

## Meta-analysis on Instructional Methods Employed and Challenges at Technical Colleges in Nigeria

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Gimba Dogara<sup>1,2,\*</sup>, Muhammad Sukri Saud<sup>1</sup>, Yusri Kamin<sup>1</sup>, Shirka Kassam Jwasshaka<sup>1,3</sup>

<sup>1</sup> Department of Technical and Engineering Education, Faculty of Education, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia

<sup>2</sup> Department of Technical Education, Kaduna State College of Education, Gidan waya, Kafanchan, Kaduna State, Nigeria

<sup>3</sup> Department of Technical Education, Plateau State Polytechnic, Barkin Ladi, Plateau State, Nigeria

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### ABSTRACT

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Technical Vocational Education and Training (TVET) in Nigeria is designed to produce competent craftsmen and technician for different sectors of the economy, therefore, they are expected to be enterprising and self-reliant. However, the development of skills for the training of such personnel have not been adequately successful as a result of numerous challenges. The aim of this review therefore, is to synthesize the available evidences in the literatures about instructional methods employed for the acquisition of skills and the challenges of effective instructional delivery at technical Colleges in Nigeria. The study adopted a systematic review approach to search for relevant literatures. TVET, instructional methods, challenges of instructional delivery, Technical Colleges were some of the key words used to select the relevant literatures from data web-based providers such as: Science Direct, Scopus, Google Scholar, Springer link and Wiley Online Library. The result of this study revealed that the appropriate instructional methods for the adequate acquisition of skills are rarely employed at the Technical Colleges. It was also revealed that there are numerous challenges militating against effective instructional delivery, ranging from inadequate infrastructural facilities, dearth of qualified technical teachers, inadequate instructional facilities/materials, poor funding, in appropriate instructional methods employed, and poor remuneration among others. It is therefore recommended that government should adequately fund Technical Colleges; avail opportunities for technical teachers to update their pedagogical skills through in-service training, conferences and workshops.

#### Keywords:

Instructional methods, skills, technical colleges

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## 1. Introduction

Technical Vocational Education and Training (TVET) could be termed as that aspect of education which provides the recipients with the basic knowledge and practical skills necessary to prepare them for entry into the world of work. TVET is a form of education that involved in addition to general education, the study of techniques and related sciences and the acquisition of practical skills,

\* Corresponding author.

E-mail address: [ggimbadogara@gmail.com](mailto:ggimbadogara@gmail.com) (Gimba Dogara)

attitudes, understanding and knowledge relating to occupations in the various sector of the economy and social life [1]. It is therefore conceived to be the type of education which provides relevant and functional education that lead to the acquisition of practical and applied creative skills. It avails the recipients the opportunity to be productive and resourceful in order to make progressive contributions to the socio- economic development of the society.

TVET is an effective human resource development initiative in almost all nations for economic and technological growth. The economic and technological development of any country is directly proportional to the quality of its available human resources, however, human resource productivity can only be enhanced through adequate skill acquisition [2]. Therefore, the education and training of students at TVET institutions of learning must be of high quality and competency based in order to meet the need of the industry and the society [3]. One of the most critical features of TVET is its designed orientation towards training for the world of work as the emphasis of the curriculum is on skill acquisition [4]. Francis [5] observed that the teaching of technical subjects (trades) involved exposing students to several opportunities in order to help them understand different concepts and principles; and also exposing them to the manipulation of physical materials in the form of practical work; this, he said, will enhance the critical thinking and problem solving skills of the students.

Okorie [6] defined skill as manual dexterity through repetitive performance of an operation. He further explained that skill is expertness, practiced ability, dexterity and tact. Okorie & Ezeji [7] remarked that possession of a skill is to demonstrate the habit of acting, thinking, or behaving in a specific activity which has become so natural to the individual through repetitive or practice such that it becomes automatic.

Practical skills could be technical skills or employability skills. Practical skills are skills acquired which are relating to what is real rather than relating to what is possible or imagined. Practical skill training is a unique aspect of the technical college programme that can be defined as an act of doing, making, manipulating, and practicing the theoretical experience gained through the use of knowledge, materials, tools and equipment [2]. Therefore, for skills to be adequately acquired, the learner must be exposed to the specific skills or relevant activities embodying the skill. This can only be adequately achieved through the application of appropriate instructional methods.

Instructional methods are the strategies used by teachers to create conducive learning environment by specifying the nature of activities to be carried out by the teacher and learners during the lesson for adequate acquisition of relevant skills. Sound instructional delivery will certainly enhance the acquisition of adequate and relevant skills by students at Technical Colleges in Nigeria; consequently, this will lead to the production of highly knowledgeable and employable graduates [8].

This study therefore, is a systematic review of journal articles to synthesize the available evidences in the literatures about instructional methods employed for the acquisition of skills. Besides, the study investigated the challenges of effective instructional delivery at technical Colleges in Nigeria. Hence, the study is aimed to answer the following research questions:

1. What are the instructional methods employed for the acquisition of practical skills among students at Technical Colleges in Nigeria?
2. What are the challenges of effective instructional delivery at Technical Colleges in Nigeria?

## **2. Methodology**

An online database of Educational Resources Information Centre (ERIC) was used to search for relevant published articles. Among the web-based service providers were Science Direct, Wiley Online Library, Springer Link and Google Scholar. Titles, abstracts, results, and conclusions were screened, and studies related to instructional methods, strategies and techniques employed for the

acquisition of practical skills at Technical colleges and those related to the challenges of effective instructional delivery at Technical Colleges were selected for the study. At the initial stage of the search, there was no limitation on searching relevant studies, it included all concept papers, research papers and conference papers, therefore, the search found a total of 146 articles with some relation to the topic in question. During the second stage, criteria such as: only articles that were published between 2012 and 2018; only studies that has to do with instructional methods, strategies, and techniques employed in TVET and the challenges of effective instructional delivery at Technical Colleges; and literature search conducted in ERIC database and Google Scholar; use of terms such as practical skills, Technical Colleges, instructional methods, challenges of effective instructional delivery. This therefore resulted to the reduction of the number of articles to about 16 which fulfilled the criteria. The papers were analyzed qualitatively and discussed according to the research questions as presented in Table 1 and 2.

### 3. Results

Table 1 summarizes the research study conducted on instructional methods employed for the acquisition of practical skills at Technical colleges in Nigeria. Based on the analysis, 'lecture method' was indicated by Yinusa et al. [10], Josephine *et al.*, [12], and Amaechi and Thomas [11] as an instructional method employed for the acquisition of practical skills at the Technical colleges. Similarly, Yinusa *et al.*, [10] and Odo *et al.*, [13] signified 'Assignment method' as an instructional methods that is employed for the acquisition of practical skills at Technical colleges in Nigeria.

**Table 1**

Analysis of the Instructional methods employed for the acquisition of practical skills among students at Technical Colleges

studies	<i>Project-based Learning</i>	<i>Lecture</i>	<i>Assignment</i>	<i>Demonstration</i>	<i>Field Trip</i>	<i>Discussion</i>	<i>Multi Media Instruction</i>
Elom [9]				✓		✓	✓
Yinusa <i>et al.</i> , [10]		✓	✓	✓			
Amaechi and Thomas [11]		✓		✓		✓	
Josephine <i>et al.</i> , [12]		✓		✓		✓	
Odo <i>et al.</i> , [13]	✓		✓	✓	✓		
Total	1	3	2	5	1	3	1

Demonstration method' was denoted by Elom [9], Yinusa *et al.*, [10], Amaechi and Thomas [11], Josephine *et al.*, [12] and Odo et al. [13] as an instructional method that is employed for the acquisition of practical skills at Technical Colleges. Demonstration simply means showing and

explaining how something works or how it is done or operated. Likewise ‘discussion method’ was verified by Elom [9], Amaechi and Thomas [11], and Josephine *et al.*, [12], as an instructional method that is employed for the acquisition of practical skills at Technical Colleges. Field trip was signified by Odo *et al.*, [13], as an instructional method that is employed for the acquisition of practical skills; in the same vein, multi-media instructional method was indicated by Elom [9] as an instructional method that is employed for the acquisition of practical skills at technical colleges.

**Table 2**  
Analysis of the Challenges of instructional delivery at Technical Colleges

studies	Infrastructural Facilities	Poor Funding	Dearth of Qualified Tech. Teachers	Poor teaching methods	Poor Admin/Supervisi	Poor Remuneration	Inadequate Instructional materials	Poor Staff Development	Poor ICT Compliance	Poor Assessment
Ayomike et al. [14]	✓	✓		✓						✓
Okwelle et al. [15]	✓		✓							
Agbonghallye and Iserameiya [16]	✓	✓	✓		✓	✓	✓			
Okoye and Arimonu [17]	✓	✓								
Ayomike [18]	✓	✓					✓			
Serumu [19]		✓	✓				✓			
Nnena [20]	✓	✓					✓	✓		
Kennedy et al. [21]	✓	✓	✓		✓				✓	
Ayodele [22]			✓				✓	✓		
Total	7	7	5	1	2	1	5	2	1	1

Analysis of the results presented in Table 2 indicated the various challenges of effective instructional delivery which militates against the adequate acquisition of practical skills by the students at Technical Colleges. Based on the meta-analysis, ‘infrastructural facilities’ was denoted by Ayomike [18], Okwelle *et al.*, [15], Agbonghallye and Iserameiya [16], Okoye and Arimonu [17], Ayomike [18], Nnena [20], and Kennedy *et al.*, [21] as a challenge of effective instructional delivery at Technical Colleges.

Based on the analysis in Table 2, Ayomike [18], Agbonghallye and Iserameiya [16], Okoye and Arimonu [17], Ayomike [18], Tihamiyu and Babalola [23], Nnena [20], and Kennedy *et al.*, [21] confirmed that ‘poor funding’ is one of the challenges of effective instructional delivery at Technical Colleges in Nigeria. On the other hand, ‘Dearth of qualified Technical teachers’ was indicated by Okwelle *et al.*, [15], Agbonghallye and Iserameiya [16], Tihamiyu and Babalola [23], Kennedy *et al.*, [21], and Ayodele [22] as a challenge of effective instructional delivery at Technical Colleges. In the same vein, Adedeji *et al.*, [24] signified, ‘Poor teaching methods employed’ as a challenge of effective instructional delivery at Technical Colleges.

'Poor administration/supervision' was indicated by Agbonghalle and Iserameiya [16], and Kennedy *et al.*, [21] as a challenge of effective instructional delivery at Technical Colleges. Based on the analysis in Table 2, Agbonghalle and Iserameiya [16], Ayomike [18], Tiamiyu and Babalola [23], Nnena [20], and Ayodele [22] signified that 'inadequate instructional facilities/materials' is one of the challenges of effective instructional delivery at Technical Colleges. Likewise, 'Poor remuneration' was denoted by Adedeji *et al.*, [24] as a challenge of effective instructional delivery at Technical Colleges. From the analysis in Table 2, Nnena [20], and Amaechi and Thomas [11] confirmed 'Poor staff development' as a challenge of effective instructional delivery at Technical Colleges. Similarly 'Poor ICT compliance' was confirmed by Amaechi, & Thomas [11] as a challenge of effective instructional delivery at Technical Colleges. 'Poor assessment' was indicated by Adedeji *et al.*, [24] as a challenge of effective instructional delivery at Technical Colleges.

The findings of this study are discussed according to the research questions:

1. *What are the instructional methods employed for the acquisition of practical skills among students at Technical Colleges in Nigeria?*

Table 1 highlighted three (3) articles which signified lecture method as an instructional method that is employed for the acquisition of practical skills at Technical Colleges. Lecture method, a traditional teacher centered method, though it provides a way to communicate a large amount of information to many learners, non-threatening to students; however, it involved very little or no students' participation; the teacher does most of the talking while students are merely required to listen; it is also characterized by assumption of unrealistic level of students' understanding and comprehension therefore it is not appropriate for problem solving and critical thinking skills development which are core characteristics of TVET personnel [25].

Also, Table 1 highlighted two (2) articles which signified Assignment method as an instructional method that is employed at Technical colleges for the acquisition of practical skills. The assignment method is found in the group of instructional methods under independent instructional strategy. It encourages students' independent search and enhances acquisition of academic independency skills. It is supervised by the teacher whether group or individual assignment.

In addition, Table 1 highlighted five (5) articles which confirmed Demonstration method as an instructional method that is employed for the acquisition of practical skills at Technical Colleges. Demonstration simply means visual way of presenting information in a group; it often supplements a written presentation or lecture. Demonstration method of teaching develops learners' interest and motivates them for active participation; however, it can only be used for a few skills, and moreover, only the attention of learners are invited toward the activity demonstrated. Uwoifo [26], lamented that demonstration method of teaching can become frustrated where teachers are not creative to produce handmade or improvise models for demonstration.

Lastly, Table 1 highlighted three (3) articles which indicated Discussion method as an instructional method that is employed for the acquisition of practical skills at Technical Colleges. Discussion method is a method which involves sharing of ideas, information, attitudes and experiences among a group of students and the teacher thereby helping students to develop new knowledge, new methods and cooperative attitudes; however, Yinusa *et al.*, [10] observed that, with discussion method, the various levels of students' capabilities are not considered, moreover, there is a high tendency of dominance by the intelligent ones hence, it is not appropriate for all the topics.

By this meta-analysis it is evident that the effective 21st century pedagogical approaches are rarely employed at the TVET institutions for the acquisition of adequate relevant skills by the

students. Employing the effective pedagogical approaches for instruction at the Technical Colleges would greatly enhance the acquisition of practical skills by the students.

## 2. What are the Challenges of Effective Instructional Delivery at Technical Colleges?

Table 2 highlighted seven (7) articles which signified 'infrastructural facilities' as a challenge of effective instructional delivery at Technical Colleges. Infrastructural facilities at the TVET institutions include classrooms, tools and equipment, libraries, laboratories, workshops and furniture among others. In line with this, Ajibola [27], in his study, traced the technological backwardness in the country to lack of infrastructural facilities and equipment. In the same vein, data presented in Table 2 highlighted seven (7) articles which verified 'poor funding' as a challenge of effective instructional delivery at Technical Colleges. Educational funding is an inevitable task if the objectives of any educational programme are to be achieved. Therefore, Okwelle *et al.*, [15] lamented that inadequate funding of vocational institutions has caused the production of half-baked graduates because there is no fund to build and maintain workshops, laboratories and to purchase modern equipment among others.

Besides Table 2 highlighted five (5) articles which indicated 'dearth of qualified technical teachers' as a challenge of effective instructional delivery at Technical Colleges. Teachers are the principal implementers of any educational curriculum. Elom [9] opined that the teacher among other things must be abreast with the fundamental principles of teaching to enable him or her be efficient and productive in the discharge of his or her duties. The data in Table 2 highlighted one (1) article which signified 'poor teaching methods employed' as a challenge of effective instructional delivery at Technical Colleges. Teaching is an attempt to bring about desirable changes in learners for a better living. Akuezilo [28] posited that the basic science and technology curriculum including vocational education is very practical in nature and should be taught through methods that make best use of the active participation of the learners in the teaching learning process. The findings of this study as shown in Table 2, highlighted two (2) articles which indicated 'poor administration/supervision as a challenge of effective instructional delivery at Technical Colleges. Tihamiyu & Babalola [23] contended that the inability of College management to control the population of students usually lead to over population in the classes which invariably affect the effectiveness of instructional delivery. They further maintained that the inability of management to effect discipline on the erring students or staff due to ethnicity and cronyism adversely affects the effectiveness of instructional delivery.

Likewise, Table 2 highlighted five (5) articles which denoted instructional facilities/materials as a challenge of effective instructional delivery at Technical Colleges. Nevertheless, the attainment of ultimate skills calls for effective teaching methods and the use of better and standard instructional materials so as to produce the needed graduates with quality and enterprising skills.

The roadmap in Figure 1 is an essential guide for the acquisition of practical skills by students at Technical colleges. The roadmap was developed from the findings of the study. There are a variety of instructional methods, and it is only through the appropriate (effective) delivery of such instructional methods that students can adequately acquire the required skills embedded in the curriculum; in a situation where teachers fail through inadequate application of appropriate teaching methods, a good curriculum plan could turn to be useless [29]. Akuezilo [28] posited that the basic science and technology curriculum including vocational education is very practical in nature and should be taught through methods that make best use of the active participation of learners in the teaching learning process; such effective methods are usually characterized by collaboration, open mindedness, team work, self-expression and self-experience for effective acquisition of relevant skills [28].

Moreover, effective instructional delivery begets adequate acquisition of practical skills, however, for instructional delivery to be effective, a number of instructional challenges must be tackled. Such challenges include: inadequate infrastructural facilities, dearth of qualified technical teachers, inadequate instructional facilities/materials, poor funding, and inappropriate teaching methods employed by teachers among others.

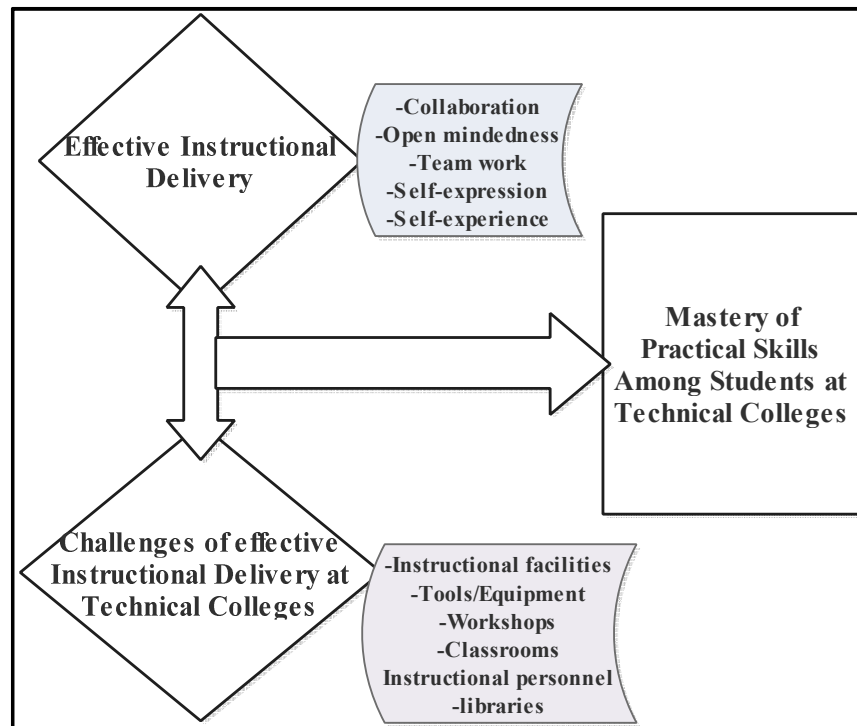


Fig. 1. Roadmap for effective acquisition of practical skills in TVET

#### 4. Conclusion and Recommendation

The study ex-rayed into the instructional methods employed and the challenges of at Technical Colleges in Nigeria. It adopted a systematic review of related published journal articles searched from different data-base providers. Based on the result, modern pedagogical approaches are rarely employed by teachers at Technical Colleges, perhaps, it could be as a result of the numerous challenges bedeviling the programme. The reviewers therefore recommended that government should provide the enabling environment for the appropriate implementation of the modern pedagogical approaches for adequate acquisition of practical skills at Technical Colleges.

We are living in an era of knowledge-based economy with changes in industrial organizations and society, change of social values, the emergence of multi-strategy learning approaches, and shift in instructional methods, social growth and values where students can no longer only depend on what they are taught in schools [30]. Therefore, appropriate strategies and methods of instruction should be adopted in order to ensure adequate skills acquisition through teaching leaning process so as to overcome the challenges of the 21<sup>st</sup> century through adequate acquisition of the required skills.

#### References

- [1] Federal Republic of Nigeria. National Policy on Education. Abuja: NERDC Press, 2013.

- [2] Bakare, J., Ogbuanya, T. C., Akintola, A. A. Assessment of practical skill training of technical college students in electrical and electronics trades in Osun State, Nigeria, *International Journal of Applied Engineering Research* 12, no. 18 (2017): 7501-7515.
- [3] Emesini, Nnenna Oriema. "Empowering of students in Technical Colleges in Nigeria with trade skills for self-reliance to enhance sustainable development." *British Journal of Education* 4, no. 9 (2016): 46-54.
- [4] Idris, Ali, and Muhammad Rashid Rajuddin. "The influence of teaching approaches among technical and vocational education teachers towards acquisition of technical skills in Kano State-Nigeria." *Journal of Education and Practice* 3, no. 16 (2012): 160-165.
- [5] Donkor, Francis. "The comparative instructional effectiveness of print-based and video-based instructional materials for teaching practical skills at a distance." *The International Review of Research in Open and Distributed Learning* 11, no. 1 (2010): 96-116.
- [6] Okorie, J. U. *Developing Nigeria workforce*. Macnky Environs Publishers (LRN), 2001.
- [7] Okorie, J. U., & Ezeji, S. C. A. O. *Elements of guidance in vocational and career education*. Onisha: Summer Educational Publishers, 1998.
- [8] Othman, Norasmah, Harinder Kaur T. Singh, M. Izham M. Hamzah, Jamalul Lail Abdul Wahab, and Rahmah Ismail. "Globalization of higher education institutions in Malaysia: A pilot study." In *2011 International Conference on Social Science and Humanity IEPDR*, vol. 5, pp. V2-376. 2011.
- [9] Elom, Elisha N. "Effective Teaching and Learning in Technical Colleges: Challenges of Technical Drawing." *JOURNAL OF EDUCATIONAL POLICY AND ENTREPRENEURIAL RESEARCH* 1, no. 1 (2014): 76-86.
- [10] Faremi, Yinusa Akintoye. "Assessment of Teaching Strategies Adopted for Effective Implementation of Science Subjects and Trade Modules Curriculum in Nigerian Technical Colleges." *Journal of Educational and Social Research* 4, no. 6 (2014): 391.
- [11] AMAECHI, ENGR, O. JOSEPH, and C. GODSTIME THOMAS. "STRATEGIES OF EFFECTIVE TEACHING AND LEARNING PRACTICAL SKILLS IN TECHNICAL AND VOCATIONAL TRAINING PROGRAMMES IN NIGERIA."
- [12] Anindo, I., M. Mugambi, and D. Matula. "Training Equipment and Acquisition of Employable Skills by Trainees in Public Technical and Vocational Education and Training Institutions in Nairobi County, Kenya." *Training* 3, no. 4 (2016): 103-110.
- [13] Odo, M. I., S. O. Adenle, and R. O. Okwori. "ENHANCING MASTERY OF PRACTICAL SKILLS IN STUDENTS OF VOCATIONAL AND TECHNICAL EDUCATION THROUGH ACTIVITY BASED." *Journal of Technical Education and Training* 4, no. 2 (2012).
- [14] Ayonmike, Chinyere S. Okwelle, P. Chijioke, and Benjamin C. Okeke. "Competency based education and training in technical vocational education: Implication for sustainable national security and development." *Journal of Educational Policy and Entrepreneurial Research* 1, no. 2 (2014): 290-300.
- [15] Okwelle, P. Chijioke, M. Tambari Deebom, Port Harcourt, and P. C. Okwelle. "Technical vocational education and training as a tool for sustainable empowerment of youths in Niger Delta, Nigeria." *International Journal of Innovative Social & Science Education Research* 5, no. 1 (2017): 29-38.
- [16] Agbonghale, G., & Iserameiya, F. E. Factors militating against the teaching and learning of technical drawing in technical education in public universities. *International Journal of New Technology and Research (IJNTR)* 4, no. 2 (2018): 67-72.
- [17] Okoye and Arimonu. Technical and vocational education in Nigeria: challenges and the way forward. *Journal of Education and Practice* 7, no. 3 (2016): 113-118.
- [18] Ayonmike, C. S. "Challenges in Implementing the TVET Curriculum in Technical Colleges in Southern Nigeria." *Makerere Journal of Higher Education* 6, no. 1 (2014): 87-97.
- [19] Seremu, I. Challenges of implementing technical vocational education and training curriculum in Nigerian universities. *Global Advance Research Journal of Educational Research and Reviews (GARJERR)* 3, no.5 (2014): 98-101.
- [20] Emesini, Nnenna Oriema. "Empowering of students in Technical Colleges in Nigeria with trade skills for self-reliance to enhance sustainable development." *British Journal of Education* 4, no. 9 (2016): 46-54.
- [21] Kennedy, George W., Udemé S. Udoetuk, and Stella Iniobong Ufot. "Challenges of Technical Vocational Teacher Education and Teaching in Nigeria: The Need for Intervention." *International Journal of Education and Evaluation* 3, no. 7 (2017).
- [22] Asebiomo, Ayodele M. "Moving With Global Trends in Curriculum Innovation: Mitigating the Challenges of Curriculum Implementation for Effective Teaching and Learning in Nigeria."
- [23] Tiamiyu, R & Babalola, Y.A. Vocational education and security challenges in Nigeria: the way forward. *Developing Country Studies* 3, no. 5 (2013): 97-100.



- [24] Afolabi, Adedeji Olushola, Rapheal A. Ojelabi, Opeyemi Oyeyipo, P. F. Tunji-Olayeni, and L. M. Amusan. "Integrating Construction Craft Skill Acquisition in the Built Environment Curriculum Using a Competence Based Education Approach." *Research Journal of Applied Sciences* 12, no. 3-4 (2017): 295-303.
- [25] Kennedy, Odu Oji. "Reappraising the work skill requirements for building technology education in senior secondary school for optimum performance in Nigeria." In *1st International Technology, Education and Environment Conference*. 2011.
- [26] Uwaifo, V. O. "Technical Education and its Challenges in Nigeria in the 21st Century." *International NGO Journal* 5, no. 2 (2010): 040-044.
- [27] Ajibola, M. A. "Innovations and curriculum development for basic education in Nigeria: Policy priorities and challenges of practice and implementation." *Research Journal of international studies* 8, no. 54 (2008): 51-58.
- [28] Akuezulo, E. D. The new 9-year basic technology curriculum and challenges of its implementation. *Journal of Curriculum and Instruction* 6, no. 2 (2017): 1-6.
- [29] Dorgu, Theresa Ebiere. "Different Teaching Methods: A Panacea for Effective Curriculum Implementation in the Classroom." *International Journal of Secondary Education. Special Issue: Teaching Methods and Learning Styles in Education* 3, no. 6-1 (2015): 77-87.
- [30] Rau, Dar-Chin, Shao-Tsu Chu, Yi-Ping Lin, and Ming-Hua Chang. "Development and Teaching Approaches of Technical and Vocational Education Curricula." In *9th International Conference of Engineering Education*. 2006.