue, collaboration and partnership locally and internationally between the professionals, academics and students to facilitate and encourage exchange of ideas, joint research, study tours and faculty exchange programs in order to extend domestic and international connections. There is the need for the architectural education system to place emphasis on fostering attitudes compatible with sustainability behavior and needs as well as human capital development through the training of lecturers in sustainable building to teach, supervise and support students. Also, there is the need to attract and sustain world renowned sustainability specialists and under their guidance, students should receive substantial training in sustainable architecture design and cultivate a global competitiveness in the international society.

Conclusion

This study has revealed that the architectural course training program of an architect equips the architect in different areas of physical development. It reveals from case study that the Nigerian School of Architectural course training program, though physical development oriented, is lacking in some major sustainable development courses in environmental and ecological studies. From case study, the research further reveals that the University of South California School of architecture course training program is equipped with environmental and ecological courses which are key in forming sustainable design concepts and philosophies for enhanced physical development.

Conclusively, if more environmentally and ecologically focused courses are incorporated into the Nigerian Architectural Course training program, it will make the training of architectural students more sustainably driven, equipping architectural students at different levels in concepts, philosophies and principles of sustainable development, hence producing architecture graduates sound in the concept of sustainable development and consequently resulting to more contemporary physically developed Nigerian society.

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