

Integrating Construction Craft Skill Acquisition in the Built Environment Curriculum Using a Competence Based Education Approach

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Abstract: The relevance of the study is to enrich the built environment curriculum. The resolve of this study is to examine construction craft skill acquisition in the built environment using a competence based education approach. This study was carried out through a detailed literature base and questionnaire survey to elicit data on construction craft skills acquisition in Nigeria's tertiary institutions. The targeted population comprised educationist and students in the faculty of environmental science. The study revealed that the students were mostly interested in acquiring three major craft skills which include painting, tiling and landscaping craft skills. Acquiring construction craft skills will increase self-employment, increase business opportunities and increase employability of the students. In conclusion, major barriers in acquiring construction craft skills in tertiary institutions are lack of interest from the students and inadequacies in construction curriculum to cover the craft skills. The study developed a construction craft skill's acquisition framework for the built environment curriculum. It was recommended that the government, National University Commission (NUC) and educators should integrate construction craft skills acquisition programmes in the built environment curriculum. Also, the National Vocational Qualification Framework (NVQF) policies for training and retraining indigenous artisans be extended to tertiary institutions to assess and license construction students in specific chosen trained construction craft skills. It is important to make the craft wage attractive in this quest.

Key words: Built environment, competence based education, construction craft skill, curriculum, employment, population

INTRODUCTION

Every man has a skill. These set of skills are acquired in one way or the other, at various times and has made man evolve over time. Adeyemo (2010) defined skill as the basic ability by which a person adjusts to life. Skill in itself is elastic as it is acquired through all phases of education ranging from the informal, non-formal and formal sectors (Omofonmwan and Chukwuedo, 2013). From the mid-1970's, unacceptably high levels of continuing unemployment propelled the concept of skill acquisition (Rigby and Sanchis, 2006).

According to Uwaifo (2009), the Nigerian tertiary education adopted from the British system fails to look at the socio-cultural and technical needs of the nation even the Nigerian construction industry. In the quest to enhance student's skills in Nigeria, the Federal Government of Nigeria (FGN) through the

Industrial Training Fund (ITF) inaugurated the Students Industrial Work Experience Scheme (SIWES) in the 90's. This skill training usually occurs in a formal setting. But this has refused to yield the required result.

With over 100 tertiary institutions churning up unemployable graduates (Nkechi *et al.*, 2012; Ogundele, 2013; Uwaifo, 2009) argued that the educational system must move away from the era of chalk and talk, rather to the point of getting hands engaged. According to Nkechi *et al.* (2012), unemployment in Nigeria is worsened due to the crusted tertiary curricula and anti-industry skills. Researchers such as Venatus and Agnes (2010), Olokundun *et al.* (2014) noted that unemployment has been the most socio economic challenge gripping the nation.

A sad aspect of unemployment was felt in March 2014 where 522,650 youths gathered to fill 4,556 vacant positions advertised by the Nigerian immigration service,

resulting in the death of several young graduates. The National Bureau of Statistics, FOS (2013) recorded that 4.5 million graduates from higher institutions are added to the already saturated employment market annually. Currently, Nigeria's unemployment rate is put at 12.1% in the first quarter of 2016 while youth unemployment falls at 21.5% and yet (Oseghale *et al.*, 2015) reported that 80% of construction managers in Nigeria still experienced shortage of bricklayers, carpenters, painters and plumbers.

Going with the definition by Omofonmwan and Chukwuedo (2013) on technical and vocational education and training been a blend between the traditional higher education and non-formal sector in educating students. One of the non-formal sector, the construction craft sector has a lot to offer the occupation of construction students. Therefore, the study aims to examine construction craft skill acquisition in the built environment using a competence based education approach.

Research questions: What construction craft skills are of interest to construction students in tertiary institutions? What are the major barriers to the actualization of a construction craft skill integrated curriculum? What are the merits of acquiring construction craft skills from the perception of educationists and construction students? How can construction craft skill's acquisition be integrated into the built environment curriculum?

Significance of study: Enormous significance has been recorded in literature about the importance of skill acquisition. Even the national development plans initiated by successive governments in Nigeria such as Vision 2010, NEEDS, Vision 20-2020 and the transformation agenda have individually highlighted the need for a highly skilled workforce (Opaluwah and Opaluwah, 2015). Largely, the consequent effect of skill acquisition has been hinged on employment (Ogundeke, 2013; Omofonmwan and Chukwuedo, 2013; Ekpe *et al.*, 2015).

According to Okpor and Hassan education combined with skill acquisition training that is focused on capacity building would result in self-sufficient and a self-reliant people. Ekpe *et al.* (2015) stated that the entrepreneurial spirit that leads to self-employment is heavily dependent on skill acquisition training. This relationship is recorded by Abdullah *et al.* (2008), Ojo (2008) and Onuoha *et al.* (2013). Brush *et al.* (2004) and Emaikwu (2011) opined that the mix of skill acquisition programmes with the conventional education could give one an edge in business and greatly influence entrepreneurship decisions.

Ogundeke (2013) reasoned that skill acquisition will provide lifelong opportunity for self-development, national development and nation building despite growing concerns of globalization and the rapid changing environment. Adeyemo (2010) related the possession of skill to enhancing the quality of performance while Ogundeke (2013), Opaluwah and Opaluwah (2015) argued that it would lead to improved productivity.

Uwaiwo (2009) opined that skill acquisition through a practical based education can lead to higher standard of living, self-employment, political stability and technological improvement. Emaikwu (2011) stated that incorporating skill development targeted at the tertiary school programme in the occupational area of the student would lead to enterprise, innovation and creativity. The implication of skill acquisition for sustainable development is resounding (Emaikwu, 2011; Ogundeke, 2013) thereby creating a sustainable people and sustainable built environment.

National Vocational Qualification Framework (NVQF):

The NVQ practice started from the UK and Commonwealth countries but it has now spread widely in the world. It may be noted from the onset that now a days most countries, including the UK, operate the more comprehensive National Qualifications Framework (NQF) which goes beyond vocational skills to embrace qualification and credit transfer for the entire education system. Kazaure stated that the National Vocational Qualifications (NVQ) are competence based qualifications acquired at workplace that demonstrate that the holder has the (nationally benchmarked) skills and aptitude required to perform the job in question.

Clearly, a framework is essentially just a qualification template. These qualifications are organized at different levels and are awarded to demonstrate the level of work-based competency the learner has achieved. They could provide avenues for upward progression in the labour market and into higher level education and training routes if desired. Usually, these qualifications are designed on the basis of 'National Occupational Standards' (NOS) which define the standards of performance required for competence in an occupation. It would require job specifications experts and industry-based practitioners to design work units/modules and structure for each individual occupation.

The framework sets out the scope of competence required which can be realized in many different learning situations. The key concern is what the learner must know or be able to do whether learning in a classroom on the job or less formally.

Reasons for introducing NQF/NVQF vary across different countries. However, in most cases they include: promoting lifelong learning and enhancing quality assurance and recognition. NVQs are not obtained by writing professional exams perse.

The National Vocational Qualifications Framework (NVQF) is a government directed programme that regulates the structure, titles and quality assurance specifications for vocational qualifications across the whole country for uniformity. The assessment is usually undertaken by the awarding bodies which work closely with qualified and licensed assessors and verifiers in line with the standards laid out by the NVQF. It may include a written and oral component as well as practical demonstration of particular set of skills.

The unique advantage of this type of qualification is that learners/candidates do not have any limitation based on age, period or location of training, provided it is in the same industry. NVQF provides the learners with ample choice of the time, place and pace of their study.

Conceptual framework: The Nigerian construction industry is becoming highly competitive while the rate of unemployment within the country is drastically increasing among the youth. Industry's expectations of increased output, innovation and tested results from the education sector takes a critical look at graduate competency. The construction students must therefore brace up with adequate skills that is able to better the industry and compete adequately.

The present construction curriculum dishes out knowledge to construction students but right now the construction industry is mainly concerned about what can be done with that knowledge. More worrisome is the slow and rigid nature of universities in developing countries such as Nigeria towards adapting to the needs of the industry. Maamouri and Wagner (2001) observed that these universities are strict in delivering the old traditional functions of the education sector. Kouwenhoven (2009) argued that closing this gap between the world of work and the education sector can be achieved through the Competence Based Education (CBE).

Understanding the concept of competence would make one think, what else would the industry need? A situation where competence is sort for in education for the purpose of occupation or industry is termed competence-based education. Broadly speaking, Kouwenhoven (2009) noted that the concept aims to empower students in tertiary institutions to be more competent through the acquiring and nurturing of newly

or already held competencies. Competence in this context is aiming at attaining standards or highest quality attainable.

Boyatzis *et al.* (1996) noted that competence based education is more professional practice centered, focusing on the future occupation of the university graduate. As professionals are entrusted with the ultimate trust of the people they service, a competence based education in sectors such as medicine, accounting, engineering, law and even environmental sciences becomes paramount. Korthagen (2004) found out using the 'onion model' in Fig. 1 that the built environment student's behavior, personal traits armed with his or her competencies has an impact on the outcome he/she produces in changing the environment.

Although, the CBE has its own draw backs such as the focusing on the traditional functions of disciples, the reduced role of the teacher and reduced scientific theory been imparted, the main aim of the graduate student been empowered should bring sustainable solace. Also, the professional's, market and employer's needs are adequately met. Although, Kouwenhoven (2009) argued that there may be strong opposition from professional accreditation teams and university boards towards a more traditional curriculum. The argument is softened knowing that CBE will positively react to the pressing requirements of professional practice in the work industry (Diwakar, 2002).

Construction graduates are most times produced to fulfil the needs of the built environment. Applying competence based education to the present needs of the Nigerian construction industry aims to fill the craft skills shortage been experienced in the industry. Using a competency profile which is a framework that provide learning tools to help employees increase their skills, knowledge and expertise and to foster professional development thereby increase economic growth. Figure 2 represents the researcher's conceptual model for integrating construction craft skill acquisition into the academic/scientific knowledge acquisition of construction students while in their tertiary institutions.

The construction craft skill competencies integrated into the environmental science curriculum uses cognitive guides of the contributors, motivators and national vocational qualification frameworks to ensure quality and standards in meeting the demands of the competencies. In this, competence based education is seen as a scientific way of learning to be a professional and filling gaps in the labour market which meets the need of modern society in terms of diversification, sustainability, etc.

Figure 2 described the researcher's framework for construction craft skill's acquisition for tertiary institutions. The built environment is comprised of several professionals ranging from architects, builders,

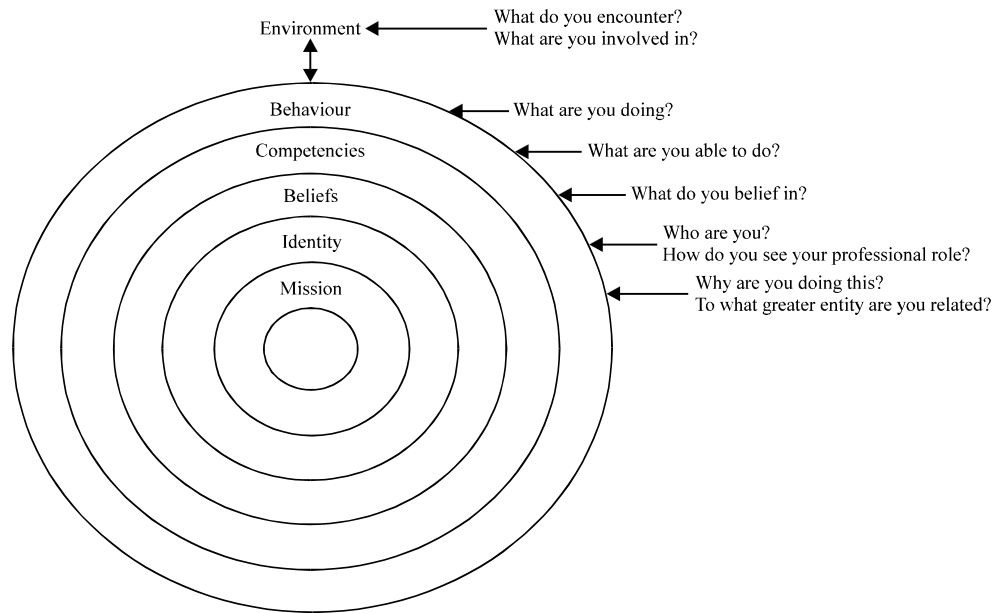


Fig. 1: Relationship between behaviour, competencies and personal traits

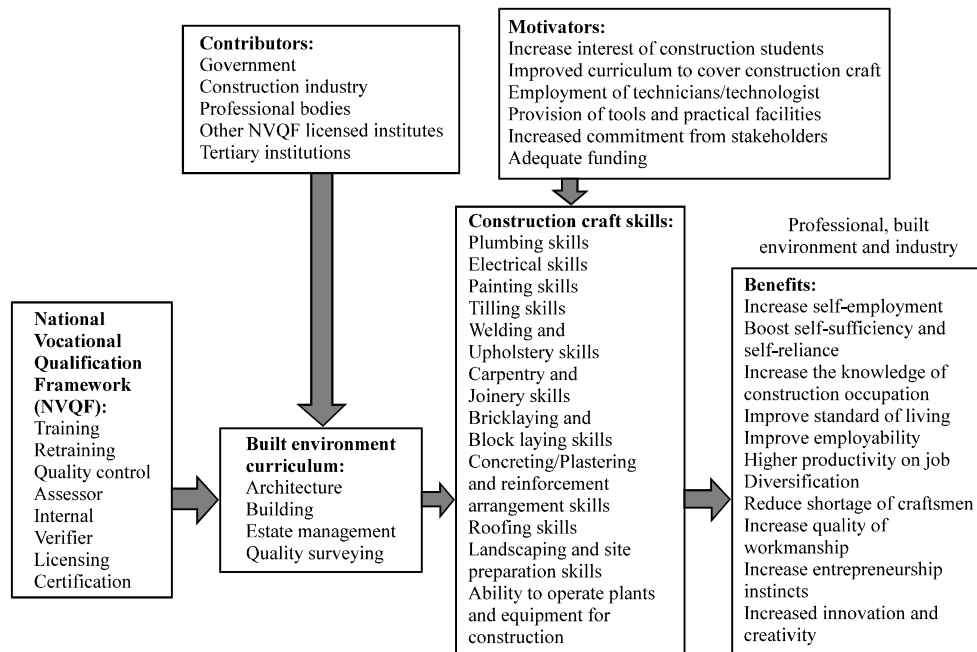


Fig. 2: Construction craft skill's acquisition framework for tertiary institutions

quantity surveyors, estate managers, land surveyors, urban planners and engineers. The concept believed that construction students can be trained to fill the deficit that exist in the construction craft skill sector even though informal in order to serve the built environment, the professional and the construction industry. The framework identified eleven major crafts in the construction industry. Noting that construction students

have interest in acquiring these craft skills, it should be made mandatory for construction students in the built environment to acquire at least two craft skills as highlighted in Fig. 2 aided with knowledge and practical based education.

Figure 2 showed the motivators and the contributors that would ensure that the integration is made possible and effective. The contributors are important in that this

framework requires funding and technical support in order to function. These contributors would birth the motivation both for the higher institution and the construction students. Essentially, there must be a final link with the existing National Vocational Qualification Framework (NVQF) before and after graduation. This would ensure quality and not just satisfying the need for quantity in the construction craft sector. The NVQF would help in training, retraining, assessing, internal verifier, licensing and final certification of the construction students that partake of the construction craft skills acquisition programme in tertiary institutions.

MATERIALS AND METHODS

The study designed and conducted a quantitative survey as an appropriate method for data collection. Specifically, a cross-sectional research design was used where samples were drawn from the population of study. This study was carried out through questionnaire survey to elicit data on construction craft skills acquisition in Nigeria's tertiary institutions. The targeted population comprised educationist and students in the Faculty of Environmental Science.

The study area were one public and one private tertiary institutions in the South Western part of Nigeria. A purposive sampling method was adopted in order to arrive at the sample size for the study. The purposive sampling technique was used because the study is specific to a group of people and the construction characteristics relevant to the study such as academics and students in the Department of Architecture, Building, Quantity Surveying and Estate Management.

The questionnaire was divided into four sections and analyzed using SPSS V21. Two sets of questionnaires were developed for the study.

Out of the 50 copies of research questionnaire distributed for educationist, 35 were completed and returned representing a 70% response rate while 150 copies of research questionnaire were distributed for construction students with 110 returned representing a 73% response rate. The questionnaire administered showed that among the educationist, there were 12 (34%) lectures from the Department of Building/Building Technology, 10 (29%) lectures from the Department of Architecture, 8 (23%) educationists from the Department of Estate Management and 5 (14%) educationists from the Department of Quantity Surveying. Among the construction students, the distribution of returned questionnaires were as follows; 43 (39%) were building/building technology students, 26 (24%) were estate management students, 25 (23%) were architecture

students while 16 (14%) of the respondents were quantity surveying students. The result were presented using frequencies, percentages and mean score.

RESULTS AND DISCUSSION

Research findings: The result and discussion as obtained from the distributed questionnaires are presented under the following headings.

Interest in acquiring construction craft skills: The result in Table 1 showed the mean score distribution of construction craft skills interest highlighted by the construction students.

Table 1 revealed that students in architecture have interest in landscaping and site preparation skills (Mean Score, MS = 4.00), painting skills (Mean Score, MS = 3.94) and carpentry and joinery skills (Mean Score, MS = 3.90) while building/building technology students have interest in tilling skills (Mean Score, MS = 3.86), painting skills (Mean Score, MS = 3.81) and landscaping and site preparation skills (Mean Score, MS = 3.77). Students in the department of estate management have interest in acquiring painting skills (Mean Score, MS = 3.64), plumbing skills (Mean Score, MS = 3.56) and landscaping and site preparation skills (Mean Score, MS = 3.50). Students in the department of quantity surveying have interest in acquiring construction skills such as tilling skills (Mean Score, MS = 3.52), carpentry and joinery skills (Mean Score, MS = 3.50) and painting skills (Mean Score, MS = 3.49).

Overall, construction students in the tertiary institutions surveyed had interest in acquiring construction craft skills in painting, tiling and landscaping craft skills.

The issues of skill shortage viewed on the global level as reported by Wiseman noted that in the United Kingdom, construction firms had shortage in filling vacant positions of carpenters/joiners (14%), bricklayers (9%), plasterers (8%), plumbers (8%), roofers (7%), fabricators/welders (5%), floorers (4%), painters/decorators (3%), electricians (2%) and tilers (2%) with 80% of the applicants lacking the required skill to fill the vacant positions.

In findings by Oseghale *et al.* (2015), 80% of construction managers in Nigeria reported shortage of Bricklayers, Carpenters, Painters and Plumbers. With this, the problem of construction craft skill's shortage could be tackled by harnessing the interest of the construction students. Kashiwagi and Massner explained that a major change in construction education programs needs to occur in order to reverse the trend of shortage of construction craftsmen.

Table 1: Interest in acquiring construction craft skills

Construction craft skills	Architecture		Building		Estate management		Quantity surveying		Overall rank
	MS	Rank	MS	Rank	MS	Rank	MS	Rank	
Plumbing skills	3.50	7	3.15	9	3.56	2	3.30	5	5
Electrical skills	3.55	6	3.30	7	3.48	4	3.05	9	6
Painting skills	3.94	2	3.81	2	3.64	1	3.49	3	1
Tiling skills	3.81	4	3.86	1	3.36	6	3.52	1	2
Welding and upholstery skills	3.74	5	3.18	8	3.20	7	3.15	8	7
Carpentry and joinery skills	3.90	3	3.54	6	3.48	4	3.50	2	4
Bricklaying and block laying skills	3.46	8	3.59	5	3.15	8	3.25	6	8
Concreting/plastering and reinforcement arrangement skills	3.42	9	3.73	4	3.12	9	3.17	7	9
Roofing skills	3.42	9	3.09	10	3.04	10	2.98	10	10
Landscaping and site preparation skills	4.00	1	3.77	3	3.50	3	3.38	4	3
Ability to operate plants and equipment for construction	2.85	11	2.96	11	2.72	11	1.90	11	11

MS = Mean Score

Table 2: Merits of acquiring construction craft skills

Merits	Educationists		Students	
	Mean score	Rank	Mean score	Rank
Increase self-employment	4.61	2	4.11	1
Boost self-sufficiency and self-reliance	4.52	4	3.84	6
Increase the knowledge of construction occupation	4.08	9	3.97	3
Improve standard of living	3.85	10	3.59	10
Improve employability	4.64	1	3.81	7
Higher productivity on job	3.66	11	3.46	11
Diversification	4.40	5	3.76	8
Reduce shortage of craftsmen	3.42	12	2.80	14
Increase quality of workmanship	3.30	13	3.44	12
Increase entrepreneurship instincts	4.55	3	3.66	9
Sustainability of the construction industry	3.28	14	3.37	13
Improve supervision on construction sites	4.14	8	3.92	5
Increase business opportunities	4.34	6	4.07	2
Technological improvement	3.11	15	2.71	15
Increased innovation and creativity	4.26	7	3.96	4

Merits of acquiring construction craft skills by construction students: The result of the merits of acquiring construction craft skills by students in tertiary institutions as indicated by construction educationist and students is shown in Table 2. The result in Table 2 showed that educationists opined that acquiring construction craft skills by construction students would increase employability of the students which had a Mean Score (MS) of 4.64 and ranked 1st. This is followed by increase self-employment which had a Mean Score (MS) of 4.61 and Increase entrepreneurship instincts which had a Mean Score (MS) of 4.55 which both ranked 2nd and 3rd, respectively. The construction students noted that acquiring construction craft skills will increase self-employment (Mean Score, MS = 4.11), increase business opportunities (Mean Score, MS = 4.07) and increase the knowledge of construction occupation (Mean Score, MS = 3.97). The global market is presently going through various challenges at various levels.

Adeyemo *et al.* (2010) stated that some institutions of higher learning are trying to maintain higher competitive edge for their graduates by including

different professional experiences during the course of study. Thereby, sharpening the employability skills of their graduates. Poropat (2011) described employability as a major educational goal, even though employability programmes emphasized skill development. While, Hedley (2003) described employability as possessing skills and competences to survive in a work situation.

Given that the unemployment rate is at its alarming state, Uwaifo (2009) noted that graduates need practical skill to enable them function profitably in the society. The issues of self-employment ensure that graduates from schools system do not enter the job market seeking employment that does hardly exist in this country today. Researchers such as Uwaifo (2009), Ogundele (2013), Omofonmwan and Chukwuedo (2013), Ekpe *et al.* (2015) stressed the need for skill acquisition as an elixir to graduate unemployment by creating self-employed youths that are able to create more jobs that the country direly needs.

Barriers to construction craft skill acquisition in tertiary institution: The result of the barriers to

Table 3: Barriers to construction craft skill acquisition

Barriers	Educationists		Students	
	Mean score	Rank	Mean score	Rank
Low interest from students	4.23	1	3.08	8
Inadequate curriculum to cover the area	3.81	5	3.86	1
Lack of technicians/technologist	3.75	6	3.50	6
Lack of tools and practical facilities	4.10	2	3.82	2
Low commitment from stakeholders	3.96	3	3.69	5
Insufficient time to incorporate in programme of study	3.66	7	3.74	4
Insufficient funds	3.90	4	3.28	7
Too much emphasis on theory	3.31	9	3.81	3
Inability to communicate skills to the students	3.50	8	2.95	9

construction craft skill acquisition in tertiary institution is presented in Table 3. Table 3 revealed that low interest from students with a mean score of 4.23, lack of tools and practical facilities had a mean score of 4.10 and low commitment from stakeholders had a mean score of 3.96 ranked 1st, 2nd and 3rd, respectively as the major barriers to the acquisition of construction craft skills in tertiary institutions. Construction students opined that inadequate curriculum to cover the area which had a mean score of 3.86, lack of tools and practical facilities had a mean score of 3.82 and too much emphasis on theory had a mean score of 3.81 and ranked 1st, 2nd and 3rd, respectively as the major barriers to the acquisition of construction craft skills by construction students in tertiary institutions.

From the study, educationists identified low interest from construction students as a major barrier in acquiring construction craft skills, Oseghale *et al.* (2015) noted that the poor image of the industry has unfavourably affected the popularity of craftsmanship as a career choice. This can be attributed to the low wage scheme, no clear-cut career path, poor image, a diminishing craftsman skilled training program.

Adeyemo *et al.* (2010) stated that Nigerians tend to berate those who work in less fashionable jobs such as craftsmanship. Adeyemo *et al.* (2010) advised that this culture must change that Nigerians must cultivate the culture of the fact that there is dignity in labour. Therefore, construction students should take up a construction craft skill with pride and be innovative and creative in their dealings.

Another challenge identified by construction students was the curriculum issue. Kazaure stated that there exists poor articulation between qualifications and actual skills needs in the workplace because educational institutions have been largely disconnected from industrial and socio-economic needs by consistent neglect of competence and placing undue emphasis on paper qualification. Uwaifo (2009) and Adeyemo (2010) argued that closing the gap between school and work requires skill development.

Emaikwu (2010) opined that the type of education a nation gives to her citizen determines the success of such citizen in the highly competitive global economy. With the fast changing economic trends as a result of globalization the educational system of a developing nation like Nigeria cannot afford the luxury of producing manpower that is poorly equipped to grapple with the demanding market variables. The mindset of the youth needs to be on enterprises, job creation and poverty alleviation. In the construction sector, Kashiwagi and Massner opined that the construction curriculum needs to move from creating job seeking project managers to independent performing contractors.

CONCLUSION

The state of unemployment in Nigeria grows drastically with millions of graduates being churned out annually to an already saturated labour market. Although, the issues of unemployment are not peculiar to Nigeria alone, it is a global phenomenon. The study called for an urgent action to revisit the built environment education curricula by examining construction craft skill acquisition in tertiary institutions. Education development is a dynamic instrument that must be harnessed to build graduates that are not only prepared for now but also the future.

The study developed a construction craft skill's acquisition framework for the built environment curriculum using a competence based education approach as shown in Fig. 2 where different participants in the construction industry contribute and motivate the construction craft skill interests of construction students through an adaptive built environment curriculum.

The study revealed that the students were mostly interested in acquiring three major craft skills which include painting, tiling and landscaping craft skills. Perception of the construction students were that acquiring construction craft skills will increase self-employment and increase business opportunities but observed that a major barrier in acquiring construction

craft skills in tertiary institutions was that the curriculum had some inadequacies that did not cover the practical acquisition of construction craft skills.

Construction educationist revealed acquiring construction craft skills would increase employability of the students but that lack of interest from the students in acquiring construction craft skills is a major barrier to a construction craft skill acquisition programme.

It was recommended that the government, National University Commission (NUC) and educators should integrate construction craft skills acquisition programmes in the built environment curriculum like the entrepreneurship programmes integrated in the present curriculum. The National Vocational Qualification Framework (NVQF) policies for training and retraining indigenous artisans be extended to tertiary institutions to assess and license construction students in specific chosen trained construction craft skills. Also, in order to attract youth into the construction craft sector there is urgent need to revisit the craft wage scheme by making it good-looking even to the educated graduate.

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