



MAKING ARCHITECTURAL TECHNOLOGY PROGRAMMES IN NIGERIA RELEVANT TO 21ST CENTURY DESIGN AND TECHNOLOGY: A CASE STUDY OF FEDERAL POLYTECHNIC, NEKEDE, NIGERIA

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Abstract

Architectural technology programmes have experienced tremendous changes in the bid to address concerns of local identity and environmental responsiveness to contextual issues that are peculiar to the Nigerian milieu, while still conforming to global standards. This paper examines the academic curriculum contents of architectural technology programmes in Nigerian polytechnics in line with design and technological advancements of the 21st century with a view of establishing its relevance for national development. Adopting the case study research method, data were collected from two sets of questionnaires; one set administered to the tutorial staff of department, and the other set to a group of their graduates in professional practice. The data were analysed using descriptive statistics. The results revealed that the graduates' proficiency with varied CADD software packages availed them of more job opportunities. The paper recommends the complete adoption of computer-based workstations for the Higher National Diploma (HND) levels in the department, a robust curriculum for computer courses to tackle the evolving challenges of the work expectations and funding of infrastructure to improve computer-based training programmes in the department. The paper concludes that addressing the shortfalls of the computer courses will boost the industrial coe of the programme, making it relevant to the 21st century design and technology in Nigeria which is paramount to national development.

Keywords: Architectural Technology, Curriculum, Environmentally Responsive, National Development

INTRODUCTION

Architecture and technology are intricately linked, since devoid of the technologies essential to erect the physical buildings, architectural designs would exist only on paper. Yet the separation of technology from architecture in recent times, both in education and in practice, has birthed a constantly evolving new professional discipline, architectural technology (Emmitt, 2002). In Nigeria, architectural technologists are Higher National Diploma (HND) graduates of architectural technology programmes, trained to assist the architect in converting the design purpose into substantial information that can be conveyed to the construction team. Equally, they play vital underground roles as detailers and provide dependable data criss-crossing design and production boundaries.

The contemporary issues peculiar to Nigeria which the graduate architectural technologist finds himself practising include the attendant issues of assisting in the creation of diverse built environments for an exploding population characteristic of Nigeria. The paper therefore, seeks to determine whether the architectural technology programme has prepared the graduates for the dynamic work expectations relevant to 21st century design and technological advancements needed to propel national development.

Many scholars have posited that there remains an apparent disconnect between the training and the work of the architectural team hence, demanding urgent reviews in the curriculum of architectural education programme (Tzonis, 2014; Agbo, Ogbonna, & Okwoli, 2004; Opoko & Oluwatayo, 2015; Nkwogu, 2008). Scholars have also observed that the quality of the work rendered by the products of the programme reveals the quality of education received (Olotuah, 2006; Adewale & Adhuze, 2014; Agbo, Ogbonna, & Okwoli, 2004; Anunobi, 2006). Quality work delivery is central to the technological development of any nation especially in the 21st century (Jude & Dankaro, 2012). The dearth of empirical studies to back up the need for reviews of the academic curriculum of architectural technology programmes being advocated by many scholars, and make reliable decisions to improve the quality of services rendered by the products have formed the premise upon which this paper is developed (Adewale & Adhuze, 2014; Agbo, Ogbonna, & Okwoli, 2004; Opoko & Oluwatayo, 2015).

Architectural technology programmes in Nigeria are exclusively offered in the polytechnics and are accredited by the National Board for Technical Education (NBTE). The NBTE develops a system of certification for National Diploma (ND) and Higher National Diploma (HND) programmes being offered in the polytechnics, and has the mandate to among others; accredit architectural technology programmes offered by technical institutions in Nigeria (National Board for Technical Education, 2016). Hence, the Federal Polytechnic, Nekede, Owerri, Imo State, with a full NBTE accredited department of architectural technology formed the scope of the study and the period covered is between 2010 and 2015.

LITERATURE REVIEW

Literature has shown that the process and content of training is critical to the development of the learners' cognitive abilities as well as the quality of work delivered in practice. Architecture and by extension architectural technology is regarded as a discipline and a profession, distinguished primarily from others by the body of knowledge it contains (Dassah & Uji, 2015). The architectural technologist is fundamentally an outcome of his training and it is the training he receives that equips him with the essential knowledge and skills required for the world of professional practice. It is therefore expected that the totality of the knowledge acquired be responsive to the dynamism of the practice environment (Opoko & Oluwatayo, 2015). Olotuah and Adesiji (2005) posit that the programme of study leads to the making of professionals who are insightful and sensitive to human needs and aspirations having been adroitly equipped to proffer solutions to the problems of the built environment.

An Overview of the Curriculum and Work Expectation of the Architectural Technologist

The stages of training for the architectural technologist require that on the successful completion of the first year, the student proceeds for a four (4) month Industrial Training and return after to complete the second and terminal year resulting in the attainment of the

National Diploma (ND) certificate, which is a prerequisite for the one (1) year compulsory Supervised Industrial Work Experience Scheme (SIWES). This one year practical work training is peculiar to the polytechnic training and qualifies the ND holder for another two (2) years of study to attain the Higher National Diploma (HND) certificate.

The certificates are awarded to candidates who have successfully completed the prescribed coursework, examinations, diploma project and the SIWES programme. The aspect of the course content of the curriculum comprises four main components namely:

1. General Studies: These include courses in art and humanities, mathematics and sciences, social and entrepreneurship studies. This component accounts for a maximum of 10% of the total contact hours for the programme.
2. Foundation Courses: These include courses in pure sciences, economics, statistics and account for 10-15% of the total contact hours for the programme.
3. Professional Courses: These include theoretical and practical courses in the field of study and provide the student with cognitive and practical skills needed to practice. Consequently they account for 70-80% of the contact hours for the programme.
4. SIWES for ND programme: the following criteria are used for assessment of this component; i) punctuality ii) attendance iii) general attitude to work iv) technical competence v) respect for authority vi) interest in the field (National Board for Technical Education, NBTE, 1994).

The architectural technologists having successfully passed through the rigours of the polytechnic training should be competent in the following core areas among others:

1. Prepare space programmes and working drawings for architectural projects.
2. Assist in the design and preparation of spatial relationship, circulation and area diagrams.
3. Make presentation drawings of architectural works and draw detailed perspectives with necessary rendering and requisite colour scheme.
4. Make detailed architectural models.
5. Assist in the supervision of construction works and make progress reports on building projects.

Conceptual/Theoretical Framework

Curriculum is the body of knowledge that houses all the experiences, skills, creativity and activities going on in the school environment in order to achieve educational goals (Asoegwu, 2006). Good curriculum plays a significant role in forging lifetime learning competencies, social attitudes and skills, such as tolerance and respect, constructive management of diversity, peaceful conflict management, promotion and respect of human rights, gender equality, justice and inclusiveness. Curriculum also contributes to the development of cognitive skills and acquisition of necessary knowledge that learners need to apply in the context of their studies and eventual livelihood (UNESCO, 2009).

National development is a crucial ingredient every undeveloped country across the globe aspires to acquire, while the developed countries take pride in the realization of advanced level of development as a key function of self-sufficiency and sustainability. Lawal and Oluwatoyin (2011) posited that development is an indispensable factor to the growth and sustenance of any robust economy. The need to achieve qualitative measure of development in countries across the globe precipitated the establishment of the eight (8) Millennium

Development Goals (MDGs) proposed to be achieved by the year 2015, following the millennium summit of the United Nations in the year 2000. Nigeria however, failed to attain the target benchmark of the MDGs and continues to struggle with the attendant factors of peripheral development which include the problem-laden housing situation and other issues related to attaining sustainable environment.

The multiplication and complexity of technologies have brought about diversification in the building profession. However, the observed state of depression in the profession and the building industry in Nigeria along with the current universal change of educational curricula in most fields of human endeavour have compelled stakeholders in the profession to clamour for a paradigm shift in architectural education programme (Arayela, 2001; Sa'ad, 2001). Anunobi (2006) and Olotuah, Taiwo, and Ijatuyi (2016) succinctly emphasise the need for an improvement in the architecture curriculum to address the challenges of housing inadequacies, squatter control and other environmental dilapidation issues as well as a review particularly in the design studio to inculcate further sustainability studies with the view to enhance environmentally-conscious design techniques.

The success of the Bauhaus movement which advocated a design philosophy of mass production and prototype designs encouraged the adoption of pre-fabricated residential constructions during the post second world war era in the United Kingdom which boosted manufacturing and assembly. The popularity and efficiency of the pre-fabricated building types enhanced the advancement of technology driven designs in the building industry which consequently emphasised the responsibilities of the architectural technologist. Design and technological advances constitute part of the constant factors which affect buildings and are also influenced by the producers and users of such buildings. The complex link between technology and architecture is apparent in the desire to grasp the technology that can be used to achieve a particular design concept. It is this nexus that birthed the evolution of architectural technology discipline which aims to integrate the three core areas of design, technology and management in the quest for quality buildings (Emmitt, 2002).

The study was carried out based on Rostow's modernization theory of development which states that development in developing worlds can be attained through following the processes of development that are used by currently developed nations (Rostow, 1960) in (Kasanda, 2016). Carmody (2004) observed that education plays a crucial role in the five stages of modernization propounded in the theory, in order to achieve the necessary development. The stages are: 1) The Traditional Society, 2) The Preconditions for Take-off, 3) Take Off, 4) The Drive to Maturity, and 5) The Age of High Mass Consumption. Gow and Mallick (2005) stated that modernization theories try to transfer western development experiences into developing countries, hence western countries recommend modernization as the imitation of western experience, which are anticipated to yield successful societies in the current developing countries. Therefore, the adoption of technology driven designs that have recorded successes in developed nations such as the Bauhaus movement and the implementation of the strategies in the training processes is key to attaining similar successes in the Nigerian society.

METHODOLOGY

The paper examined the academic curriculum contents of architectural technology programmes in Nigerian polytechnics in line with design and technological advancements of

the 21st century, with a view to establishing its relevance for national development. The case study design approach was adopted for the study and the Federal Polytechnic, Nekede, Nigeria was selected as the case. The Federal Polytechnic, Nekede established in 1978 is one of the second generations of technical institutions of higher learning in Nigeria. It is located in Imo State, south eastern part of Nigeria and offers courses leading to the award of National and Higher National Diplomas (ND & HND). One of the departments in the institution is Architectural Technology which is fully accredited by the NBTE and has programmes at both ND and HND levels.

Data were obtained from survey method through self-administered questionnaire. Self-administered questionnaire as described in Oppenheim (2005) is a technique of data collection, whereby the questionnaires are usually presented to the respondents by an interviewer or approved representative. Due to the non-concentration of the graduates in a specific geographical location and in tandem with the period of the study (2010 and 2015), 30 graduates and 21 members of staff of the department were purposively sampled in the distribution of the self-administered questionnaire. The questionnaire was coded with pre-determined questions intended to obtain responses using nominal and Likert scales appropriately. The variables investigated on the part of the graduates were on relevance of courses learnt to work expectations in place of work, current trends in design and technological advancements and principals' satisfaction with the types of architectural services offered by them. On the other part of the staff, relevance of the courses taught, general and performance objectives as stipulated in the curriculum to current trends in design and technological advancements and satisfaction with work place were equally examined.

RESULTS

Relevance of Knowledge Acquired in the Department to Work demands in the Architectural Practice

Out of the 30 graduates sampled for the study, most of them (63%) agreed that the knowledge they garnered while in school imparted positively on their performance in practice. 37% of the graduates disagreed as depicted in Figure 1.

Principals' Satisfaction with Type of Architectural Services Rendered

It was observed that all (100%) the graduates said that their principals were satisfied with the quality of architectural services they rendered to their various practices. This is shown in Figure 2.

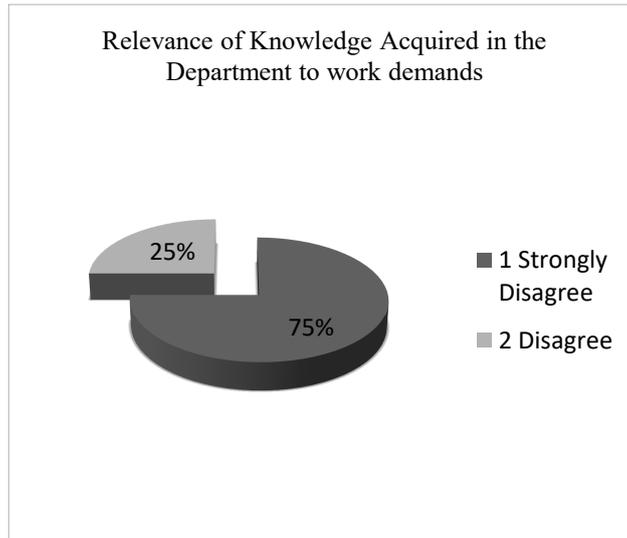


Figure 1: Pie chart for knowledge acquired
Source: (Fieldwork, 2017)

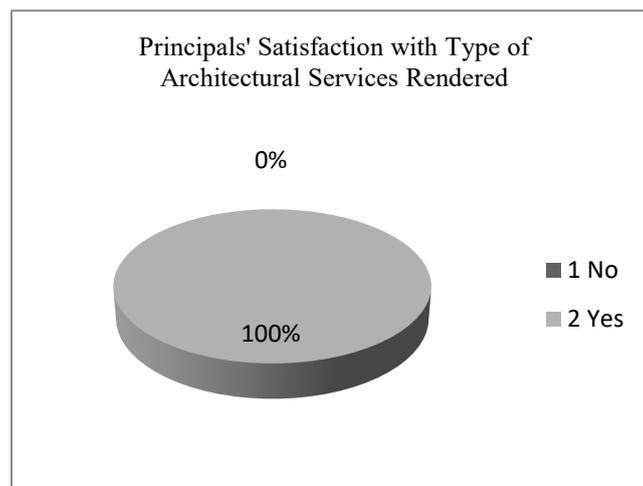


Figure 2: Pie chart for principals' satisfaction
Source: (Fieldwork, 2017)

Relevance of Final Year Courses Learnt to Current Trends in Design and Technological Advancements

The relevance of the final year courses to current trends in design and technological advancements by the graduates was investigated using the 5-point Likert scale of strongly disagrees to strongly agree. The courses examined were: Architectural delineation, construction drawings, application of computer in architecture, environmental science and interior design. It was observed as depicted in Table 1 that only 16.7% of the graduates strongly agreed that the learning experiences from courses on architectural delineation were relevant, 10% on construction drawings, none on environmental science and only 6.7% on interior design were relevant. However, majority (93.3%) of them strongly agreed that the course on application of computer in architecture was relevant to current trends in design and

technological advancements. It was noted that only one and six graduates disagreed that interior design and environmental science respectively were relevant to current trends in design and technological advancements.

Table 1: Relevance of final year courses learnt to current trends in design and technological advancements

Variables	SD	D	N	A	SA
Architectural Delineation	0 (0.00)	2 (6.6)	0 (0.00)	23 (76.7)	5 (16.7)
Construction Drawings	0 (0.00)	0 (0.00)	0 (0.00)	27 (90.0)	3 (10.0)
Application of Computer in Architecture	0 (0.00)	0 (0.00)	0 (0.00)	2 (6.7)	28 (93.3)
Environmental Science	0 (0.00)	5 (16.7)	0 (0.00)	25 (83.3)	0 (0.00)
Interior Design	0 (0.00)	1 (3.30)	0 (0.00)	27 (90.0)	2 (6.7)

SD (Strongly Disagree), D (Disagree), N (Neutral), A (Agree) and SA (Strongly Agree)
Source: Fieldwork, 2017

Relevance of Courses Taught to Current Trends in Design and Technological Advancements

The relevance of the courses taught to current trends in design and technological advancements by the tutorial staff of the department of architectural technology was investigated also using the 5-point Likert scale of strongly disagree to strongly agree. From Table 2, it was evident that no staff strongly disagreed or disagreed to the relevance of the courses taught to current trends in design and technological advancements. Rather all agreed that the courses: architectural delineation, construction drawings, application of computer in architecture, environmental science and interior design were relevant.

Table 2: Relevance of courses taught to current trends in design and technological advancements

Variables	SD	D	N	A	SA
Architectural Delineation	0 (0.00)	0 (0.00)	0 (0.00)	13(62.00)	8 (38.00)
Construction Drawings	0 (0.00)	0 (0.00)	0 (0.00)	13(62.00)	8 (38.00)
Application of Computer in Architecture	0 (0.00)	0 (0.00)	0 (0.00)	13(62.00)	8 (38.00)
Environmental Science	0 (0.00)	0 (0.00)	0 (0.00)	6 (28.00)	15 (72.00)
Interior Design	0 (0.00)	0 (0.00)	0 (0.00)	4 (19.0)	17 (81.00)

SD (Strongly Disagree), D (Disagree), N (Neutral), A (Agree) and SA (Strongly Agree)
Source: Fieldwork, 2017

Relevance of General and Performance Objectives Stipulated in the Curriculum to Current Trends in Design and Technological Advancements

The members of the staff were asked to indicate on a 5-point Likert scale their level of agreement or otherwise with the relevance of general and performance objectives as stipulated in the department's curriculum to current trends in design and technology. The results from Figure 3 showed that almost half (48%) of the staff disagreed that the general and performance objectives as stipulated in the curriculum were relevant to current trends in design and technological advancements. Nineteen percent (19%) agreed out of which fourteen percent (14%) strongly agreed. About quartet (24%) of the staff neither agreed nor disagreed with the relevance of general and performance objectives as stipulated in the curriculum to current trends in design and technological advancements.

Staff Satisfaction with Teaching Environment

It was observed that more (62%) of the staff members were not satisfied with the conditions of the teaching environment as shown in Figure 4, whereas less than half (38%) of the staff were satisfied with the teaching environment. The majority of the staff opted for alternatives if certain criteria were met, which would constitute discussions in subsequent studies.

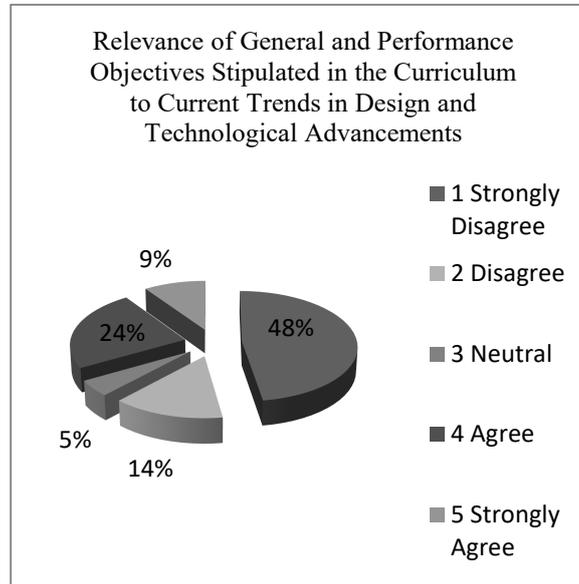


Figure 3: Pie chart for relevance of general and Performance objectives stipulated in the curriculum.

Source: Fieldwork, 2017

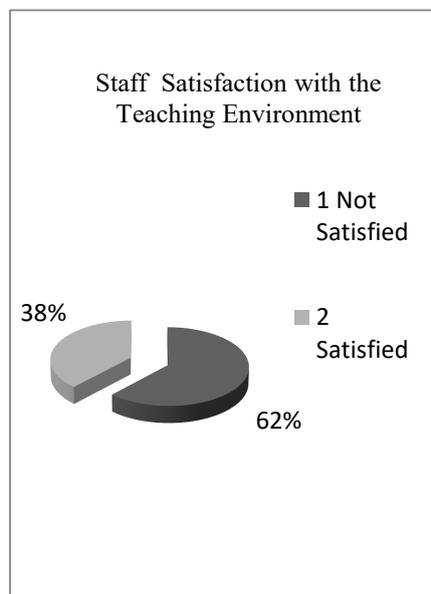


Figure 4: Pie chart for staff satisfaction with The teaching environment

Source: Fieldwork, 2017

DISCUSSION

The purpose of this study was to examine the academic curriculum contents of architectural technology programmes in Nigerian polytechnics in line with design and technological advancements of the 21st century, with a view to establishing its relevance for national development. The study revealed that 93% of the respondents strongly agreed to the relevance of the course Application of Computer in Architecture to the current trends design. However, 48% of the staff that participated disagreed that the general and performance objectives as stipulated in the curriculum were relevant to current trends in design and technological advancements and 62% were not satisfied with the teaching environment. The results reflect the importance of computer courses to the programme and the need to review the curriculum contents so as to make both the general and performance objectives stipulated in the curriculum relevant to the current trends, based on the stages of development stated in Rostow's modernization theory. The dissatisfaction expressed by over half of the staff reveals the need to transit from the traditional environment and adopt the necessary preconditions for take-off which will thrust the subsequent stages in motion.

The emergence of Information and Communications Technology (ICT), which is a key propellant in design and technological advancements in the profession, has impacted significantly on the practice (Oladunjoye & Obeta, 2016). To effectively shift from the traditional method of "drawing table" to the modern method of 'computer table' via Computer-Aided Design and Drafting (CADD) requires that the entire pedagogical process encompassing the lecturers, the students and, the learning environment must be ICT-compliant. Most students of architecture are being taught using the traditional methods only to launch them into the practice world characterised by the staunch effort to catch up with the global trends in CADD. It is against this backdrop that the paper made the following recommendations.

RECOMMENDATIONS

1. Provision of additional computer-based courses in the programme to boost the existing rudimentary courses being taught in the department. This will include varied software packages such as; Autocad, Archicad, Revit, SketchUp, 3^D Studio Max, V-Ray, Photoshop, and InDesign.
2. Funding by government and concerned bodies will enable the teachers and students acquire original versions of the latest software packages, thereby expunge piracy through illegal cracking techniques. Subsidization of cost of acquiring laptops by government is also recommended as part of measures to ensure that all students own personal laptops, which will facilitate the preconditions for take-off stage of development.
3. Regular periodic review and implementation of the curriculum geared towards making the curriculum up to date with design and technological advancements.
4. Regular staff development to keep the teachers that impart the knowledge abreast with current trends in design and technology.
5. Government must eradicate the socio-political bigotry against technical education which has devalued the entire polytechnic education despite the practice-based learning style inherent in it, which is germane to unleashing the technological potentials and breakthroughs needed for national development in the country

CONCLUSION

This paper has analytically explored the relevance of the architectural technology curriculum to 21st century design and technological advancements. The study concludes that an urgent review is critical in order to make the curriculum responsive to the current trends in design and technology. This will target training the professionals in line with modern advances in design and technology to attain far-reaching results that can mainly be appreciated by effectively ameliorating the problem-laden housing situation and other issues related to attaining sustainable environment in the country thereby boost national development.

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