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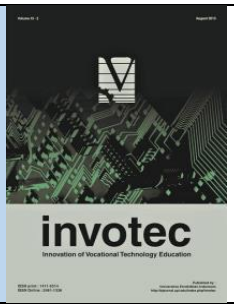

Enhancing Effectiveness in Teaching and Learning Technical Drawing for Sustainable Development in Nigerian Technical Colleges

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ABSTRACT

This study determined enhancing effectiveness in teaching and learning technical drawing for sustainable development in Nigerian technical colleges. Two research questions focusing on status of Technical Drawing in Nigerian Technical Colleges and mechanisms for enhancing teaching and learning of Technical Drawing guided the study. The population of the study was all the 152 technical college administrators in state government owned technical colleges in South- Western States of Nigeria. A 30-item self-developed questionnaire was used to collect data from all the 152 respondents. The questionnaire was validated by three experts and its reliability coefficient was established at 0.92 using Cronbach's Alpha Coefficient method. The data collected were analyzed using descriptive statistics. The study found that traditional mode of classroom instruction dominated the teaching and learning of technical drawing and that procurement of ICT facilities and retraining of technical drawing teachers would enhance teaching and learning of the subject. The study recommended, among others that relevant stakeholders responsible for the administration of technical colleges should procure ICT facilities for teaching and learning of technical drawing.

1. Introduction

Globally, education has shifted from a traditional classroom setting to a technology driven setting. The technology driven classroom has its footing on Information and Communication Technology (ICT). ICT has become a global tool in education to enhance effective teaching and learning of any subject including technical drawing. Traditional educational environments do not seem to be suitable for preparing learners to function or be productive in the workplaces of today's society and that organization that do not incorporate the use of new technologies in institutions cannot seriously claim to prepare their students for life in the twenty-first century (Yellam, 2001). The entire universe has been transformed to a global village through the use of ICT. The use of Information and communication technology (ICT) for teaching is a functional way of providing

education to learners in order to assist them imbibe the required capacity for the world of work. Only very few jobs if at all they are available in the market labour today do not require the use of skills in technology, collaboration and teamwork; all of which can be acquired through teaching with ICT (Ajayi, 2008). The ICT plays important roles in classroom teaching. She maintained that it is both useful as a tool for teaching and for imparting saleable skills on the students (Mmerenikwu-Fiac, 2010).

Globalization is also considered an accelerator of social change and a catalyst for social connections among people and communities in distant localities in a way that events particularly those occurring in the educational system of advanced economies will help a great deal in shaping events happening in developing countries (Undie and Ewuru, 2012). In this wise, it is expected that events particularly those occurring in the educational system of advanced economies will be replicated in Nigerian Technical Colleges, specifically as it relates to teaching and learning Technical Drawing.

Technical Drawing refers to 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 (Elom, 2014). It is a peculiar language which technicians, engineers, craftsmen and industrialist communicate with.

The technical drawing is a widely recognized graphic language accepted for communicating production requirement (Foster, 2001). The technical drawing communicates solutions to technical problems. It includes the representation of all kinds of objects for production in a manner that the shapes, dimensions, materials, and finishing of such objects are shown precisely and completely without ambiguity (Nsima, 2001). The technical drawing is the most popular technical subjects in any technical college. It is the mother of all other technical related subjects (Ekwu, 2003). A sound knowledge of technical drawing relates positively to the understanding of other technical subjects such as automobile technology, building technology, electrical/electronic technology, metalwork technology and woodwork technology (Foster, 2001; Nsima, 2001). The usability of Technical Drawing transcends cultures and languages and for any country to progress technologically, it is essential that such country develops the training of her citizenry in the language of the technology to enhance sustainable development (Elom, 2014). Sustainable development refers to development which meets the needs of the present, without compromising the ability of future generations to meet their own needs. It is a holistic approach to improving the quality of human life and meeting human needs for present and future generation. The effective education will afford Nigerian youth enormous advantage of economic opportunities to become active players in the nation's economy.

Therefore, for any noticeable and achievable sustainable development, teaching and learning of all subjects across all levels of education in Nigeria must be effective. The teaching implies that a teacher who is a product of both nature and nurture impart knowledge to the learners and that effective teaching implies that the intended outcome of the teacher's teaching is brought about and the favourable impression on the students is overtly felt (Olakotan, 2011). Since teaching and learning are simultaneous activities, the learning environment must be sufficiently made conducive if meaningful learning must take place (Adeoluwa, Aboderin and Omodara, 2013). Also, the conduciveness in the learning environment must encompass rich resources so as to provide learning experiences needed by the learner for the expected learning outcomes. A shift from teacher-centered instruction to learner-centered instruction is needed to enable students acquire the new 21st century knowledge and skills (Rojewski, 2002).

The lack of finance to execute educational policy projects, shortage of manpower, lack of facilities and lack of policy itself (i.e. the planning and implementations) are factors responsible for poor teaching and learning in Nigerian schools (Osuolale, 2014). The effective utilization of ICT in teaching and learning depends on the availability of these facilities and teachers competence in using them (Ajayi, 2008). Hence, enhancing effectiveness in the teaching and learning of technical drawing requires availability, adequacy and utilization of facilities to match with global practices. This is consonance with the underlying theories for this study as propounded by Prosser and Ouingley. Prosser and Ouingley (1949) propounded in the environmental habit and experience instructor theories. The environmental habit theory stated that vocational education will be efficient in proportion as the environment in which the learner is trained is a replica of the environment in which he must subsequently work. This implies that effective vocational training can only be given where training is carried out in the same way with the same operation, tools and machines as in the occupation itself.

On the other hand, the experience instructor theory stated that vocational education will be effective in proportion if the instructor has had successful experience in the application of skills, knowledge, operations and processes he undertakes to teach. This theory implies that the teacher cannot teach that which they do not know. Hence, this study focused on the status of Technical Drawing in Nigerian Technical Colleges with respect to factors such as ICT facilities, teachers' skills, students' readiness, achievement and mechanisms for enhancing teaching and learning of TD.

The teachers communicate instructions for acquisition of knowledge and skills to students in the teaching and learning process (Oke and Olakotan, 2017). Therefore, teachers' novelties in dishing out good instructions rely heavily on their preparations and readiness at all times. The instructional delivery mode employed by the teacher plays an important role in skills acquisition and meaningful learning. The use of media for effective teaching and learning of technical subjects (Abd-El-Aziz, 2014). The explorative survey carried out by the researcher across technical colleges in Ogun State revealed that the classrooms in all the technical colleges visited are dominated by chalkboards and marker-boards. Also, students on their parts confessed that they usually abscond classes, while some confessed that carrying drawing boards to technical drawing classrooms remain burdensome.

Some of the limitations of these types of instructional delivery mode (Gambari, Yusuf and Balogun, 2018) are: ineffectiveness for very large group instruction, inability to allow information storage for future use, inability to accommodate illustrations to support the teaching, health hazard for teachers from chalk particles, uninteresting learning. The adopting constructivist approach in teaching technology related subjects would go a long way in improving students' achievement in Nigeria. The teaching and learning tailored towards the constructivist approach should be adopted in schools (Ogundola, 2017).

The magnitude of development noticed in any society is dependent on the quality of teaching and learning in her educational system. This is because institutions of learning which adopt best practices in imparting knowledge and skills to students remain at the forefront of societal development. Suffices to say that the Nigerian society remains what it is, because her teaching and learning environment does not replicate global best practices. However, the better developed a society is, the lesser the ills and social vices in that society and the easier and quicker for a noticeable sustainable development. Therefore, for Nigeria to be reckoned with, among comity of nations, teaching and learning in her institutions of learning particularly technical and vocational education and training (TVET) institutions must be made effective.

2. Method

This study adopted a descriptive survey research design. A survey is a method of data collection using questionnaire or interviews to collect data from a sample that has been selected to represent a population to which the findings of the data analysis can be generalized. The design was considered suitable for the study since it sought the opinions of technical college administrators and no variable was manipulated. The population of this study was 152 technical college administrators. This comprised of 34 principals, 56 vice principals and 62 Heads of Departments in all the state government owned technical colleges in South-West, Nigeria. No sampling technique was considered for this study because of the manageable size of the population.

Enhancing effectiveness in teaching and learning technical drawing questionnaire (EETLTDQ) containing 30 items was developed and used for the study. The scaling responses for the instrument was based on adapted Likert Scale ratings viz: Strongly Agree (SA) – 4, Agree (A) – 3, Disagree (D) – 2 and Strongly Disagree (SD)-1. The instrument was validated by three experts in Technical Education and tested to obtain 0.92 reliability coefficient using Cronbach Alpha coefficient method. The instrument was personally administered on the respondents by the researchers. Due to adequate monitoring and guidance of the instrument, 100% return rate was achieved. The data collected were statistically analyzed using descriptive statistics of means and standard deviation as appropriate. A mean of 2.50 and above was considered positive and agreed upon, while a mean rating of less than 2.50 was regarded as negative and disagreed upon.

3. Result and Discussion

The data presented in Table 1 revealed the status of technical drawing in Nigerian technical colleges. All the 10 items attached to facilities (Items 1-10) had a mean range of 3.41 to 3.85. This indicated that the respondents agreed on all the 10 items attached to facilities under the status of technical drawing in Nigerian Technical Colleges because their means were above the cut-off point of 2.50. The standard deviation of the items also ranged from 0.61 to 0.87. This showed that the respondents were close to one another in their responses. Similarly, the 2 items attached to technical drawing teacher's skill (Items 11 and 12) had their mean as 3.78 and 1.87 respectively. This also showed that the respondents agreed on one of the items and disagreed on the other because their means were above and below the cut-off point respectively. The standard deviation of the items were 0.85 and 0.54 respectively which also attested to homogeneity. Also, the 3 items attached to students' readiness and achievement (Items 13-15) had a mean range of 1.58 to 1.87. This indicated that the respondents disagreed on all the 3 items because their mean were below the cut-off point. The standard deviation of the items also ranged from 0.42 to 0.49 which also was a pointer to homogeneity.

Table 1: Mean responses of respondents on the status of technical drawing in Nigerian Technical Colleges

S/N	Item Statements	Ẋ	S.D	Remarks
	Facilities			
1	Technical Drawing can boast of at least 2 drawing rooms	3.62	0.83	Agree
2	There are chalkboards for Technical Drawing	3.52	0.74	Agree
3	There are white marker boards for Technical Drawing	3.68	0.66	Agree
4	There are board instruments for Technical Drawing	3.41	0.63	Agree
5	There are drawing boards	3.48	0.77	Agree
6	There are students set squares	3.44	0.61	Agree
7	There are students drawing instruments	3.73	0.78	Agree
8	There are students drawing sheet	3.85	0.87	Agree
9	There are students French curves	3.45	0.75	Agree
10	There are students templates	3.74	0.84	Agree
	Technical Drawing Teacher's Skills			
11	The teacher is competent using traditional method	3.78	0.85	Agree
12	The Technical Drawing teacher is ICT compliant	1.87	0.54	Disagree
	Students' Readiness and Achievement			
13	Students are always ready to learn TD	1.58	0.42	Disagree
14	Students usually complete their TD assignments	1.87	0.54	Disagree
15	Students perform better in both internal and external exams	1.64	0.49	Disagree

The data presented in Table 2 revealed mechanisms for enhancing effective teaching and learning of Technical Drawing. All the 10 items attached to ICT facilities (Items 16-25) had a mean range of 3.64 to 3.85. This indicated that the respondents agreed on all the 10 items attached to ICT facilities under mechanisms for enhancing effective teaching and learning of Technical Drawing because their means were above the cut-off point of 2.50. The standard deviation of the items also ranged from 0.71 to 0.93. This showed that the respondents were close to one another in their responses. Similarly, the 2 items attached to technical drawing teacher's skill (Items 26 & 27) had their mean as 3.74 and 3.82 respectively. This also showed that the respondents agreed on the items because their means were above the cut-off point. The standard deviation of the items was 0.85 and 0.89 respectively which also attested to homogeneity. Also, the 3 items attached to

students' readiness and achievement (Items 28-30) had a mean range of 3.64 to 3.85. This indicated that the respondents agreed on all the 3 items because their mean were above the cut-off point. The standard deviation of the items also ranged from 0.73 to 0.93 which also was a pointer to homogeneity.

Table 2: Mean responses of respondents on mechanisms for enhancing effective teaching and learning of technical drawing

S/N	Item Statements	Ẋ	S.D	Remarks
	Information and Communication Technology Facilities			
16	Provision of ICT studio for Technical Drawing	3.85	0.93	Agree
17	Provision of LCD projectors	3.74	0.85	Agree
18	Adequate provision of computer systems	3.78	0.76	Agree
19	Procurement of interactive board	3.78	0.76	Agree
20	Availability of internet connectivity	3.67	0.71	Agree
21	Provision of Technical Drawing Software	3.64	0.73	Agree
22	Provision of UPS to sustain computer systems	3.85	0.93	Agree
23	Procurement of solar inverters to power computer systems	3.74	0.85	Agree
24	Provision of Generator	3.85	0.93	Agree
25	Provision of internet modem	3.82	0.89	Agree
	Technical Drawing Teacher's Skills			
26	The T.D teacher should be retrained to acquire ICT skills	3.82	0.89	Agree
27	The Technical Drawing teacher should be ICT compliant	3.74	0.85	Agree
	Students' Readiness and Achievement			Agree
28	Students should be provided personal computers	3.78	0.76	Agree
29	Students should be provide personal software	3.85	0.93	Agree
30	Students should be made to attempt online practice tests	3.64	0.73	Agree

Achieving overt results that will benefit all and sundry in the teaching and learning process can possibly be achieved when best practices as used in developed nations are adopted in Nigeria. The findings of this study as corroborated by various researchers revealed the status of technical drawing in Nigerian technical colleges. The using the traditional approach in passing instructions in schools result to ineffectiveness, inability to store information for future use, inability to accommodate illustrations to support the teaching and uninteresting learning among others (Gambari, Yusuf and Balogun, 2018). The submission of the above scholar was also substantiated in the explorative survey carried out by the researchers as the technical drawing classrooms in the technical colleges visited are set up traditionally without any component of a 21st century classroom. This also makes students to usually abscond classes while some confessed that carrying drawing boards to technical drawing classrooms remain burdensome.

The findings of the study revealed mechanisms for enhancing effective teaching and learning of technical drawing and were corroborated by the propositions of scholars. The instructional delivery mode employed by the teacher plays an important role in skills acquisition and meaningful learning. The use of media for effective teaching and learning of technical subjects.The effective utilization of ICT in teaching and learning depends on the availability of these facilities and teachers competence in using them. The submission tilted towards making learning environment conducive for meaningful learning to take place. The conduciveness in the learning environment must encompass rich resources so as to provide learning experiences needed by the learner for the expected learning outcomes.

4. Conclusion

This study has shown that effective teaching and learning of technical drawing would culminate into sustainable development if ICT is integrated into its teaching and learning. This is evident from the findings of the study and the various works of scholars reviewed. It is then believed that if Nigerian technical college students are taught in line with best practices in the world over, sustainable development would in no time be achieved.

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