International Journal of Civil Engineering and Technology (IJCIET)
Volume 9, Issue 1, January 2018, pp. 273–289, Article ID: IJCIET_09_01_028
Available online at http://http://www.iaeme.com/ijciet/issues.asp?JType=IJCIET&VType=9&IType=1
ISSN Print: 0976-6308 and ISSN Online: 0976-6316

MISSING GAPS IN SAFETY EDUCATION AND PRACTICES: ACADEMIA PERSPECTIVES

Kunle E. OGUNDIPE*, Ayodeji O. OGUNDE, Hezekiah F. OLANIRAN, Adekunle M. AJAO, Babatunde F. OGUNBAYO
Department of Building Technology, Covenant University,
Ota, Nigeria. P.M.B. 1023, Ota, Ogun State, Nigeria
*****Corresponding Author'E-mail: kunle.ogundipe@covenantuniversity.edu.ng

Julius A. OGUNDIPE
Department of Mechanical Engineering, William V. S. Tubman University,
Harper, Maryland County. Republic of Liberia

ABSTRACT

In the developing countries, the syndrome of low level of safety practices are common phenomenon among construction firms when trying to achieve speedy delivery of construction projects. Various researchers have established factors causing accidents on project sites under unsafe conditions and behaviour of construction workers. This study examined construction safety education embedded in Architecture, Building Technology and Quantity Surveying curricula in some selected tertiary institutions in South-Western Nigeria. Secondary data were sourced from the National Universities Commission (NUC) and National Board for Technical Education (NBTE) curricula through desk review. The descriptive assessment underscored insufficient knowledge coverage because there is no particular course titled construction health and safety in the construction programs curricula. Also, the three top knowledge areas of the respondents on safety practice were: use of personal protective wears, injury and illness prevention and construction all risk and contractors all risk insurance. This study concluded that lack of depth knowledge on safety education is capable of limiting students' ability to coordinate safety practices, develop Safety Policy when employed in construction industry and as well reduce their employability as Safety Manager. The study therefore recommends that both NUC and NBTE should engage Academic and Industry Partnerships (AIPS), Collaborative Curriculum Designing (CCD) in modifying existing curricula for Architecture, Building Technology and Quantity Surveying programs in Nigerian tertiary institutions that will facilitate better understanding both to planning and managing construction safety rather than applying corrective measures after the havoc has been fully perpetrated.

Key words: Academia, Construction Workers, Safety Education, Safety Practices.

Cite this Article: Kunle E. OGUNDIPE, Ayodeji O. OGUNDE, Hezekiah F. OLANIRAN, Adekunle M. AJAO, Babatunde F. OGUNBAYO, Julius A. OGUNDIPE, Missing Gaps in Safety Education and Practices: Academia Perspectives. *International Journal of Civil Engineering and Technology*, 9(1), 2018, pp. 273-289.
http://www.iaeme.com/IJCIET/issues.asp?JType=IJCIET&VType=9&IType=1

1. INTRODUCTION

It is believed that construction accidents remained an ongoing concern in the developing countries, despite the level of awareness in promoting Occupational Safety and Health (OSH) over the years. The perceived increment in casualties, injuries and illnesses rate on project sites is unacceptably high considering the numerous regulatory standards and control systems in the construction industry, thus creating serious menace to construction operatives' health and wellbeing. The causes of accident and injuries are viewed in different perceptions on projects site raging from artistic beliefs that accidents occur as an act of God, as a result of unknown causes, as a result of unsafe conditions and unsafe practices (Idubor and Oisamoje, 2013), while others attributed causes of accident to bad luck or workers' ignorance (Guldenmund, Cleal and Mearns, 2013). This means causes of accident can be identified under the combination of various factors, but the largest proportions of the causes were attributed to unsafe behaviours as against unsafe conditions (Abdelhamid and Everett 2000; Mullen 2004; Sadullah and Kanten, 2009; Mui Zin and Ismail, 2011; Oostakhan, Mofidi and Talab, 2012; Solis-Carcano and Franco-Poot, 2014).

Amazingly, construction industry played a pivotal roles in national economic development through strategic planning, design and construction, transforming various production stages into constructed facilities (Isa, Jimoh, and Achuenu, 2013). While construction workers contribute significantly to the successful outcome of the projects before, during and after completion. Therefore, workers safety and welfare should be a major concern to the clients and construction managers during production stage. As matter of fact, researches on safety practices in the Nigeria have always been concentrated on the level of implementation of safety rules and regulations, procedures for monitoring safety performance, causes and effect of accidents, hazard control mechanisms, sustainability of safety measures employed by building firms, level of adopting health and safety plan for building projects (Ayangade, 2000; Idoro, 2007; Okeola, 2009; Idoro, 2011; Dingwu, Baba and Egila, 2012; Okolie and Okoye, 2012; Idubor and Oisamoje, 2013; Windapo, 2013; Isa, Jimoh and Achuenu, 2013; Umeokafor, Isaac, Umeadi and Jones, 2014; and Dodo, 2014; Kadiri *et al.*, 2014), of which have offered little and impractical solutions in developing countries.

Safety research need to explore the role of trainers and level of safety training incorporated in both the artisans and professionals workforce in solving these current challenges. More importantly, since education is an unending process of acquiring information, knowledge and skill development, thereby justified the popular saying that constant exposure to new ideas and skills makes people better thinkers, workers and societal contributors. Idoro, (2008) added that learning of construction safety should focus on the final result of a dynamic and all construction processes rather that acquiring knowledge through instructions and training in lecture halls or other formal settings.

Pisaniello, Stewart, Jahan, Pisaniello, Winefield, and Braunack-Mayer (2013) noticed that teaching of occupational safety in schools is an essential role of the school's in preparing students for the workplace challenges. The author stressed that safety education will become

an important course content for the students in learning and development safety skills, if safety policies that is applicable beyond the workplace are infused into their curriculum. Also, for accident and injury rates to reduce to low occurrence on construction sites, research on safety practices need to focus on possibility of integrating more safety education into stakeholders training thereby building a robust skills development on safety planning, safety policy development and safety implantation strategies. Meanwhile, this will provide opportunity that will look beyond the general assessment of the traditional causes of safety problems rather focuses on safety education in curbing unsafe behaviours exhibited by workers before they resort into accidents.

This study examined depth of construction safety education in Architecture Technology, Building Technology and Quantity Surveying curricula in tertiary institutions in Southwestern Nigeria. This study identified the curricula prepared by NUC and NBTE for Nigerian Tertiary Institutions in Built Environment, it also identified possible missing gaps in stakeholders training in the tertiary institutions and concluded by examining construction safety knowledge acquired by final year students of Architecture Technology, Building Technology and Quantity Surveying.

2. REVIEWED OF LITERATURE

2.1. Background Study on Safety Education and Knowledge Development

Safety can be expressed as point at which risks associated with a particular job are managed in a reasonable manner (Brueggman, 2001). Safety policy is a strategy and commitment together with the arrangements put in place to create awareness among workers on the associated hazards to their work and the role of individual/person will play at work in ensuring healthy working conditions. Alli (2008) defined Occupational Safety and Health (OSH) as the science that take into consideration the possibility of hazards from the workplace and its anticipation impact on workers' health and general well-being. In the same vein, Ahmad, Iqbal, Rashid, Iqbal and Roomi (2016) opined that safety focus on curbing accidents at work and its negative effect on workers in all manner.

Over the decades, construction firms has made several efforts toward improving its safety performance. Meanwhile, focus have been diverted from monitoring safety performance to proactive measures of improving safety practices. Hughes (2010) stressed that a paradigm shift in thinking, values addition and change of believes will boost healthy and sustainable society. Neale (2013); Kolawole (2014) opined that adequate training of students on occupational safety and health via cognitive education will be a good channel in helping the stakeholders to improve safety practices. Samovar, Poster and Jain (1981) added that the industry can boost professionals' interests in active safety management and implementation of safety awareness programs, this need to be developed and implemented on site for construction workers. A nationwide survey conducted by Boustras, Hadjimanolis, Economides, Yiannaki and Nicolaides (2015) on management of health and safety in Cyprus showed that safety at work in a small scale firms needs improvement on training, risk assessment, and safety policy formulation. Awwad, El Souki, and Jabbour (2016) examined construction safety practices and challenges in a Middle Eastern developing country, found availability of construction labour safety law but lacks necessary awareness, absence of monitoring and inadequate support from all the participants concerned with implementations of safety practices on sites. Abdullah and Wern (2011) stated that the role of academia in creating necessary awareness, knowledge, skills and values in construction students during their training is vital in developing safety culture. In view of this, Akinwale and Olusanya (2016) stated that high level of awareness on the importance of occupational health and

safety, training on how to identify and manage risk among contractors and workers will optimize site safety.

Education and training might not be enough to solve all problems regarding construction health and safety (Weinstock and Slatin, 2012) but it could be good tools to building safety consciousness among the students' right from the school. Recently, the increase in social and public education has helped in fighting disease outbreak like HIV AIDS, Ebola, Polio, sickle cell etc. in the developing countries. However, improper handling of safety education as part of the students training when in school will forfeit the objectives of the industry contributions to national development, as Stephens, Hernanadez, Roman, Graham & Scholz (2008) emphasized that the construction programmes remained a core of any nation's economy development. Ismail, Doostdar and Harun (2011) evaluated factors influencing the implementation of safety management system for construction sites. The result from the survey found personal awareness and communication as the most influencing management factor.

In understanding and defining operational health and safety competency on construction site using worker opinion, Dingsdag, Biggs and Sheahan (2007) assessed the feelings, skills, behaviors and knowledge of construction participants that contribute to safety culture. The findings of the study established that workers have four most influential positions to be safe on construction site this includes: workers opinion on safety culture promotion via training and education, a strong knowledge of safety rules and regulations, good communication and interpersonal skills, behaviour and actions that will enforce and monitor safety.

2.2. Identified Missing Gaps on Safety Education and Safety Practices

Inadequate Safety Education Programs in Students Curricula

This section assessed safety courses embedded in the following construction related programs (Architecture, Building, and Quantity Surveying) as provided in the National Universities Commission (NUC) and National Board for Technical Education (NBTE) curricula benchmark for Nigerian tertiary institution. There is a general shortage of designated courses titled occupational health and safety or Construction Safety Management in the curricula of both the (NUC) and (NBTE) rather the subject of safety were briefly discussed in Building Technology Courses; the Professional Practice and Workshop Practice. Though National Universities Commission (NUC) and National Board for Technical Education (NBTE) made minimum requirement for the curricula in the tertiary institution, yet the development of this curricula is differ both in contents and programs from one institution to another. Also, the safety training and knowledge received by this future professionals were differ. Therefore it is important to ensure that safety education given to intending professionals is adequate in all ramifications. According to Che Hassan, Basha, Wan Hanafi (2007); Shamsuddin, Ani, Ismail, Ibrahim (2015) workers knowledge and understanding of safety practices at work setting remained vital in promoting safety among themselves on construction site. This can be achieved according to Pisaniello *et al.,* (2013) by standardizing students' training using case studies approach in teaching and learning occupational safety in tertiary institutions, because this will involve student's participation in Safety practices and any lesson learnt will greatly impact their understanding.

Recent trend in construction activities would require safety education and practices to be a specialized program rather than topic within another construction courses. This will adequately prepare future professionals on the needs for safety on/off sites.

Learning opportunity can be harnessed during the eight (8) weeks Student Work Experience Programme (SWEP) designed for students of 200level in construction and engineering programs at various tertiary institutions because this training is domiciled in each of the tertiary institutions. It can be designed to include practical demonstrations on occupational health and safety education. Schunk & Zimmerman, (2012) noted that promotion of skill and knowledge development ability could be achieved by individual-motivation and self-regulatory behaviors of students through positive performance outcomes in schools such as adaptive behavior in the face of challenges and sustainable habits study.

2.3. Expected Training for Construction Professional in the Built Environment

Construction industry is a unique and fast growing industry where several percentages are contributed to nation's economic development from the industry yearly. Different innovations are coming every day, therefore posing demand for professionals to be skillful enough in managing construction projects. Training of construction professionals are expected to cover distinctive areas such as: planning, organizing, scheduling, executing, supervising, monitoring, controlling and follow up on ongoing projects. (Baharudin, 2006, Egbu (1999) studied seventy five types of management skills and knowledge, the six most important are: leadership, communication (oral/written), motivation of others, health and safety, decision making, and forecasting and planning. According to Kuroshi (2015) professionals that will manage building production processes are expected to possess the following advanced skills: Technical skills, Leadership skills, Multi skilling, Team-working skills, Customer skills, Safety implementation skills, regulation compliance and customer relations. Otherwise construction activities will always resort in poor workmanship and building failure.

Farooqui, Ahmed, and Saqib (2011) expressed that construction management demand professionals having knowledge on relevant building codes and regulations, knowledge on safety controls, translating contract documents, paying attention to details, and time management. Adenuga, Soyingbe, and Ajayi (2007); Idubor and Osiamoje (2013) highlighted that inadequate training of staff is a hindrance to safety performance of construction projects. In agreement, Windapo and Oladapo (2012) stated that, unsafe work environment and inadequate training could indicate how construction firms handle the issues of compliance with safety practices. Farooqui, Lodi and Ahmed (2011) maintained that a selected safety outlines in addition with industry experience could be added to the built environment programs.

There are numerous codes and regulations that support management of health and safety practice, they include: The Provision and Use of Equipment Regulation (1992), ILO Code of Practice-International Labour Office (1992), The Manual Handling Operations Regulations (1992), The Personal Protective Equipment at Work Regulations(1992), The Occupational Safety and Health Act of (2007), The Health and Safety (Display Screen Equipment) Regulations (1991), Health and Safety (First-Aid) Regulations (1981), Management of Health and Safety at Work Regulations (1999), Control of Substances Hazardous to Health Regulations (2002), Construction Design and Management Regulations 2015 (CDM 2015), Nigerian National Building Code (2007) (Bamisile, 2004; Muiruri and Cornelius, 2014). Students are expected to have good knowledge and know how to apply them.

Therefore, educational institutions require a key arrangement to satisfactorily set up this system into the intending construction project managers. Idubor and Osiamoje (2013) argued that the performance and productivity of staff have to do with their level of expertise and skill gained from appropriate training and education. It is an indication that if adequate safety training and education are not given to the professional in the built environment, compliance

with safety regulations will be affected. Tertiary institutions need to attach more emphases on empowering and developing student's safety skill rather than mere teaching of safety courses. Thereby, making them more knowledgeable beyond lecture halls.

2.4. Misconception Between Training and Practices of Construction Workers

It has been observed among operatives in indigenous Construction sites not to imbibe the culture of enforcing wearing of safety gears. Majority of them complained that they were not used to it, some said it promoted inconveniencies which could lead to low productivity. This complaint is as a result of lack of safety education and its gross effect on their lives. Professionals who are to enforce safety practices have limited education on it and the workforces who are to practice it are loaded with traditional belief. This agitations call for an improved safety education and performance among construction workers on site. Roelofs, Martinez, Brunette and Azaroff (2011) worked on construction workers perception regarding factors influencing worksite safety, the study established that workers attitude towards training is low because their goal is to get their work done and be remunerated. However, inadequate knowledge on safety training of construction workers during their apprenticeship (Ogundipe, 2017) will impact negatively on their skills and response to safety practices on site.

Kuroshi (2015) explained that Artisans and Craftsmen are experiencing skill gaps in Nigerian construction industry, because they lack adequate skills, knowledge and experience needed to function productively. He stressed that there are gaps between the skills needed on the job and the actual skills possessed by the Artisans. Irizarry, Simonsen, and Abraham (2005) maintained that workers safety practices have been overlooked because some contractors thought that it is time consuming for workers to comply with safety practices. Okeola (2009) blamed workers lack of safety compliance on an approach and attitude contractors disregarded Occupational Health and Safety (OHS). Umeokafor *et al.,* (2014) stated that unemployment have made workers to disregard compliance with safety practices by accepting risky jobs. Ogunde *et al.,* (2017) maintained that construction projects could experience low quality of finished job, project elongation, disputes, delay payment, company's loss of integrity, loss of productivity and efficiency due to shortage of skilled labour. Tunji-Olayeni *et al.,* (2017) opined that enticing females into built environment programs could bridge the skill gaps through adequate career counseling, a gender inclusive learning environment, students' self-motivation and subjection to female role models.

Also high demand for aestheticism and quality of work by the clients has raised concern amongst contractors about inadequacy of skilled and qualified manpower needed for construction activities. This will warrant further training and development of workers in meeting this demand. There should be a synergy between the workers training and practices on site because construction industry employs different categories of skilled and unskilled labour on site for the executions of building production process and their operations are under the supervision and control of the professionals in the built environment in ensuring stated objectives of the project are met.

2.5. Suggested Measures to Improve Safety Education in Tertiary Institutions

Academic and Industry Partnership Seminar (AIPS)

Academic and Industry partnerships (AIPS) are becoming fast approach of providing vocational education opportunities. Weybrecht (2016) noted that partnerships with organisation help school to explore wide range of collaborations beyond just recruiting and raising funds, but rather provide numerous opportunities in resources and experiential

learning for students and faculty. This partnership will bring on board an industrial experience of the resource person to give lectures on some of the general problems and safety challenges confronting the industry and this may bring new ideas for breakthrough in academic teaching and research. Also the experience of the resource person could become useful in teaching some of the professional's practices related courses expected in future practice.

2.6. Collaborative Curriculum Designing (CCD)

Collaborations with the industry will go a long way in developing a curriculum that will reflect new trend being face with in the industry that can better prepare students and faculty to tackle real life challenges. Watters and Christensen (2013) opined that the role of Academic and Industry Partnerships (AIPS) in curriculum development may deliver learning exchange and also prepare the potential employees for workplace expectations. Interestingly, construction programs curriculum need to be frequently reviewed with the input of well-seasoned members of professional affiliation in built environment to infuse the educational needs of the industry and that of the intending professionals. Billet, Clemans, and Seddon, 2005; Blomqvist, Hurmelinna and Seppanen 2005; Fawcett, Jones and Fawcett (2012) believed that Academic and Industry Partnerships (AIPS) are engine to drive innovation and educational ideas relevant to the industry respective workforces.

2.7. Institutionalized Vocational Center for Artisans Training

Nigerian construction industry has come of age to have a vocation training centre through the help of National Board for Technical Education (NBTE) and all bodies of Professional affiliations. Nwachukwu and Emoh (2011) noted that national policy should considered institutionalization of project management. Oseghale, Abiola-Falemu and Oseghale (2015) added that poor image of the industry has unfavourably affected the popularity of craftsmanship as a career choice.

National Building Code (2006) section 13 (12) stated that the supervision of the building works shall be the responsibility of a Registered Architect and engineer in line with their inputs. However, management of building production process, including supervision and training of Artisans and Tradesmen will be the responsibility of a Registered Builder. The accident trend in the construction industry can only be influenced positively by providing adequate safety education training and management control for workers, working environment, plants and equipment.

Odusami *et al*., (2003) and Kissi and Ansah (2013) asserted that both Nigeria and Ghana have no institutional framework or regulatory bodies that review, assess and control current and future skill requirements for construction project. Yet, there have been a decline in skill required for construction jobs. Afolabi, Emeghe, Oyeyipo and Ojelabi (2016) stated that Nigerian construction industry preference for Migrant Craftsmen is as a result of shortage of skilled local Craftsmen and besides Nigerian Artisans do cut corners in carrying out their job, carry out hasty job in meeting target and they lack improvement trainings on their skills.

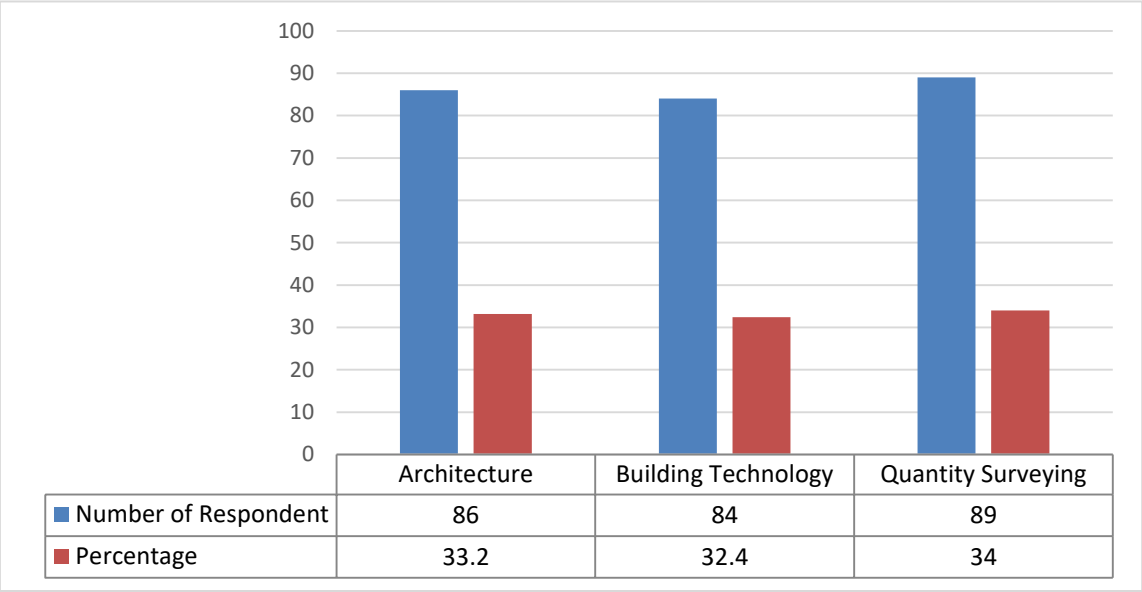
3. RESEARCH METHODS

The research engaged desk review of related literature covering a period of 17 years (2000-2017) and also explored the curricula of construction programmes in tertiary institutions both the Public and Private Institutions in South Western Nigeria based on National Universities Commission (NUC) and National Board for Technical Education (NBTE) benchmark dated December, 2016 for the Departments of Architecture, Building Technology and Quantity Surveying programmes. There are thirty nine (39) accredited private and public Universities

and thirty three (33) Polytechnics in study area as indicated in National Universities Commission (NUC) and National Board for Technical Education (NBTE) dated December, 2016 in south western Nigeria. However, Ten (10) Universities offers Architecture, Seven (7) Universities offer Building Technology and Seven (7) Universities offer Quantity Surveying programmes, while Ten (10) Polytechnics' offer Architecture, Nine (9) offers Building Technology and Ten (10) Polytechnics' offer Quantity Surveying programs respectively in South Western Nigeria. Sample size for the study was determined through (Sediary, 1994) as adopted by (Fagbenle *et al.*, 2007) n = n'/ (1+ (n'/N)) where, n= sample size n'= s/v, N = total estimated population, v = standard error of the sampling population. Total error= 0.1 at a confidence level of 95% s = (p) X (1- p) = (0.5) X (0.5) = 0.25. 100 copies each of structured questionnaire designed in Likert Scale were administered to final year students in Architecture, Building Technology and Quantity Surveying making 300 copies of questionnaire in total to further justify the study outcome. Data were analyzed with frequency, percentage, bar and pie chart and mean scores raking.

4. DATA ANALYSIS, RESULTS AND PRESENTATION

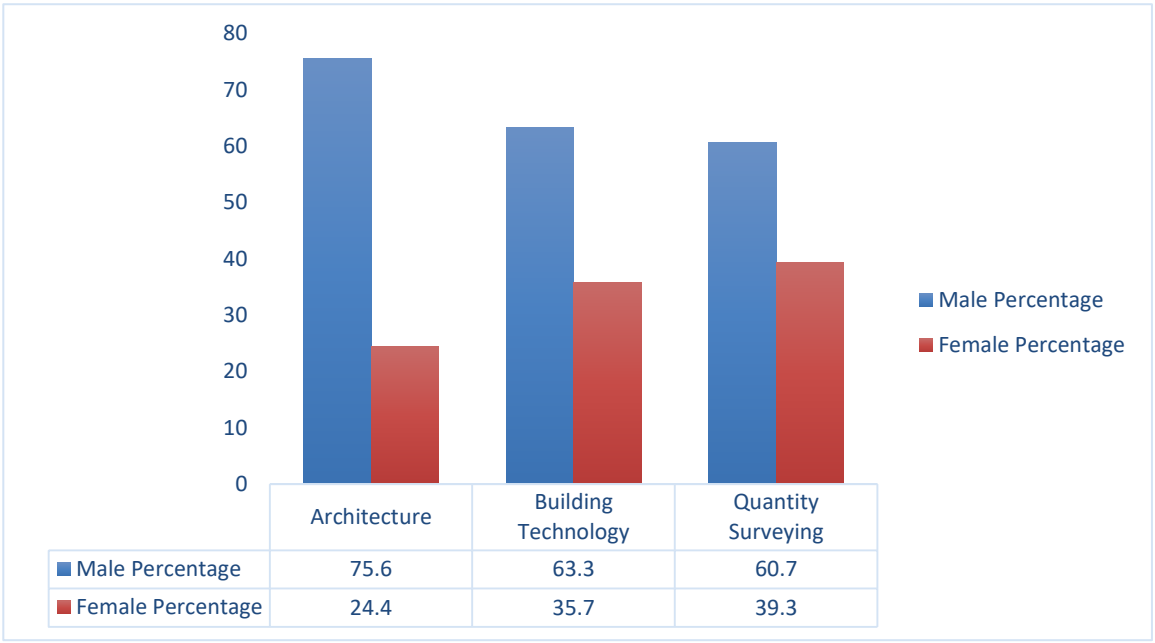
Background Information of the Respondents



	Architecture	Building Technology	Quantity Surveying
Number of Respondent	86	84	89
Percentage	33.2	32.4	34

Figure 1 Number of Programs and response rate

Figure 1 showed that from each of 100 copies of questionnaire distributed per programs 33.2% (86) of the respondents were final year students in Architecture, compared to 32.4% (84) students of Building Technology, while 34.4% (89) were studying Quantity surveying respectively. 259 (78%) response rate was recorded from the 300 copies of structured questionnaire distributed and responses from Quantity surveying students were more than that of other two programs sampled.



	Architecture	Building Technology	Quantity Surveying
Male Percentage	75.6	63.3	60.7
Female Percentage	24.4	35.7	39.3

Respondent's gender

Figure 2 Respondents gender

Figure 2 showed that Architecture students had highest male responses 75.6% (65) compare to 24.4% (21) female, Building Technology have 63.3% (54) male responses and 35.7 % (30) female. Quantity Surveying students had highest number of female responses 39.3% (35) compare to their male counterpart 60.7% (54).

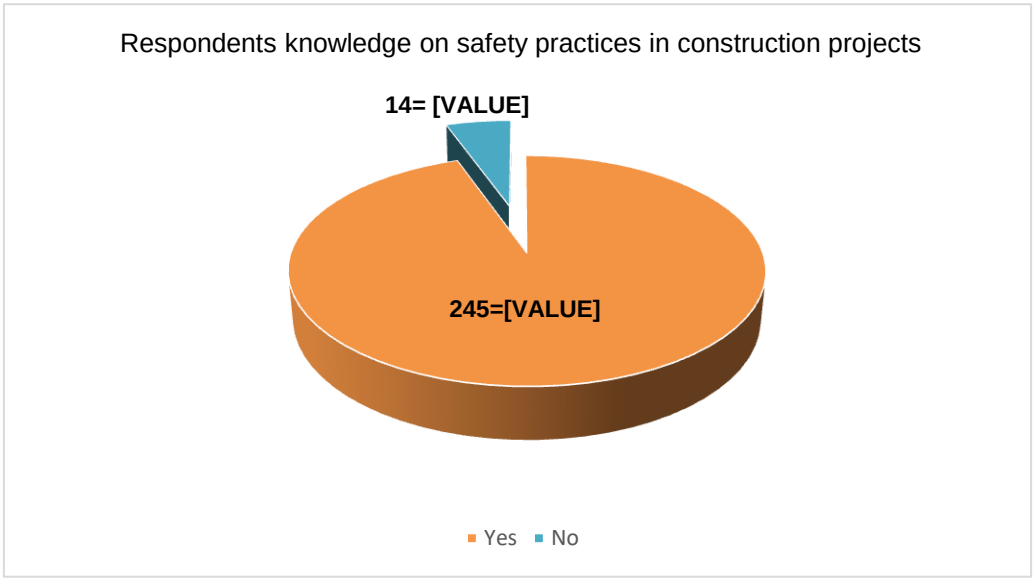
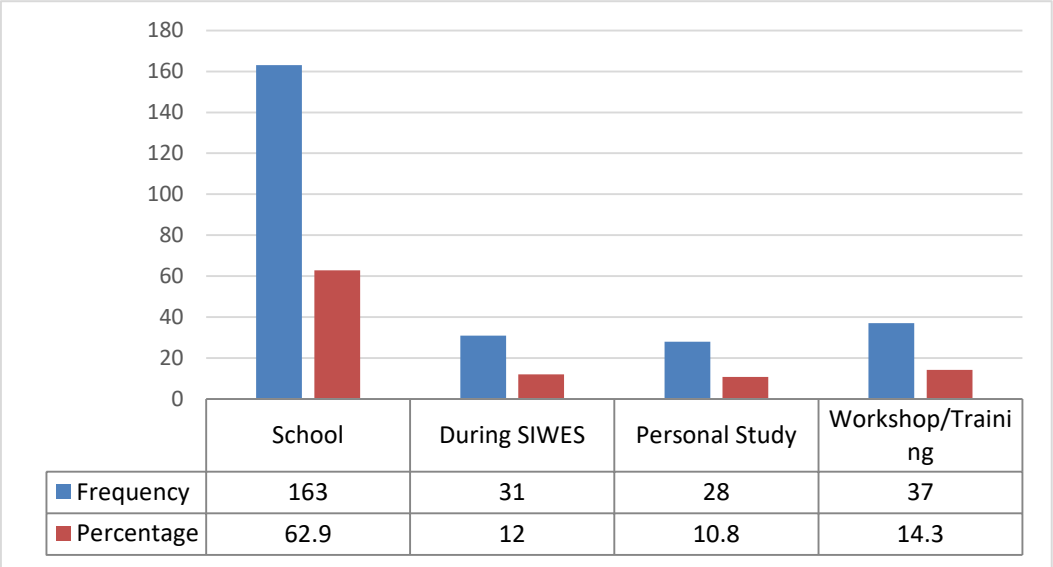


Figure 3 Respondents knowledge on safety practices in construction projects

Figure 3 showed 94.6% (245) of the respondents were aware about the knowledge of safety practices in construction projects delivery in Nigeria, against 5.4% (14) who declined. This justified that larger percentage of the respondents were highly qualified and knowledgeable enough to respond to the questions posed at them.

4.1. Responses on how respondents learnt about construction health and safety



	School	During SIWES	Personal Study	Workshop/Training
Frequency	163	31	28	37
Percentage	62.9	12	10.8	14.3

Figure 4 Responses on how respondents learnt about construction health and safety

Figure 4 showed percentage distribution of the respondents based on how they knew about construction health and safety. 62.9% (163) learnt about construction safety in school, 12% (31) did during Students Industrial Work Experience (SIWES), compared with 10.8% (28) at their person study and lastly 14.3% (37) knew about construction safety at workshop, seminar or training. It can be concluded that majority of the respondents knew construction safety at school. This supported Pisaniello, Stewart, Jahan, Pisaniello, Winefield, and Braunack-Mayer (2013) finding that teaching of occupational safety in schools is an essential role of the school's in preparing students for the workplace challenges.

Duration of respondents program

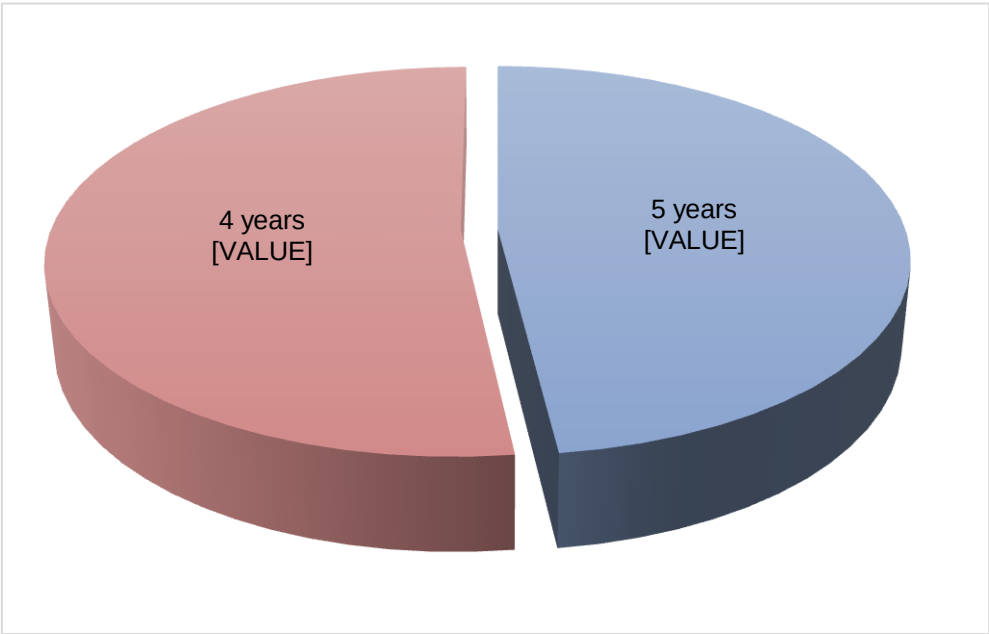


Figure 5 Duration of respondents program

Figure 3 showed that 52% (124) of the respondent who's programs is schedules for four years, this includes those Universities and Polytechnics that award degree of Bachelor of Science (B.Sc.) and Higher National Diploma (H.N.D) respectively compared to 48% (135) of the respondents who will spend five years to obtain Bachelor of Technology (B.Tech.).

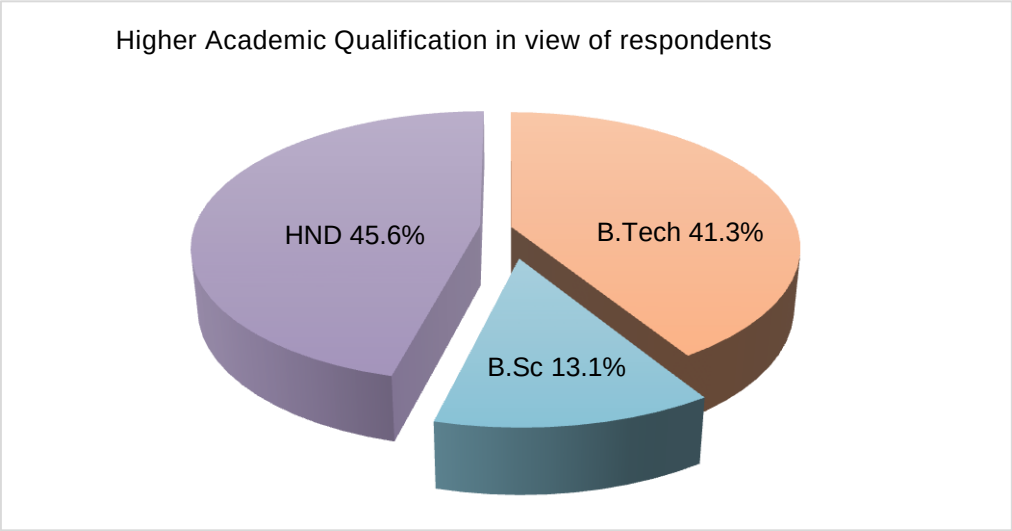


Figure 6 Higher Academic Qualification in view of respondents

Figure 6 showed that 118(45.6%) of the respondents are studying to obtain Higher National Diploma (H.N.D) degree, while 107(41.3%) will be awarded Bachelor of Technology (B.Tech.) compared with 34 (13.1%) of the respondents who are studying to obtain degree of Bachelor of Science (B.Sc.) in construction related programs.

4.2. Safety Knowledge of Final Year Students of Architecture Technology, Building Technology and Quantity Surveying

One of the objectives of this study is to capture the perception of students at final year in Architecture Technology, Building Technology and Quantity Surveying programs on their knowledge of construction safety practice. The analysis dealt mainly with ranking of some of the safety knowledge that are needed on construction site. Respondents were asked to indicate their level of awareness using four-point scale 4=very high awareness, 3= high awareness, 2= moderate awareness, 1= little awareness 0= no awareness. The results are presented in Tables 1 to 3 respectively.

Table 1 Ranked respondents on safety education

	Architecture	**Scores**	**Building**	**Scores**	**Q/S**	**Scores**	**Overall**	**Scores**
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Safety signs and symbols	2.78	1st	2.85	3rd	2.98	3rd	2.86	3rd
Personal protective wears	2.73	2nd	2.97	2nd	3.06	1st	2.91	1st
Safety practices for building projects	2.68	3rd	2.77	5th	2.74	6th	2.73	4th
Safety first aid	2.66	4th	3.05	1st	2.99	2nd	2.89	2nd
Accident prevention	2.64	5th	2.61	8th	2.74	6th	2.66	6th
Safety codes and regulations	2.59	6th	2.75	4th	2.86	4th	2.73	4th
Safety application	2.47	7th	2.72	6th	2.81	5th	2.66	6th
Fire prevention	2.45	8th	2.61	8th	2.67	9th	2.57	9th
Response plan to emergency incidence	2.41	9th	2.66	7th	2.72	8th	2.59	8th

Source: *Author's Field Survey, 2017.* Architecture N= 86, Building Technology N= 84, Quantity Surveying N=89.

The result showed that personal protective equipment was ranked 2nd (2.73) by Architecture students, 2nd (2.97) by Building students, 1st (3.06) by Quantity Surveying students and overall mean score 1st (2.86). However, students knowledge on fire prevention and response plan to emergency incidence was ranked 8th and 9th (2.45; 2.41) by Architecture students, 8th and 7th (2.61; 2.66) by Building students and 9th and 8th (2.75; 2.59) by Quantity Surveying students respectively. Therefore, it can be argued that final year students' knowledge on safety practices as indicated from the analysis is basic, this can not avail them the opportunity to be employed as safety managers immediately after graduation because of shallow knowledge they had on safety at workplace. Windapo and Oladapo (2012) found that, unsafe work environment and inadequate training could indicate how construction firms handle the issues of compliance with safety practices.

Table 2 Ranked respondents knowledge on site safety risk assessment

	Architecture	**Scores**	**Building**	**Scores**	**Q/S**	**Scores**	**Overall**	**Scores**
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Injury and illness prevention	2.39	1st	2.59	1st	2.68	2nd	2.55	1st
Hazard control	2.38	2nd	2.58	2nd	2.52	4th	2.49	3rd
Handling of hazardous materials	2.31	3rd	2.66	3rd	2.72	1st	2.55	1st
Hazard identification	2.28	4th	2.49	5th	2.64	3rd	2.46	4th
Workers motivation/ welfare	2.22	5th	2.48	6th	2.45	6th	2.37	6th
Site safety orientation	2.21	6th	2.53	4th	2.48	5th	2.40	5th

Source: *Author's Field Survey, 2017.* Architecture N= 86 Building Technology N= 84, Quantity Surveying N=89

Table 2 showed respondents high knowledge on Injury and illness prevention on site as it was ranked 1st (2.39) by Architecture students and (2.59) by Building students while it was ranked 2nd (2.55) by Quantity Surveying students. Handling of hazardous materials was ranked 3rd (2.66) by Architecture students and (2.72) Building students while Quantity Surveying ranked it 1st (2.55). This conformed to Akinwale and Olusanya (2016) recommendation that high level of awareness on the importance of occupational health and safety, knowledge on how to identify and manage risk among workers and contractors will optimize site safety. Workers motivation/welfare and site safety orientation was ranked lowest as revealed from table 2, this connotes that students have but not all the six required managers skill for construction project. According to (Egbu (1999; Baharudin, 2006), construction managers must possess the following skills: leadership, communication (oral/written), motivation of others, health and safety, decision making, and forecasting and planning. Safety and risk assessment is an important aspect of project planning. Therefore, students training must be improved towards this important aspect in order to avert challenges associated with such areas before resorting into loss of lives on sites.

Table 3 Ranked respondents knowledge on safety enforcement

	Architecture	Scores	Building	Scores	Q/S	Scores	Overall	Scores
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Construction all risk and contractors all risk insurance	2.36	1st	2.44	4th	2.72	1st	2.50	1st
Foundation permit	2.35	2nd	2.51	1st	2.41	5th	2.42	2nd
Scaffold permit	2.25	3rd	2.49	2nd	2.44	3rd	2.39	3rd
Legal right	2.18	4th	2.25	5th	2.46	2nd	2.29	8th
Nigerian National building code	2.14	5th	2.48	3rd	2.35	6th	2.31	4th
International labour organisation (ILO) regulation	1.88	6th	2.19	7th	2.13	4th	2.06	5th
Construction (Design and Management) Regulation (CDM)	1.80	7th	2.20	6th	2.15	7th	2.04	6th
Development of safety policies for construction project	1.49	8th	2.09	8th	2.04	8th	1.85	7th

Source: *Author's Field Survey, 2017.* Architecture N= 86, Building Technology N= 84, Quantity Surveying N=89

The overall ranking of the respondents from Table 3 showed three top knowledge area of the respondents as: Construction all risk and contractors all risk insurance 1st, (2.50), Foundation permit 2nd (2.42) and Scaffold permit 3rd (2.39) respectively. Knowledge on Nigerian National building code was ranked 6th (2.14) by Architecture students, 3rd (2.48) Building students 16th (2.35) Quantity Surveying students compared with other safety codes adopted in the industry.

Development of safety policies for construction project was ranked 8th (1.49) Architecture student's, (2.09) Building students and (2.15) Quantity Surveying student's, this is the lowest ranking of all the variables listed on knowledge on safety enforcement. To plan safety from projects inception, professionals training needs good knowledge on safety policies development and workable hazard management which will be properly communicated to sites operatives. Farooqui, Ahmed, and Saqib (2011) expressed that construction management demand professionals having knowledge on relevant building codes and regulations, knowledge on safety controls, translating contract documents, paying attention to details, and time management.

5. CONCLUSION AND RECOMMENDATION

The study found that curricula benchmark set by the National Universities Commission (NUC) and National Board for Technical Education (NBTE) in Architecture, Building Technology and Quantity Surveying programs cannot match recent trend on construction sites. Students' curriculum lack depth of knowledge on safety education that is capable of making them to coordinate safety practices on site, develop safety policy and as well increase their employability as Safety Manager. Therefore, construction safety practice should be taught as a course on its own or should be considered as specialized program and not to be treated as topics inside another construction courses as designed in the current curriculum. This will adequately prepare future professionals on the needs for safety on/off sites.

In addition, the findings of the study can be generalized to tertiary institutions in Nigeria because they are all using National Universities Commission (NUC) and National Board for Technical Education (NBTE) curricula benchmark and they are all accredited and regulated by this same bodies. The study also revealed urgent need for both the academia, National Universities Commission (NUC) and National Board of Technical Education (NBTE) to look at the possible medium of solving this cogent point raised. Furthermore, there should be modifications to the existing curricula for these programs Architecture, Building Technology

and Quantity Surveying in the Nigerian tertiary institutions that will accommodate safety education and practices.

Each tertiary institutions should form Academic and Industry partnerships (AIPS) with the construction industry and their relevant professional affiliations in solving the current trend of unsafe practices among the stakeholders by engaging in quality training on Continuous Safety Development (CSD) with emphasis on students rather than the course. Hughes and Ferret (2007) maintained that stakeholders lack required knowledge on health and safety provision as a cause of accidents on work site.

Tertiary institutions can as well ensure health and safety workshop as part of their College Week, this can be backed up with certificate courses when they are in school. This will also unified the gaps between safety education and practices couple with the formal training they have received to make them more suitable for employment. This study is no doubt an addition to previous knowledge on construction projects safety practices and as well shifted focus from general assessment of safety short coming on sites rather provided sustainable solutions to the challenges confronting safety education of the future professionals in the tertiary institutions.

ACKNOWLEDGEMENT

We acknowledge Covenant University, Ota, Nigeria for creating research enabling environment.

REFERENCES

[1] Abdelhamid, T. S. & Everett J. G. (2000) Identifying root causes of construction accidents. *Journal of construction engineering and management*; 126:52-60.

[2] Afolabi, O. A., Emeghe, I., Oyeyipo, O. & Ojelabi R. A. (2016) Professionals' Preference for Migrant Craftsmen in Lagos State. *Mediterranean Journal of Social Sciences.* 7 (1). Doi:10.5901/mjss.2016.v7n1p501.

[3] Agwu, M. O. & Olele, H. E. (2013).Fatalities in the Nigeria country industry. A case of Poor safety culture. *British journal of economics, management and trade* 4(3); 432-452.

[4] Alli, B.O. (2008). Fundamentals principles of occupational health and safety. *International Labour Office ILO-Geneva*

[5] Awwad, R., El Souki, O. & Jabbour, M. (2016). Construction safety practices and challenges in a Middle Eastern developing country. *Safety science*, *83*, 1-11.

[6] Ayangade (2000). An evaluation of safety practices in selected construction sites in Nigeria. *An unpublished M.Sc. Thesis submitted to the Department Of Building, Obafemi Awolowo University, Ile-Ife, Nigeria*.

[7] Baharudin, Khairul S. B. (2006). *Construction Management Skills for the Global Market (News Article)*

[8] Bamisile, A. (2004). *Building production management* (1st ed.). Lagos, Foresight Press Ltd, pp. 27-145.

[9] Boustras, G., Hadjimanolis, A., Economides, A., Yiannaki, A., & Nicolaides, L. (2015). Management of health and safety in micro-firms in Cyprus–Results from a Nationwide Survey. *Safety science*, *79*, 305-313.

[10] Che Hassan C.R., Basha O. J. & Wan Hanafi W. H. (2007). "Perception of building construction workers towards safety, health and environment." *Journal of Engineering Science and Technology*; 2:271-279

[11] Dingsdag, D. P., Biggs, H. C., & Sheahan, V. L. (2008). Understanding and defining OH&S competency for construction site positions: Worker perceptions. *Safety Science*, *46*(4), 619-633.

[12] Dodo, M. (2014). The application of health and safety plan in Nigerian construction firms. *Jordan Journal of Civil Engineering.* 8 (1):81-87. doi:10.14525/jjce.8.1.2631.

[13] Egbu, Charles O. (1999). "Skills, knowledge and competencies for managing construction refurbishment Estate Development and Investment, *American Journal of Social and Management Sciences*, 2 (1), 56 – 75.

[14] Guldenmund, F., Cleal, B., & Mearns, K. (2013). An exploratory study of migrant workers and safety in three European countries. *Safety science*, *52*, 92-99.

[15] Hughes, W. P. & Ferret, E. (2007). Introduction to Health and Safety in Construction. 2nd Ed., Elsevier Ltd., Oxford, UK.

[16] Hughes, W. P. (2010). Built environment education, research and practice: Integrating diverse interests to make an impact In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) *Proceedings of West Africa Built Environment Research (WABER) Conference, Accra, Ghana*, pp.1-8.

[17] Idoro, G. I. (2007). A comparative evaluation of health and safety performance of indigenous and multinational construction firms in Nigeria. *Construction Research Journal, 1*(1), 65-75

[18] Idoro, G. I. (2008). Health and safety management efforts as correlates of performance in the Nigerian construction industry. *Journal of Civil Engineering and Management*. Vol 14(4) 277-285.

[19] Idubor E. E, & Oisamoje M. D. (2013). An exploration of health and safety management issues in Nigeria's efforts to industrialize. *European Science Journal*. 9:154-169.

[20] Irizarry, J., Simonsen, K. L., & Abraham, D. M. (2005). Effect of safety and environmental variables on task durations in steel erection. *Journal of construction engineering and management*, *131*(12), 1310-1319.

[21] Isa R. B. Jimoh R. A, & Achuenu E. (2013). An Overview of the Contribution of Construction Sector to Sustainable Development in Nigeria. *Net Journal of Business Management*; 1, 1-6.

[22] Kadiri, Z. O., Nden, T., Avre, G. K. Oladapo, T.O. Edom, A., Samuel, P.O. & Ananso, G. N. (2014). Causes and effects of accidents on construction sites a case study of some selected construction firms in Abuja FCT Nigeria. *Journal of Mechanical and Civil Engineering*. 11 (5) 1 pp 66-72.

[23] Kissi, E. & Ansah, S. K. (2013). Professional Project Management Practices and Its Constraints in Developing African Countries: A Literature Review, *Covenant Journal of Research in the Built Environment (CJRBE)*, 1 (2), 28 – 40.

[24] Kolawole M. J. (2014). Assessment of Safety Measures on Building Sites (A Case Study of Minna, North Central Nigeria): *Greener Journal of Environmental Management and Public Safety*. 3. 001-008.

[25] Mat Zin, S. & Ismail, F. (2011). Employers' behavioural safety compliance factors towards occupational safety and health improvement in the construction industry. *ASEAN Conference on Environmental Behaviour Studies*.

[26] Muiruri, G. & Mulinge, C. (2014). Health and safety management on construction project sites in Kenya; A case study of construction projects in Nairobi County. *FIG Congress*.

[27] Mullen, J. (2004) Investigating factors that influence individual safety behaviour at work. *Journal of Safety Research.* 36; 275-285.

[28] National Board for Technical Education (NBTE) http://www.nbte.gov.ng/institutions.html cited 9th March 2017

[29] National Universities Commission (NUC) http://nuc.edu.ng/nigerian-univerisities/federal-univeristies/ cited 9th March 2017

[30] Neale, R. (2013). Ten factors to improve occupational safety and health in construction projects. *African Newsletter on Occupational Health and Safety*, 23, pp. 52–54.

[31] Nwachukwu, C. C. & Emoh, F. I. (2011). Building Construction Project Management Success as A Critical Issue in Real Estate Development and Investment, *American Journal of Social and Management Sciences*, 2 (1), 56 – 75.

[32] Odusami, K. T., Iyagba, R. R. O., & Omirin, M. M. (2003). The Relationship between Projects Leadership, Team Composition and Construction Project Performance in Nigeria, *International Journal of Project Management, 21 (7), 519-527.*

[33] Ogunde, A. O., Dafe, O. E., Akinola, G. A., Ogundipe, K. E., Oloke, O. C., Ademola, S. A., Akuete, E. & Olaniran, H. F. (2017). Factors Militating Against Prompt Delivery of Construction Projects in Lagos Megacity, Nigeria: Contractors' Perspective. *Mediterranean Journal of Social Sciences, 8*(3), pp233-242.

[34] Ogundipe, K. E. (2017). *Safety Practices and Workers Performance on Construction Sites in Lagos State, Nigeria.* Unpublished M.Sc. dissertation to Department of Building Technology, Covenant University Ota, Ogun State, Nigeria.

[35] Okeola, O.G. (2009) Occupational health and safety assessment in the construction industry. *1st Annual Civil Engineering Conference, Physical Planning Unit, University of Ilorin, Nigeria*.

[36] Okolie, K. C., & Okoye, P. U. (2012). Assessment of national culture dimensions and construction health and safety climate in Nigeria. *Science Journal of Environmental Engineering Research*. 12:1-6. doi: 10.7237/sjeer/167.

[37] Oostakhan, M., Mofidi, A. and Talab, A.D. (2012). Behavioural-based safety approach at a large construction site in Iran. *Iranian Rehabilitation Journal*, 10.

[38] Oseghale, B. O., Abiola-Falemu, J. O. & Oseghale, G. E. (2015). An Evaluation of Skilled labour shortage in selected construction firms in Edo state, Nigeria. *American Journal of Engineering Research (AJER)*, 4 (1), 156 – 167.

[39] Pisaniello, D. L., Stewart, S. K., Jahan, N., Pisaniello, S. L., Winefield, H., & Braunack-Mayer, A. (2013). The role of high schools in introductory occupational safety education–Teacher perspectives on effectiveness. *Safety science, 55,* 53-61.

[40] Rizwan U. Farooqui, Sarosh H. Lodi and Syed M. Ahmed (2011). "Desirable Attributes and Skills for Graduating Construction Management Students*". Proceedings of the Sixth International Conference on Construction in the 21st Century (CITC-VI) "Construction Challenges in the New Decade"*, Kuala Lumpur, Malaysia, pp. 1322-1333.

[41] Roelofs, C., Martinez, L. S., Brunette, M., & Azaroff, L. (2011). A Qualitative Investigation of Hispanic Construction Worker Perspectives on Factors Impacting Worksite Safety and Risk, *Journal of Environmental Health*, 10(84): 1-9. doi:10.1186/1476-069X-10-84.

[42] Samovar, L. A., Poster, R. E. and Jain, N. C. (1981). *Understanding Intercultural Communication*. Wadsworth. Belmont, C. A.

[43] Schunk, D. H., & Zimmerman, B. J. (Eds.). (2012). *Motivation and self-regulated learning: Theory, research, and applications*. New York: Routledge.

[44] Shamsuddin, K. A., Ani, M. N. C., Ismail, A. K., & Ibrahim, M. R. (2015) Investigation the Safety, Health and Environment (SHE) protection in construction area. *International Research Journal of Engineering and Technology*, *2*(6), 624-636.

[45] Sollis-Carcadio, R.G. & Franco-Poot, R.J. (2014) Construction workers' perception of safety practices. A case study in Mexico. *Journal of Building Construction and Planning Research*. 2, (1), 1-11.

[46] Stephens, J. C., Hernanadez, M. E., Roman, M., Graham, A. & Scholz, R. W. (2008). Higher Education as a change Agent for Sustainability in Different Cultures and Context. *International Journal of Sustainability in Higher Education.* 9(3), 3 pp. 17-338

[47] Tunji-Olayeni, P. F, Omuh, O. I., Amusan L. M., Afolabi, O. A., Ojelabi R. A. & Ogundipe, K. E. (2017). Attracting and Retaining Female Students in Construction Related Programs *Turkish online journal of educational technology.* Special issue for INTE 2017. Pp 425-430.

[48] Umeokafor, N., Isaac, D., Jones, K., & Umeadi, B. (2014). Enforcement of occupational safety and health regulations in Nigeria: An exploration. *European Scientific Journal*.

[49] Windapo A. (2013). Relationship Between degree of Risk, Cost and Level of Compliance to Occupational Health and Safety Regulations in Construction". *Australian Journal of Construction Economics & Building*. 13:67-82.

[50] K. Gunasekaran and Dr. S. Kamal, Identification of Occurrence of Work Related Health Issues Among the Construction Workers in the Construction Industry. International Journal of Advanced Research in Engineering and Technology, 8(6), 2017, pp 73 – 81.

[51] Dr. S. Poongavanam, R. Rajendra Prasad, Dr. R. Srinivasan and Dr. Rengamani, An Empirical Study on Civil Construction Workers Labour Welfare Facilities in Chennai. International Journal of Civil Engineering and Technology, 8(7), 2017, pp. 63–68.