

Enhancing the Teaching of Drafting Technology in TVET in Nigeria Colleges of Education Delivery for National Development

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Abstract

Drafting technology is defined as the act and discipline of composing drawings that visually communicate how something functions or is constructed. Drafters are individuals or persons who have become proficient in technical drawing with years of experience and specializes in producing various types of technical drawings, such as the architectural drafters, Electrical drafter, Mechanical drafters, Civil drafters and Electronic drafters. Colleges of education in Nigeria are saddle with the mandate of the teacher training programme at the NCE level, In the Nigeria colleges of education, Technical and Vocational Education Training (TVET) programme was designed by the NCCE 2012 revised to be delivered in specialized areas such as automobile, building, electrical electronic, metalwork and woodwork technology, drafting technology excluded. The paper discussed the importance of drafting technology, the concept of drafting technology, and the delivery of drafting in TVET in Nigeria colleges of education, an x-ray into the minimum standard for Nigerian certificate in education (NCE) program was also looked upon and a recommendation was made on enhancing the teaching and learning of drafting technology.

Keywords: *Drafting Technology, National Development, Delivery, Technical and Vocational Education Training, Enhancement.*

Introduction

Technical and Vocational Education Training (TVET) is that type of Education specially designed and aim at providing its learners with the basic practical knowledge and skills that will enable them to fit and contributes their quarter into the world of work. (McGrath & Powell, 2016) This system of education equips individuals with basic knowledge and needed skills that will enable them to contribute and enhance their relevance and functionality in society. According to Okorafor (2016), TVET education is geared towards the production of educated individuals who can use their hand, intellect, and work, Goel (2011), in his submission, the role of TVET education in facilitating social and economic progress has long been recognized. This implies that education improves functional and analytical ability thereby creating opportunities for individuals achieving greater access to labour markets and livelihoods. Such a demand is obtainable and increases through a functional education system. Education is not only an instrument of enhancing efficiency but is also an effective tool for widening and augmenting democratic participation and upgrading the overall quality of individual and social life. According to Goel (2011), India is in the transition to a knowledge-based economy and its competitive edge will be determined by the abilities of its people to create, share and use knowledge more effectively. This shows that skills and knowledge are a determining factor or are engines of economic growth and social development of any country. Countries with a higher and better level of knowledge and skills respond more effectively and promptly to challenges and opportunities of globalization. Drafting technology is an aspect of technical and

vocational education training (TVET) that provides the individual with the skillful ability to visualized and develop ideas. According to (G., 2010) published that technical drawing/drafting technology has been used from ancient time to the modern era to communicate ideas as the most commonly spoken language of production in industry, in another word drafting and drawings are essential to the curricular of all design programs and technology engineering. Chedi, (2016), stated that technical drawing/graphic is a medium of communication among technologist, engineers, architects and technicians. This aspect of learning is a subject/course in Nigeria's educational system at the post-primary and tertiary institutions. To enhance mean to provide changes that increase the value of an object or an item by improving it overall capability, availability or functionality (Fernando, 2018). This signify a process of bringing or introducing changes into teaching and learning activities, it could be done while an activity is ongoing to keep the records or documenting the direction that will guide teachers and students achieved targeted goals.

The Concept of Drafting technology.

Drafting technology/technical drawing is defined as the act and discipline of composing drawings that visually communicate how something functions or is constructed. (Peter 2004), This implies that Drafting is the integral communication of technical or engineering drawings which is an industrial arts sub-discipline that underlies all involved technical endeavours in representing complex three-dimensional objects in two-dimensional drawings, the objects could be described by at least one view or as many views and sections that are required to show all features of the object.

According Franz (2000), drafting technology is an essential language use for communicating ideas in industry and in the field of engineering using lines, symbols and graphics to make the drawings easier to understand, drafters use familiar symbols, perspectives, units of measurement, notation systems, visual styles, and page layout in different types of drawings using international conventions which constitute a visual language to help the user of the drawing with a clarity and ensure that the drawing is unambiguous and relatively easy to understand. Evans (2019), define drafting technology or technical drawing as a language that communicates to building contractors and manufacturers on how to build or construct a product, highways, and automobiles. Technical drawing professionals work under the supervision of engineers, architects and designers to transform their ideas and designs into actionable plans. Manufacturers and contractors need technical drawings to produce all kinds of products.

To make such products, a technical drawing is the blueprints, schematics, and diagrams that communicate how such a product, a device, machine, highway or a building could be constructed or produce, they also include sketches, 2D, and 3D models that show the appearance of a completed project. Technical drawing professionals are called drafters or draftspersons who create the blueprints, schematics and models which the manufacturers and contractors use to construct the final building, civil project or product. Drafters work with designers, engineers and architects to translate their ideas and designs into technical drawings.

Drafters are individuals or persons who have become proficient in technical drawing with years of experience and specializes in producing various types of technical drawings, such as the architectural drafters, Electrical drafter, Mechanical drafters, Civil drafters and Electronic drafters. (Davis, n.d.) defines drafting technology as a process of getting ideas, sketches and specifications of designers and engineers and transfer or translate them drawings into a scale using conventional symbols and approved drafting standards techniques ready for production.

According to Davis, other Areas and types of drafting technology specialization profession includes Machine drafting, Structural drafting, piping drafting, Electrical drafting,

Aircraft drafting, Architectural drafting, Pressure vessel drafting Electronic drafting, Civil drafting, Computer graphics drafting and Sheet metal drafting among others. This implies that each of the mentioned areas or types of drafting profession has its job description it could be in the same industry, the same department but different sections as the case may be. (As et al., n.d.) published and defined drafting technology as a descriptive way to deliver an idea with the use of illustrations and drawings that show in detail the process of creating the idea into reality. Based on their submission, the cored basics that form the drafting work foundation are Mathematics and science. Their researched work stated that drafting technology is the oldest documented profession and that the earliest drawings were found on cave walls. Others drawings were found on animal hide, then vellum. And A great and huge advancement in the field of drafting technology profession was made by the ancient Chinese and Egyptians.

The Chinese developed rice paper while the Egyptians developed papyrus, all these were the starts of drafting technology profession about 4000 BCE based on their findings. Their finding shows that the production of every product starts from a sketch, although many people think about architecture drafting as the only drawing made by drafters. apart from the aforementioned, there are about one hundred different work disciplines for drafters and designers. These include Aerospace, Highways, Parks and Recreation, Electronic, Nano-Technology, Medical, Furniture, High Voltage Electricity, Automotive and many more. A brief of the job description of the above-mentioned drafting technology profession is shown in table 1 below

S/n	Types of Drafting	Job Description
1.	Architectural Drafting	Architectural drafting specializes in the production of site plans, foundations, floor plans, elevations, architectural sections, framing plans, area plans, and graphic standards.
2.	Computer Graphics Drafting.	Graphics drafting is a specialized field of drafting technology that Study and application of methods, problems and solutions in graphic design using AutoCAD, the individual are persons who specialize in making clear writings on Construction Documents and Drawings which provide a Warrants Reading and interpretation of construction documents for residential, light commercial and heavy commercial structures using conventional symbols and representation.
3.	Structural Drafting	Structural Drafting is an aspect of drafting technology professionals whose jobs are to Offered technical skills demanded by structural drafters and technicians to enable them to work and render effective services in structural engineering firms or as structural engineers. Their job Includes production of structural drawing. Development of computer-aided drafting skills in symbols, conventions, dimensioning systems, sheet organizations, code analysis and research methods for steel, wood, and reinforced concrete buildings.
4.	Civil drafting.	Civil drafters are professional individuals who provide the services of a high Techniques of highway design, boundaries, right of way layouts, curves and grades, bridges, cut and fill detail drawings, gas and water services, sewers, culverts, signs and guard rails. Civil drafting also provides skills of plotting traverse and surveys by bearing and distance, latitudes and departures, topographic

		drawings and maps, contours and elevations, profiles and highway curves, cross-section drawings and grading plans.
5	Mechanical and Electrical Drafting etc	Mechanical and Electrical Drafting is a field of drafting technology specialization that provides the draftsman with the skills of analysis, theory, code requirements, and CAD techniques to creates construction drawings for mechanical and electrical building systems. And the skills of drafting conventions, drawing symbols, terminology, and research methods for residential and commercial building systems and equipment.

Figure 1 Source: (As et al., n.d.)

The Minimum Standard for Nigerian certificate in education (NCE) Programme.

According to NCCE, (2012) colleges of education in Nigeria are saddle with the mandate of the teacher training programme at the NCE level, which is the recognized minimum teaching qualification in Nigeria, the colleges of education in Nigeria are to produce quality teachers for the Basic Education sub-sector, which encompasses the following categories of education: Pre-Primary Education or Early Childhood & Care Education, Primary Education, Junior Secondary Education, Adult and Non-Formal Education, Special Needs Education. Students who are trained in technical education are meant to teach technical and technology development. Daisy (2015) defines Teaching as the process of imparting knowledge to the learner, which is the sole aim and the main duty of a teacher, to someone who has gone through a proscribed period of training to effectively deliver instructions to the learners (pupils or students). Mukhtari Ado Jibril (2010) stated that the best quality of education largely depends on the quality of the teacher. This implies that whether the teacher is from the best equipped and furnish school, teaches in the best-equipped classroom of the most up to date school, whether the teacher manages a small or a larger class with modern equipment, there is the likelihood that the leaners will not get quality education unless the teacher is qualitative.

According to Onuma (2016) published that the Federal Ministry of Education (MOE) in collaboration with National University Commission (NUC), National Board for Technical Education (NBTE), National Commission for Colleges of Education (NCCE) and other relevant bodies are responsible for ensuring and maintaining quality control in Nigeria tertiary education. While the National Commission for Colleges of Education (NCCE) is entrusted with the supervision of colleges of Education (COE) in Nigeria. Following the establishment of educational standards as introduced in national policy on education 1977, this in one way or the order has been affected through enactment and policy decision and declarations. However, the Decree number 3 of 1989 authorized NCCE the mended to produce minimum standards for all programmes of teacher education also accredit their certificates and other academic awards as the case may by obtaining prior approval of the Minister. This decree, therefore, limits NCCE to teacher education undertaken outside the universities. As stated in the first minimum standards document produced by NCCE in 1990. which is been reviewed after every five years. the most recent and current was published in 2012.

TVET delivery in Nigeria colleges of education.

Okoye & Okwelle (2015) defines education as a process that is designed to train and provide knowledge, development of skills and abilities to individuals that could lead to the development and contribution of mental alertness and the right attitude and values to life. Meaning that education aims at inculcating adequate values in the human-kind, Okwelle (2015) submitted that, education remains one of the institutions that provide the individual with right values, thinking ability and attitudes to fit into the society, and meaningfully help themselves

positively by contributing to the growth and welfare of their immediate community.

Education on the other hand is seen as an agent that brings about human development, social mobility, and national transformation. Globally, it differs in concept and mostly it depends on what the society aims at achieving (Okafor 2012). Technical and vocational education training on the other hand is defined as the type of education that equips an individual with the needed technical and professional skills for the socio-economic and industrial development of the country. Kissi & Education (2016) Emphasizes that TVET is focusing on self-employment training for the individual, the technical and vocational education training (TVET) advantages cannot be over emphasized because of its important role in industrial development as well as provide social progress for any nation. Without skilled technical manpower produced by the polytechnics, technical and vocational institutes colleges of education (technical) inclusive for industry, commerce and agriculture, national development would virtually reduce to a standstill (Seniwoliba 2014). Technical and Vocational Education' was also defined by The United Nations Educational Scientific and Cultural Organization (UNESCO) as all the aspects of education that its process is involving besides of general education, acquisition of technologies and related sciences, learning of practical skills, knowledge, and attitudes which are relevant to occupations in different sector of the economic and social life for the twenty-first century, international labour organization (ILO 2002)

In the Nigeria colleges of education, TVET program was designed by the NCCE 2012 revised to be delivered in the department of technical education under five areas of specialization which are: Automobile technology (TEA), Building technology (TEB), Electrical Electronic technology (TEE), Metalwork technology (TEM) and Woodwork technology (TEW) these areas of specialty are to inculcate the necessary skills, knowledge, and attitudes for teaching-related technological subjects at the secondary and technical colleges as the case may be.

Importance of Drafting Technology

<http://www.nccvt.k12.de.us/career-programs/science-energy-drafting-technologies> overview/technical (2010), published that, drafting technology aims at training and developing skills for one or more engineering drawing specialities. In acquiring the design skills, the students are expected to start with basic drafting procedures and techniques which are coupled with a general exploration of the endeavoured field of Specialization in areas such as architectural drafting, civil engineering, piping schematics, machine design and other disciplines. In another word, the Drafting Technology program is aiming at a rewarding challenge for students learning and working in teams to solve and produce a complex drawing for real-world problems in new and exciting ways. Students are giving the required foundation in design and engineering disciplines through the introduction of mechanical and architectural drafting and engineering principles. And also acquire marketable skills in computer-aided drafting (CAD) and computer-aided manufacturing (CAM) which are developed by teaching and training the students on the basics state-of-the-art equipment and software, this is to prepare the students with a speciality on mechanical design and the product design process, the students will be required to learn to take a product from concept, to drawing, to prototype. Drafting technology as a course is expected to provide the students with many exciting opportunities for rewarding and qualification entry-level of employment and career advancement.

Enhancing the Teaching and Learning of Drafting Technology in Colleges of Education.

The importance of technical drawing cannot be over emphasized, Technical Drawing is a medium of communication among technologist, engineers, architectures, technicians it is widely used in many fields and professions. In the Nigerian educational system, Technical

Drawing is offered as a subject/module at various levels such as post-primary schools and tertiary institutions. (Chedi 2015),

The survey table below show the manpower of Technical Education teachers in some selected Colleges of Education and Polytechnics that offers Technical Education and produces teachers that will tech basic technology and Technical Drawing as the case may be.

Table 1: number of lecturers in each section.

S/n	Name of institution	Number of lecturers per section					
		Automobile Technology	Building Technology	Drafting Technology	Electrical electronic Technology	Metalwork Technology	Woodwork Technology
1	Kaduna state college of education gidan waya, kafanchan	5	7	2	5	4	3
2	Federal college of technical (Technical) Bichi-kano.	8	9	0	9	11	7
3	Waziri Usman federal polytechnic Birnin Kebbi.	4	4	0	4	4	4
4	Jigawa State Polytechnic, Dutse.Jigawa	1	2	1	3	2	1
5	FCE Gidan-madi Sokoto	8	7	0	8	10	8

Source: Survey 2024

Frome the survey table above, among the five selected institution within the northwest geopolitical zone, only one institution has 1 lecturer in automobile technology section, while other six institution have 4,5,8 and 8 lecturers to teach automobile courses. In the same vent, among the five-sample institution, the survey shows that building technology section is having adequate number of lecturers only one institution have 2 lecturers in building section while the other six institution have 7,9,4, and 8 lecturers to teach building technology courses.

Likewise, in the five-sample institution, only two institution have lecturers in drafting section, one institution 1 lecturer in drafting section, and the others one 2 lecturers. The survey indicated that drafting section is having inadequate lecturers to teacher technical drawing. The survey also indicated that lecturers who teaches technical drawing courses in the others institution are not graduates of drafting technology.

In the other hand, the survey revealed that electrical electronic technology section in the sample institution have adequate manpower with 5, 9,4,3 and 8 lecturers in the electrical electronic technology section. Also in metalwork technology, the survey shows that in the sample institution, metalwork sections have adequate manpower with 4,11,4,2 and 10 lecturers in each section who have been employed to teach metalwork courses. The survey did reveal that woodwork section also has adequate manpower with 3,7, 4,1and 8 woodwork lecturers in each section. From the survey, is only Drafting Technology appears to have inadequate manpower. Reason could be, it is not yet a section or department of its own unlike Automobile Technology, Building Technology, Woodwork and Metalwork Technology.

To have qualify teachers who will be capable of teaching Technical Drawing or engineering drawing at all level of education, there is a need of enhancing the teaching of

drafting technology in the colleges of education in Nigeria as an area of specialization like Automobile technology, Building technology, Electrical Electronic technology, and the likes so that individuals with a certificate of specialty will be engaging to teach the subject at various level of educational attainment not only people that have little experience or those that like teaching drawing as the case may appear to be.

In this regard, the introduction of new modules or a curriculum of drafting technology needs to be integrated into the NCCE minimum standard as a required criterion like other courses for graduation. This will go a long way providing more effectiveness in times of achieving meaningful delivery of communicating ideas in TVET.

Conclusion.

This study tried to bring out the relevant and the concept of drafting technology as an area of specialization, To have qualify and quality lecturers who will be capable of teaching Technical Drawing or engineering drawing at all level of education, there is a need of enhancing the teaching of drafting technology in the colleges of education in Nigeria as an area of specialization like Automobile technology, Building technology, Electrical Electronic technology, and the likes so that individuals with satisfy certificate of graduation in Drafting Technology and Education will be saddle with the mandate of teaching drawing subjects. The relevance of technical drawing in the field of engineering and technology cannot be overemphasized as such, the NCCE need to look into harmonizing the drawing curriculum as an area of specialization.

Recommendation

- It will provide an opportunity for students aspiring for engineering to develop the visualization skills necessary in engineering.
- It will give the students a great opportunity to solve the problems and challenges in representing three-dimensional space in a two-dimensional plane or visualizing a two-dimensional drawing as a three-dimensional solid object.
- To give engineering students a series of structured courses that will expose them to a series of problems, activities, and exercises that will enable them to developing and enhancing their difficulty of visualization skills.
- To provide the opportunity for engineering skills in solving graphics problems interactively using solid modeling and computer animations giving the students a clear visual view effectively in the way of showing the relationship between two or more components of solid objects and its projection in the two-dimensional plane.

REFERENCE

- As, O., Warrants, D., As, O., Warrants, D., As, O., Warrants, D., Drafting, E. (n.d.). Drafting technology (drt), 2–3.
- Chedi, J. M. (2016). Technical Drawing / Graphic Skills Acquisition For Teaching And, (August 2015).
- Daisy, I. (2015). Teachers ' Conduct in the 21 st Century : The Need for Enhancing Students ' Academic Performance, 6(35), 71–78.
- Davis, R. A. O. (n.d.). 033 511. *Ct 4te Df=pdr !Mew of Voc Ational Dnn Techrtc Dl Enoc,Ct*on StilLvater, Ol,IdhOfld /40741*.
- Evans, M. (2019). Definition of Technical Drawing, 1–13.
- Fernando, M. (2018). Teaching, Learning and Evaluation Enhancement of Information Communication Technology Education in Schools through Pedagogical and e-Learning techniques- in the Sri Lankan Context, (June).
- Franz Maria Feldhaus - Wikipedia. (2000).
- G., K. (2010). International Journal of Asian Social Science A Preliminary Study Outcome And Analysis Of Teaching And Learning Problems In Engineering At United Manjit Singh Sidhu 2. Overview Of Engineering Education In United, 3(9), 1838–1846.
- Goel, V. P. (2011). Technical and Vocational Education and Training (Tvet) System \ in India for Sustainable Development.
- ILO. (2002). *General Survey of the reports concerning the Dock Work Convention (No. 137) and Recommendation (No. 145), 1973*.
- Kissi, E., & Education, V. (2016). Technical and Vocational Education and Training in Ghana : A Tool for Skill Acquisition and Industrial Development Technical and Vocational Education and Training in Ghana: A Tool for Skill Acquisition and Industrial Development, (July).
- McGrath, S., & Powell, L. (2016). Skills for sustainable development: Transforming vocational education and training beyond 2015. *International Journal of Educational Development*, 50, 12–19. <https://doi.org/10.1016/j.ijedudev.2016.05.006>
- Mukhtari Ado Jibril. (2010.). Teacher Education in Nigeria : An Overview Mukhtari Ado Jibril (PhD) Abstract. *In Education: Dialogue and Dialectics*. New York: McGraw- Hill, (2010), 130–140.
- NCCE, 2012 Edition. (n.d.). Nigeria Certificate In Education Minimum Standards For National Commission For Colleges Of Education Minimum Standards For.
- Okafor, J. (2012). Technical and Vocational Education and Training (TVET) In Nigeria and Energy Development, Marketing and National Transformation, 4(14), 134–139.
- Okorafor, O. (2016). Reappraising Technical and Vocational Education and Training (TVET) For Functionality and Self-Reliance, (January 2010).
- Okoye, K. R. E., & Okwelle, P. (2015). Technical and Vocational Education and Training (TVET) In Nigeria and Energy Development, Marketing and National Transformation Technical and Vocational Education and Training (TVET) In Nigeria and Energy Development, Marketing and National Transformation, (January 2013).
- Onuma, P. B. E. A. and A. P. N. (2016). Minimum Standards And Accountability In Colleges Of Education In Nigeria Prof. B. E Alumode and Assoc. Prof. Nwite Onuma Department of Educational Foundations, Ebonyi State University, Abakaliki. *Journal, British Vol, Education Centre, European Uk, Development*, 4(5), 53–62.
- Peter Jeffrey Booker - Wikipedia. (2004).
- Seniwoliba, A. J. (2014). Career challenges in construction craft training in technical vocational education and training in Ghana, 6(3), 13–29. <https://doi.org/10.5897/IJVTE2014.0156>