Journal of Educational Policy and Entrepreneurial Research (JEPER) www.iiste.org
Vol.1, N0.1, September 2014. Pp. 76-86

Effective Teaching and Learning in Technical Colleges: Challenges of Technical Drawing.

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Abstract

This study was conducted to identify the effective teaching and learning in technical colleges: challenges of technical drawing. The study adopted descriptive survey research design guided by four research questions which were formulated to guide the study. Questionnaire was used for data collection and the instrument was validated by experts in the field of technical drawing to ensure it was in line with the purpose of the study. Random sampling technique was used to select the population size. Also eighty five (85) questionnaire instruments were administered to the respondents who formed the population of the study through the help of the research assistants. The questionnaires were filled and returned them to the researcher and data collected was presented in percentage tables. The study revealed among others that most technical teachers use traditional methods during teaching and learning of technical drawing instead of practical, which enhances the students' performance. Also, the provision of adequate standard drawing tables, set-square, t-square, good learning environment etc. makes students learn technical drawing better and easier. Study also revealed among others that the students' interests are positive and usually very high when drawing materials and equipment are available and adequate. Based on the findings of the study, recommendations were made.

Keywords: Effective Teaching, Teaching and Learning, Technical Drawing, Technical Colleges

Introduction

Education, particularly science and technology education is the factory for the production of the needed technologists, technicians and craftsmen as well as skilled artisans who are required to turn the nation's economy positively. It'll also usher in the desired technological advancement, which is very much required for elevation of Nigeria from a consumer nation to a producer nation, and from a developing nation to a developed nation (Avan, 2007). Acquisition of appropriate scientific and technological skills is necessary to cope with the challenges presented by the evolving needs of effective teaching of technical drawing in Nigerian Technical Colleges. Education and training system that responds adequately to these demands will therefore contribute to the hard works to overcome the growing unemployment and marginalization of majority of the populace. By providing access to appropriate teaching experience designed to broaden skills and knowledge can increase productivity and significantly improve the fortunes of the unemployed, thereby reducing poverty and unemployment among Nigerian youths.

Within the context of technical education, technical drawing has been identified as a very important science subject and its importance in scientific and technological development of any nation has been widely reported (Ara-tirmatar, 2003). Moreover**,** it was as a result of the recognition given to technical drawing in the development of an individual and the nation that it was made a core-subject among the natural sciences and other science related courses in Nigerian educational system. It has been a pre-requisite subject for offering most science oriented courses in the Tertiary Institution and this calls for the

needs in teaching technical drawing effectively in our Technical Colleges. All education institutions emphasize that teaching is important and it gives high priority to developing effective teaching and solving teaching challenges. Effective teaching may include high level of creativity in analyzing, synthesizing and presenting knowledge in new and effective ways. It should instill in the students the ability to be analytical, intellectually curious, culturally aware, employable, and capable of leadership (Okolie, 2014).

Teaching is an art and the equality of teaching depends on the love, dedication and devotion of the teacher towards the subject of the knowledge. The quality of any teaching program cannot rise above the quality of teachers, teaching is a highly individualized activity, and the student-teacher interaction is an intense human relationship that encompasses a broad range of personalities and behaviors (Okolie, 2014). There is no best or most effective teaching style, which will work well for all teachers. Many new teachers attempt to initiate the style of a favorite teacher from the past, but the most successful style is those that develop as naturally as possible from a teacher's own personal characteristics. The most effective teaching style for a teacher will be one that reflects a combination of sound teaching techniques, knowledge of the subject, enthusiasm for teaching and sensitivity to another's personal characteristics. Whatever style a teacher adopts, he/she can generally perform in a more relaxed manner if he/she simply maximizes his/her own best personality traits. In general, if a teacher comes across his/her students as a caring person, their appreciation for the teacher's personal sincerity will enhance their impression about the teacher.

The field of technical drawing encompasses work done by architects, engineers, interior designers and electricians, technical drafters require knowledge of field-specific notation and geometry, as well as program like AUTOCAD. Unlike painting or creative arts, technical drawing can be done at almost any age. In line with Okorie (2001), drawing is particularly a universal graphic language of lines used in the scientific world to cover mind concepts and ideas which are not limited to any particular national language which all and sundry can speak without correction. Okorie (2001) asserted that technical drawing is essentially the universal language which technicians, engineers, craftsmen and industrialist communicate with. He further stated that technical drawing can be understand correctly by technicians, engineers, designers, craftsmen, manufacturers and those who have instructed in making and reading it. Okoro, (1993) stated that usability of technical drawing transcends cultures and languages and for any country to progress technologically, it is essential that a country develops the training of the citizens in the language of the technology which is technical drawing.

According to Ekwu, (2003), technical drawing is the most popular technical subjects in any technical college**.** It is the prime mover of all other technical related subjects appropriately; it also forms a picture of concept of what should be drawn before actually drawing it. He further stated that greater form is done where the teacher find it difficult to help students create the image of the picture required. Okoye (1991) stated that these difficulties are of a mechanic tradition; He stated that Nigeria is just starting to experience the technology age, with the result that most of the young people, unlike youths elsewhere have had no acquaintance with machines, mechanical knowledge attitude habits and thinking that are normal part of growing up in a technology culture; it has become obvious that there is definitely something lacking our quest for technology. Collins (2000) stated that the needed background, which should be a building block for the study of engineering and technology, which is technical drawing is missing. Collins also noted that this forms basis for the technological culture that most researchers do refer to. Technical drawing requires a high level of imagination and vision. The students are required to acquire or posses the creative skills to enable them perform well in technical drawing. To this effect, it becomes necessary to find ways of improving the present state of affairs so as to improve the teaching of technical drawing in technical colleges.

Statement of the Research Problem

In spite of the efforts of the Nigerian Government to improve Technical Education Program,, majority of students in the technical colleges still perform low in technical drawing classes and examinations. Engineering and technology cannot have base in Nigeria without technical drawing and if students continue to perform poorly in the subject, our engineering and technology base will probably be unable to attain the lead found in other nations of the world. It is necessary to identify those challenges to effective teaching and learning of technical drawing in Nigerian Technical Colleges and possibly recommend solutions based on the findings of the study.

Purpose of the Study

The general purpose of this study was to identify the challenges to effective teaching and learning of technical drawing**.** Specifically, the study tends:

1. To determine the methods normally adopted in teaching technical drawing.
2. To determine the availability and adequacy of instructional facilities for teaching of technical drawing.
3. To determine how positive the interest of students in learning technical drawing.
4. To determine the suitability of instructional facilities for teaching of technical drawing.

Research Questions

The following research questions were formulated to guide the study:

1. What are methods normally adopted in teaching and learning of technical drawing?
2. How available and adequate are instructional facilities for the teaching of technical drawing?
3. How positive are the interests of students in learning technical drawing?
4. What are the suitable instructional facilities for teaching technical drawing?

Research Methodology

The study adopted survey design, because it would elicit the opinion of the respondents on the effective teaching and learning challenges of technical drawing in Nigerian Technical Colleges. Survey research is the research design that employs the study of large and small population of the research to discover the incidence, distribution and interactions of sociological variables Uzoagulu, (1998). The study was conducted in four Technical Colleges in Enugu and Ebonyi States and the population of the study comprised of Senior Students, Principals and Technical Drawing Teachers in the selected Technical Colleges. Instrument used for data collection was structured questionnaire. The instrument was validated by experts in the field of technical drawing to ensure it was in line with the purpose of the study and eighty five (85) questionnaire instruments were administered to respondents through the help of the research assistants and all were returned to the researcher. Data collected was presented in percentage tables. Random technique was used and the sample comprised senior students and teachers from each of the technical colleges selected for this study. Therefore, a total of 85 people were randomly interviewed as resource persons and at the same time given questionnaires to answer for the study. All of them were used due to the small nature of the study population.

Research Question1: What are methods normally adopted in teaching and learning of technical drawing?

Table 1

Percentage responses on the methods normally adopted in teaching and learning of Technical Drawing in Technical Colleges in Nigeria.

Item	N	Agree	%	Disagree	%
Most technical teachers use traditional methods of teaching during teaching and learning of technical drawing	85	62	72.94	23	19.55
Discussion and lecture methods of teaching are often adopted by most technical teachers during technical drawing lesson	85	71	83.00	14	16.00
Students are sometimes given take home assignments in technical drawing	85	59	69.41	26	30.59
Several objects are used by the technical teacher for illustration while teaching technical drawing	85	51	60.00	34	40.00

From the presentation on table 1 it shows that all the items agreed with the methods that are normally adopted in teaching and learning of technical drawing in the technical colleges. From the table, the respondents agreed that most technical teachers use traditional methods of teaching during teaching and learning of technical drawing. The traditional teaching method according to Akpan (2001) adopts wall maps, blackboard and chalk; the teacher expresses meaning of drawings to the students by model demonstration, drawing in the backboard, and wall map demonstration. With the development of society and progress of technique, the epidiascope and projector were introduced to the teaching process of engineering and technical drawing. The teacher can conveniently change the pictures by slide firms instead of wall maps. The study identified that several objects are used by the technical teacher for illustration while teaching technical drawing; subsequently, the videocassette was introduced into teaching, teacher can play the prepared videocassette in class, it makes the lesson become more attractive and the content become more enriched (Akpan, 2001).

The study also proved that discussion and lecture methods of teaching are often adopted by most technical teachers during technical drawing lesson. This is in line with Wanai (2002) that many technical colleges adopt different methods of teaching technical drawing, whichever method used; the most important methods of technical drawing must relate drawing practice at all levels. Amankwa, (2000) noted that poor methods of teaching technical drawing lead to poor performance of students during drawing practice. Although the study proved that students are sometimes given take home assignments in technical drawing; this will enhance their performances as well.

There are usually effective methods that could be adopted for teaching of technical drawing depending on the school system, but the introduction of technical drawing in any technical college should be specially designed to meet the needs of students studying for a particular level (Awomolo, 2001). Wanai, (2002) stated that students should be introduced to technical drawing at the beginning of their first year in the school. This is to enable them familiarize with the basic fundamentals in technical drawing and to allow the spread of the syllabus over a long period in school. Wanai (1998) stated that the first method normally used for teaching technical drawing in technical colleges is discussion method to improve the ability of

students to develop the sense for shapes, dimensional proportions and special perception such that they'll have the opportunity to draw in the early stage of their education.

Collins (2000) state that for most technical colleges, teachers adopt firstly the method of good teaching and neat line work and constant practice aimed at producing plain, clear figures which will result in the attainment of a good standard. In line with this, Anderson (2001) noted that in the early stages, it is an advantage to use pencil to write letters lightly with the aid of a ruler and the line by hand. He further stated that pencil work in line with compass work should be properly introduced to students during their early stages. Gamson (2001) stated that the appropriate method that would be used during pencil lettering should be to produce free hand drawings between a pair of faint guide line. Other methods include: all the drawing and construction must be done in pencil, the teacher should follow the order in which the content programme is written, and some notions should be taught before so that the knowledge acquired may be used when teaching other notions. Geometrical elements in space and projections should be taught before teaching senior scientific drawing. The learner should have all needed scientific drawing instruments for geometrical constructions and drawings like rubber etc. The teacher should select simple construction exercises, which must be done in class and then select complicated exercises to be done at home and the teacher should mark this work.

Research Question 2: How available and adequate are instructional facilities for the teaching of technical drawing?

Table 2

Percentage responses on the availability of adequate instructional facilities for the teaching of technical drawing

Item	**N**	**Agree**	**%**	**Disagree**	**%**
Adequate drawing materials such as boards, studio, books are provided for technical drawing teaching and learning.	85	10	11.76	75	88.24
Sometimes students do pair with other students on a drawing table during technical drawing lessons	85	68	80.00	17	20.00
Technical drawing teachers sometimes borrow drawing materials from road-sides draftsmen during technical drawing classes	85	63	74.11	22	25.88
Other instructional materials such as computer aided designs software, cassette, video tapes of drawings and internet facilities for students' researchers are not adequately available.	85	71	83.53	14	16.47

Table 2 presented the results of the second research questions. From the findings, the respondents disagreed with availability of adequate drawing materials such as boards, studio, and books for technical drawing teaching and learning. This shows that there are no adequate technical drawing facilities in most technical colleges in Nigeria. This is in line with the finding of This is in line with findings of Inyiagu (2005) that inadequacy in teaching facilities have contributed to the diminution of the quality of technical education graduates in Nigeria. The available facilities are inadequate quantitatively and qualitatively and besides most of them are obsolete (Daramola, 2005).

Adebayo (2005) posited that no matter how vibrant and well-meaning the programme of technical colleges could be, success and achievement of its goals largely depend on efficient management process. Odu (2006) asserts that the effect of limited materials, laboratories, studio activities can cause low productivity and make teaching (training) become ineffective and inefficient in their teaching or training roles. The difficulty in the procurement of facilities does not give room for the practical acquisition of skills by learners. Similarly, the reason why the facilities are not there is partly due to high cost of vocational and technical education and also high inflation rate in Nigeria (Imarhiagbe 1992). The impact of inadequate technical drawing facilities and equipment is that training of the students becomes impeded and they end up not acquiring skills to go into the labour market.

Result of the study also proved that sometimes students do pair with other students on a drawing table during technical drawing lessons and technical drawing teachers sometimes borrow drawing materials from road-sides draftsmen during technical drawing classes. In line with findings of Okolie (2014) that some of the technical education schools and departments do go to the industries to hire the practical equipment during departmental accreditation, which usually come up in a short interval just to pass the accreditation, after which the equipment and other materials are sent back to the industries where they hired them. According to Abdullahi (2005), the most disturbing phenomenon is that teachers in these Technical Education Institutions sometimes borrow workshop tools, machines and materials from works department of their institutions and from the town to teach students. One may wonder why it is difficult for some school managements and Governments to purchase relevant drawing equipment for students' technical drawing and with these situations at hand, one also wonder how Nigerian governments intend to fight poverty, reduce youth unemployment and create more jobs when the students lacks facilities they need to do well in the fields of technology and engineering.

The study found out that many technical colleges lack some instructional materials such as computer aided designs softwares, cassette, video tapes of drawings and internet facilities for students' researchers. According to Okolie, (2014) it's surprising to see that some schools and other higher institutions in Nigeria do not have latest computers and internet facilities for their technical education students; how then do they want to empower and equip them to become productive citizens, capable of contributing to economic growth and development. Adebayo, (2005) stated that poor practical works by the students due to lack of modern equipment and professionally trained teachers who operates the equipment will only leave the students in a state of confusion whenever they find themselves in their fields of work.

Research Question 3: How positive are the interests of students in learning technical drawing?
Table 3

Percentage responses on the interests of the students in learning technical drawing

Item	**N**	**Agree**	**%**	**Disagree**	**%**
The students' interests are positive and usually very high when drawing materials and equipment are available and adequate	85	66	77.65	19	22.35
Peer groups and parents perceptions about technical drawing also affect the students' interests; most of them want their children to study easy subject to enable then pass their school examinations.	85	60	70.59	25	29.41
Technical drawing teachers should cultivate the habit of improvising the non available					

materials and equipment to raise the students; interests in learning technical drawing	85	67	78.82	18	21.18
Students' interests in learning technical drawing are positive when parents provide them with the technical drawing tools and materials to practice at home.	85	57	67.06	28	32.94
Giving technical drawing assignments to enable them practice at home with their own drawing materials enhances students' interests in technical drawing.	85	74	87.06	11	12.94

Table 3 reveals the response of the population of the study as all the respondents also agreed with the whole items. The results revealed that the students' interests are positive and usually very high when drawing materials and equipment are available and adequate. This is in line with the findings of Thomas, (1998) that technical drawing students become more interested to learn drawing when they have materials and equipment that'll enable them to understand the methods used in constructing or drawing an object. He equally stated that the knowledge a student have in a particular topic can equally assist him to understand next topics. The result also showed that peer groups and parents' perceptions about technical drawing also affect the students' interests; most of them want their children to study easy subject to enable then pass their school examinations. This is in line with the findings of Okolie (2010) that most parents' perceptions about technical education programme need to change positively; many of people think technical education programmes are so difficult, for this; they advice their children to choose other theoretical based fields of study for easy graduation. This type of ideas kills the interest of the student who is science and technology inclined.

Students' interests in learning technical drawing are positive when parents provide them with the technical drawing tools and materials to practice at home and giving technical drawing assignments to enable them practice at home with their own drawing materials enhances students' interests in technical drawing. Also, technical drawing teachers should cultivate the habit of improvising the non available materials and equipment to raise the students; interests in learning technical drawing. This is in line with Collins (2000) the ability of the student to carry out assignments correctly and submit as and when due enables the students possess desirable interest in teaching and learning technical drawing. According to Wanai, (2002), when students are asked questions during technical drawing lessons. Especially questions that relates to content of the topic, they become more effective in learning technical drawing. In view of this, Anderson (2001) stated that for effective teaching of technical drawing, teachers should be more competent because, students answering questions show that the teacher has done well in transferring the required knowledge to the students, thereby the students are encouraged to have more interest in learning technical drawing. Okoye, (1991) stated that effectiveness of students in learning technical drawing is determined when students are able to teach other students that do not understand what the teacher has implemented in the course of teaching.

Research Question 4: What are the suitable instructional facilities for teaching technical drawing?

Table 4

Percentage response on the suitable instructional facilities for effective teaching of technical drawing

Item	N	Agree	%	Disagree	%
The use of standard drawing table makes students learn technical drawing better and easier	85	60	70.00	25	29.41
Standard drawing set-square, T-square, French curves etc. makes students learn technical drawing easier and faster	85	64	75.29	21	24.70
Standard drawing studios is a must for effective teaching of technical drawing in technical colleges	85	72	84.70	13	15.29
White-bulb fluorescents lights, fans and air condition are needed in the drawing studio for the student's comforts	85	65	76.47	20	23.53

Table 3 reveals the response of the population of the study as all the respondents also agreed with the whole items. The results revealed that the use of standard drawing table makes students learn technical drawing better and easier. It has been observed that human beings learn better when they hear, see, and touch. So the need arises to help the learner; the school managements together with the government can make available adequate technical drawing learning materials to aid students learn. Olaitan and Ali (1997) stated that learning materials are sources of from which learners may turn and secure helpful information for the attainment of instructional objectives. They are materials designed to help the process of learning.

(Onyejemezi (1981) expressed views on curriculum materials and approach to his job. She further stated that the learning materials help the teacher to convey the intended message effectively and meaningfully to the learners so that the learners receive, retain and apply the experience gained to reach overall educational goals. Onoh (2005) noted that learning material is any device with instructional content or function that can be used for teaching and learning process. Such materials may include magazine, charts, pictures etc. learning materials are often referred to as instructional (learning) aids or device. The materials are called so because they are used to supplement and complement the teacher's work.

Study also revealed that standard drawing set-square, T-square, French curves etc. makes students learn technical drawing easier and faster and that standard drawing studios are must for effective teaching of technical drawing in technical colleges. The respondents also agreed that white-bulb fluorescents lights, fans and air condition are needed in the drawing studio for the student's comforts. In line with Graig (1990), Shiunda and Omulando (1992) posited that a new programme requires relevant and adequate physical facilities like classrooms, textbooks, desks, drawing tables and materials, which must be prepared and purchased to ensure success of the programme. He observed that effective organization, maintenance and storage of resources is crucial to the smooth running of any classroom; resources have to be easily accessible. Without resource materials and facilities, the teacher may not be able to set the objectives that he would like his pupils to attain. It would mean that the pupils cannot be taught using the most suitable methods. But in case of lack of resources and facilities, the teacher should be innovative enough to improvise and provide alternative using local materials.

Discussion of major finding

The data collected on the methods normally adopted in teaching and learning technical drawing in technical colleges as presented in Table 1 shows that demonstration, discussion, project and observation methods are normally adopted in teaching and learning technical drawing in most Nigerian technical colleges. This agrees with Okoro (1993) that the teaching method for any vocational subject include; demonstration, project, discussion and observation methods. On the availability and adequacy of

instructional facilities for teaching of technical drawing, as presented in Table 2 include; adequate drawing boards, drawing sets, available instructional materials etc exposes students to the actual practice; they also maximize learning between teachers and students. This agrees with Awomolo (2001) that the ability of the school to provide the equipment which students might require for learning technical drawing should be made to arouse interest in learning. The study identified various factors that determine interest of students in learning technical drawing. They identified lack of provision of necessary drawing instruments e.g. drawing board, t-square, set-square etc. carrying out assignment effectively; asking questions during technical drawing lessons, cooperating with other students to gain from each other's effort, and enable a group member team between other students to maximize learning of technical drawing. This is in agreement with Amina, (2001) that students show their level of interest in learning technical drawing when they carry out assignment diligently in the course of studying. Amina, (2001) stated that the suitability of instructional facilities for teacher can seem to be the qualification, teaching methods, command and mastery of the subject matter.

Conclusion

This study examined effective teaching and learning challenges of technical drawing in Nigerian technical colleges. May challenges as well as solutions were revealed and discussed. An effective school facility is responsible to the changing programs of educational delivery and at a minimum should provide a physical environment that is comfortable, safe, secure, accessible, well illuminated, well ventilated and aesthetically pleasing. The facility also includes furnishings, materials and supplies, equipment and information technology as well as various aspects of the building grounds, namely, athletic fields, playgrounds, areas for outdoor learning etc. there is also needs for technical colleges to reach agreement with architectural, building and mechanical engineering industries to enhance teaching and learning of technical drawing in Nigeria. With strong partnership with the industries, students' interests in technical drawing will increase.

This study shall be of high benefit to students because they will benefit from the results of the study such that they will identify the effectiveness in teaching and learning technical drawing. Also, students will be able to derive joy and interests becoming designers, have less fear of technical drawing and as well do well in the exams. Teachers will also benefit from the study; they will be able to use findings of the study to evaluate the students, monitor and improve their competence in teaching technical drawing. The findings will also help to adopt the appropriate method of teaching technical drawing, especially the school and industries at large. It will also benefit the construction companies, industries and the general public because the information gotten from the work will be documented for them to use and possibly boost the company for better construction.

Recommendations

Based on the findings of the study, the following recommendations were made;

1. Technical drawing should be introduced to students in their first year in the technical college, so as to familiarize them with the fundamental principles of the subject.
2. There should be an effective method of teaching that technical drawing teachers must adopt to effectively impart the knowledge and skills to their students.
3. Technical drawing should be made compulsory in all secondary schools in Nigeria. It should be accorded the same status as Mathematics and English, or other Science subjects like Biology, Physics and Chemistry.
4. Modern technical drawing instructional materials should be available during technical drawing instruction as they stimulate learning and arouse students' interest in continued learning.

References

Abdullahi, S. M. (2005). The Roll of Effective Management of Technical Colleges Workshops for Sustainable Youth Empowerment in Nigeria. *Paper Presented* at Nigerian Association of Teachers of Technology.18th Annual Conference. Rivers. August 20th.

Adebayo, S. A. (2005). Technology Education as a Vehicle for Nigeria Industrial Transformation and Youth Development. Nigerian Association of Teachers of Technology.18th Annual Conference. Rivers. August 20th.

Akpan, S. (2001). Research on the feature of Engineering Graphic Education and the Application of CAL, Enugu. Higher Education research. (2), 55-58

Akpotu, N., and Okonta, E. (2010). Utilization of Multimedia Aided instruction. Enugu. Alex Computers.

Amankwe, J. (2000). Vocational Education Evaluation (2nd Ed). Newton. NA. Aboko Publications.

Amina, J. (2001). Research on the teaching of instructional materials. Beijiny Publishing ltd.

Anderson, C. R. (2001). Your guide to health. Nagaland. Oriental Watchman publishing House.

Ara-tirmater, T. (2008). Version I.O. Specification Article in the Internet: http://www.hyperreal.com/mpesce/vrmi.tech/vrm110-3.html. Retrieved on 4th January, 2012

Avan, G. (2007). The VRML.2.0 Specification 1.Article in http://vrml. Shicom/movingworlds/VRMLs.DRAFT3html.

Awomolo, S. (20080. Principles and methods in vocational Education (Rev. Ed.). Nsukka. University Press.

Collins, W. T. (2000). The role of technology in the Industrial Development of Nigeria. Ibadan. Clave

Daramola, I. S. (2005). Functionality of Polytechnic Education as a Tool for Enhancing Skill Acquisition of Youths. *Paper presented* at Nigerian Association of Teachers of Technology 18th Annual Conference. *Rivers.* August 20th.

Ekwu, B. M. (2003). Strategies on the Achievement of Students. Journal of Technical and Vocational Education. 10-20.

Gamson, S. (2001). Teacher Adoption of Technology: a Perception Control Theory Perspective. *Journal of Technology and Teacher Education.* 9 (1) 5-30.

Imarhiagbe, K. O. (1992). Vocational Education Programmes in Nigeria; Issues and Challenges. *Journal of Technical Teacher Education. 2* (1). 45.

Inyiagu, E. E. (2005). Improving Human Resources Development through Technology and Vocational Education for Sustainable Development. *Ebonyi Technical and Vocational Education Journal.* 1. (2). 126.

Olaitan, S., and Ali, E. (1997). The Amazingly Patient tutor. Students' Interactions with an Online Facilities in Course. *British Journal of Educational Technology*. 33 (3) 215-236.

Okolie U. C. (2014). Management of Woodwork Workshop in Tertiary Institutions in Nigeria: An Analytical Study. *Malaysian Online Journal of Education*. 2 (1) 20-36.

Okolie, U. C. (2010). Entrepreneurship Development through Technical and Vocational Education for Self-employment and Youth Development in African. *International Journal of Learning.* 17 (5) 577-578.

Okorie, J. U. (2001). Introduction to Vocational Education. Unpublished Manuscripts. Department of Vocational Teacher Education. University of Nigeria.

Okoro, O. M. (1993). *Principles and Methods in Vocational and Technical Education.* Nsukka University Trust Publishers.

Okoye, M. S. (1991). Technical and Vocational Education: Hansicon Publications.

Onoh, D. U. (2000). Curriculum Development in Education. Onitsha. Cape Publishers Ltd.

Onyejemezi, Z. (1981). Making a Difference? An Evaluation of professional knowledge and Pedagogy in Art. Journal of Art and Design Education. 22 (2). 145-154.

Odu, K. O. (2006). Improving the Quality of Technology Education in Nigerian Secondary Schools. *African Journal of Education and Developmental Studies (ATEDS).* 8 (2). 19

Shiunda, G. and Omulando, J. (1992). Repositioning the Facilities in Technical colleges for Efficiency in Technical drawing. Federal University of technology Mina. Journal of STEM Teacher Education. (1). 62

Thomas, B. (1998). Co-operative Learning a Review of Factors that Increase the Effectiveness of Engineering Drawing Instruction. *Journal of Educational Research.* 8 (40) 303-302

Uzoagulu, A. E. (1998). *Practical Guide to Writing Research Project Reports in Tertiary Institutions.* Enugu. John Jacob's Publishers Ltd.

Wanai, O. C. (2002). Introduction to Educational Research for Student Teachers. Ibadan. Heinemann educational books Nig. Ltd.