

Impact and Utilization of Instructional Materials in Enhancing Effective Teaching of Technical Drawing in Senior Secondary Schools in Education District V Zone III in Lagos State

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Abstract: The study was carried out to examine the impact and utilization of instructional materials in enhancing effective teaching of Technical Drawing in senior secondary schools in Education District V zone III in Lagos State. A descriptive survey research design was used for the study. The population for the study consisted of sixty teachers teaching Technical Drawing from six senior secondary schools in the education district V zone III. No sample was used because the population is manageable. A structured questionnaire was designed for data collection. Three research questions were developed. Mean and standard deviation were used to answer the research questions. The findings revealed that drawing instruments and materials were not sufficiently available and the few available ones were not utilized properly for enhancing effective teaching of Technical Drawing in senior secondary schools in Education District V zone III in Lagos State. The finding also showed that the professionally qualified technical teachers were inadequate and, in some cases, other science teachers were being drafted to teach the subject. From the results of these findings, it was recommended that Technical drawing subject should be mandatory in the Senior secondary schools for science and technical Students. The recruitment of technical drawing teachers should be based on experience and qualification in engineering and technical education. Regular training should be organised for Teachers teaching technical drawing in digital instructional techniques using the application of software such AUTO CAD to actively impart in the students' quality knowledge and skills among others.

Keywords: Impact, Utilization, Instructional materials, Technical drawing, Technical College.

I. Introduction

Technical drawing is one of the subjects taught at the post primary and post-secondary school levels. It deals with graphical representations of ideas with clearly and concisely communicating all of the information necessary to transform an idea or concept into a reality. Technical drawing as a science subject is activity based. The activity based instructional approach which can best be adopted for teaching it. The technical drawing concepts cannot be fully achieved without the use of instructional materials According to Laguador, (2014) technical drawing is a means of clearly and succinctly communicating all of the information necessary to transform an idea or a concept into reality which can be manufactured or constructed. This implies that technical drawing contains more than just graphical representations which includes sketches, notes and specifications of its subject and a functional way of providing education to learners in order to assist them imbibe the required capacity for the world of work. In the same vein, technical drawing is an important form of technological and engineering communication in science, technology, industry and vocations (Mikhailov, Rodin & Smirnova 2018). Without technical drawings, the engineering field would have been a discipline of enormous guesswork (Madsen, 2012). The implication of the knowledge of Technical drawing is that it allows technicians, engineers and other experts even technical teachers to create and teach engineering designs as well as do calculations which can contribute to the quality of technological development leading to production of functional graduates for industries. To function in industries either as industrial instructors, engineers or even as technical teachers, there is need to possess necessary skills and competence of becoming an expert in the technical drawing.

The Federal Republic of Nigeria (FRN) in National Policy on Education (2013), made technical drawing as an elective subject offered at secondary school level. Also, National Board for Technical Education (NBTE) [2013] stipulated that in technical colleges, technical drawing should be taught as a trade related course and should be taken by all students in engineering trade and construction trades except craft practice, this is due to the basic knowledge and skills it provides in engineering and construction courses. By this policy, technical drawing as a trade related course is made compulsory and must be studied by all students in the technical related areas for an improved academic achievement. The knowledge and competencies embedded in technical drawing is to design, solve practical and technological problems through the process of communication skills which are central to design and planning It is observed that technical drawing is taught without the use of appropriate instructional materials and drawing instruments in enhancing effective teaching of the subject. This has resulted to the poor performance and lack of Enenium & Yilbo (2022) described

instructional materials as system components that may be used as part of instructional process which are used to disseminate informative message and ideas or which make possible communication in the teaching-learning process. Instructional materials in the instruction delivery of technical drawing are highly important especially for both experienced and inexperienced teachers. Thereby, motivating and use of instructional materials will help technical drawing teachers to get the attention of the students and eliminate boredom. Teacher should also have concerted efforts to ensure that his or her teaching are more interesting, understandable, concrete and easier for students to assimilate.

Today, advances in technology have made it possible to use computer aided design (Auto CAD) among others applications that could be used to minimize the teachers' talking but make teaching of the subject to be more interesting and easier for the learner to understand. Therefore, teachers rely mainly on instructional materials in every aspect of teaching. They also use the instructional materials for detailed information on the subject they are teaching for clarity and better understanding of the students.

Azonwa & Ogbonna (2022) stated graphics includes charts, posters, sketches, cartoons, graphs and drawings and that graphics communicate explain facts and ideas clearly through combination of drawings, words and pictures. Also, Ngozi, Samuel and Ameh, (2012) unanimously agreed that audio-visual materials are very important and useful in education because, the normal learner so far as the instructional materials are concerned, students' gains understanding of the subject in terms of multiple impression recorded through the eye, ear, touch and other series. This will help to reduce most of the problems in the teaching and learning process [but in spite of this, the problem associated with these instructional materials is the procurement of the instructional materials]. Effective use of instructional materials and its relevance with the subject would enable the learners to effectively learn and retain what they have learnt and thereby advancing their performance in the subject been taught. Learning is a process through which knowledge, skills, habits, facts, ideas and principles are acquired, retained and utilized; and the only means of achieving this is through the use of instructional materials in teaching process. In the light of this, this study examines the impact and utilization of instructional materials for enhancing effective teaching of Technical Drawing in the senior secondary schools in Education District V zone III in Lagos State.

Statement of the Problem

The poor performance in technical drawing at both internal and external examinations has become serious concern to the educationists and industrialists (Diraso *et al*, 2013). This implies that the problem of technical drawing teachers and students' encounter in our educational system can be attributed to poor methodology, lack of qualified technical drawing teachers, poor drawing studio, inadequate teaching and learning drawing materials, among others. It was observed that some schools have the best of facilities, and yet, failed to produce strong students due to the negligent of technical drawing teachers toward the use of instructional materials effectively during the teaching and learning process. Other problems that affect the effective use of instructional materials in schools include lack of electricity supply to make use of instructional materials by the technical drawing teachers in senior secondary schools. It is important to note that the use of instructional materials by technical teachers will be a break-through in educational attainments. Hassan & Marzam (2017) and Ogunbote (2015) agreed that instructional materials are very important and useful in education for a typical learner. Therefore, these have brought to the fact that the proper utilization of the available instructional materials in teaching of Technical Drawing will lead to positive impact. Hence, there is need to examine the impact and utilization of instructional materials in the teaching of Technical Drawing in senior secondary schools in Education District V zone III in Lagos State.

Purpose of the Study

The main purpose of the study is to find out the impact and utilization of instructional materials for enhancing effective teaching of Technical Drawing in senior secondary schools in Education District V zone III in Lagos State. Specifically, the study sought to find out;

1. The extent of utilization of instructional materials for enhancing effective teaching of Technical Drawing in senior secondary schools in Education District V zone III in Lagos State.
2. The extent to which instructional materials are organised to enhance effective teaching Technical Drawing in senior secondary schools in Education District V zone III in Lagos State.
3. how instructional materials can effectively be impacted on students' performance in enhance teaching Technical Drawing by teachers in senior secondary Schools in Education District V zone III in Lagos State

Research Questions

The following research questions were raised to guide this study:

1. To what extent are instructional materials available are utilized for enhancing effective teaching Technical Drawing in senior secondary schools in Education District V zone III in Lagos State?

2. To what extent are the available instructional materials organized to enhance effective teaching of Technical Drawing by teachers in senior secondary schools in Education District V zone III in Lagos State?
3. To what extent are the available instructional materials impacted on students’ performance in enhance effective teaching of Technical Drawing by teachers in senior secondary schools in Education District V zone III in Lagos State?

II. Methodology

A research design used in this study was descriptive survey design. The area of the study is Education District V zone III in Lagos State. The Education District V is one of the education districts in the metropolis of Lagos being economic hub Nigeria and the education district is made of zones for ease of administration. The education district V zone III include the senior secondary schools in Badagry areas in Lagos state and this zone is carefully selected for the purpose of the study. The population of the study was made up of sixty (60) technical drawing teachers randomly selected from six senior secondary in Badagry Education District V, Zone III. A well-structured questionnaire with thirty items was developed to collect the data. The questionnaire had a 4-point rating scale with response categories of Strongly Agreed (4), Agreed (3), Disagreed (2), Strongly Disagreed (1). No sampling technique was used because the population size is manageable. The questionnaire was validated by three technical drawing teachers at the department of mechanical craft practice Government Technical College Ado Soba, Lagos State. The trial test was conducted at Community Senior Secondary School Ota, Ogun State. The reliability coefficient obtained was 0.81 using Cronbach Aloha co efficient. Sixty copies of questionnaire were administered and returned. The data collected were analysed using mean and standard deviation.

III. Results

Research Question One: To what extent are instructional materials available are utilized for enhancing effective teaching Technical Drawing in senior secondary schools in Education District V zone III in Lagos State?

Table 1: Mean and Standard Deviation Responses on Utilization of Instructional Materials used for effective Teaching of Technical Drawing in Senior Secondary School.

S/N	Items	X	SD	Remarks
1.	Functional drawing instruments are available in the drawing studio	2.33	0.95	Rejected
2.	Availability of adjustable white board drawing sets	2.17	1.22	Rejected
3.	Availability of adjustable protractors for drawing circle and measuring angles	1.82	0.87	Rejected
4.	Availability of French curves for drawing curves	1.87	0.72	Rejected
5.	Use of application of software such as auto cad among others	2.18	0.93	Rejected
6.	Use of Auto-CAD package for teaching	1.83	0.38	Rejected
7.	Availability of adequate computer system	1.75	0.44	Rejected
8.	Availability of makers, drawing papers and cleaners	2.67	0.95	Accepted
9.	Use of stencils for creating letters and designs on a surface	2.43	1.10	Rejected
10.	Availability of Tee square for drawing horizontal and vertical lines	3.13	1.10	Accepted

Table 1 revealed that the instructional materials available are adequate enough to cater for effective teaching of Technical Drawing in senior secondary schools in Education District IV in Lagos State. Items 1-7 and 9 had a mean range of 1.75 to 2.48. This implies that that the respondents rejected on items 1 to 7 on the basis that modern instructional materials and facilities are not available to teach technical drawing in our senior secondary schools. The standard deviation of the items also ranged from 0.38 to 1.22. This implies that the responses were close to one another in their opinions and mean values were below the cut-off point. Similarly, the 8 and 10 items had mean as 2.67 and 3.13 respectively. This also revealed that the respondents agreed on these items because their means were above the cut-off point. The standard deviation of the items was 0.95 and 1.03. This showed that their mean values were above the cut-off point.

Research Question Two: To what extent are the available instructional materials organized to enhance effective teaching of Technical Drawing by teachers in senior secondary schools in Education District V zone III in Lagos State?

Table 2; Mean and Standard Deviation Response on Organisation of Instructional Materials used for enhancing Effective Teaching of Technical Drawing in Senior Secondary School.

S/N	Items	X	SD	Remarks
1.	Drawing instruments are well organised during instructional delivery.	2.28	1.21	Rejected
2.	Teacher teach in a well cleaned and ventilated drawing studio with drawing boards well positioned.	2.73	1.01	Accepted
3.	Drawing sets are well arranged for instructional delivery	2.23	1.09	Rejected
4.	Drawing instruments are arranged and kept in safe place by the teacher	2.17	0.69	Rejected
5.	Teacher has good knowledge of application of auto cad to facilitate demonstration	2.70	1.08	Accepted
6.	Use of drawing instruments enhances effective learning of	2.25	1.17	Rejected
7.	Inductive courses are organised for teacher in modern technique of teaching technical drawing	2.17	0.81	Rejected
8.	Availability of internet connectivity for teaching Auto CAD	2.15	0.81	Rejected
9.	Availability of interactive board	2.22	0.78	Rejected
10.	Traditional method of teaching technical drawing be discouraged	2.00	0.41	Rejected

Table 2 above revealed that 1, 3, 4, 6 to 10 items show that the extent to which the available instructional materials are organized to enhance effective teaching of Technical Drawing in senior secondary schools in Education District IV in Lagos State is not encouraged. They have their mean scores range from 2.00 to 2.28 which is below the cut-off point of 2.50 with standard deviation ranges from 0.69 to 1.21 respectively. The technical drawing teachers did not used to arrange and organize instructional materials in a way that it will for enhance effective teaching Technical Drawing in Senior Secondary Schools in Education District IV. Similarly, the 2 and 5 items had mean as 2.73 and 2.70 respectively. This also revealed that the respondents agreed on these items because their mean scores were above the cut-off point. The standard deviation of the items was 1.01 and 1.08 respectively. This showed that their mean values were above the cut-off point.

Research Question Three: To what extent are the available instructional materials impacted on students' performance in enhance effective teaching of Technical Drawing by teachers in senior secondary schools in Education District V zone III in Lagos State?

Table 3; Mean and Standard Deviation Response on how Instructional Materials Has Impacted on Students Performance in Enhancing Effective Teaching of Technical Drawing.

S/N	Items	X	SD	Remarks
1.	There are adequate drawing boards for use	2.25	0.60	Rejected
2.	Availability of students set square	2.43	0.81	Rejected
3.	Availability of students drawing sheet for practice and assignment	2.00	0.41	Rejected
4.	Availability of students French curves	2.40	0.85	Rejected
5.	Availability of drawing instruments and materials encourage the students to learn	3.25	1.17	Rejected

6.	Technical drawing instruments are well arranged at every lesson	2.40	1.03	Rejected
7.	Students are given opportunity to demonstrate using marker board Instruments during lesson period	3.08	1.12	Rejected
8.	Students usually complete their Technical Drawing assignment	2.33	0.95	Rejected
9.	Students perform better in external exam	2.07	0.84	Rejected
10.	Enough time is allotted for teaching of technical drawing	2.40	0.85	Rejected

Table 3 revealed that items 1,2,3,4,6,8,9,10 were rejected. The mean score values range from 2.00 to 2.43. These mean values are below the cut-off point of 2.50. The standard deviation ranges from 0.41 to 1.03. This showed how instructional materials has not effectively utilized to enhance teaching of Technical Drawing in senior secondary schools and positive impact are made on the students.

IV. Findings and Discussion

The findings of the study revealed that instructional materials for the teaching of technical drawing were insufficiently available even the few available instructional materials were well organized and not very well utilized for enhancing teaching of the subject. This implies that availability of instructional materials for teaching of technical drawing were grossly inadequate. Findings of the study is in line with Abimbola (2017) observed that the shortage of educational facilities characterized almost all levels of African’s educational system excluding South Africa. Where some facilities are produced they are grossly inadequate. This situation has a lot of implications for students’ performance and interest in the subject. This implies that benefit in the teaching and learning process cannot possibly be achieved when best practices is used and adopted in developing countries such as Nigeria. The findings of this study as corroborated by various researchers that revealed the status of technical drawing in Nigerian technical colleges are substandard. The traditional approach in teaching technical drawing in technical colleges 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). This view is substantiated in the explorative survey carried out by the researchers as the technical drawing classrooms in the technical colleges visited are set up using conventional teaching approach without any component of a 21st century classroom. This makes some students to usually stay away from classes while some expressed their feeling that carrying drawing boards to technical drawing studio remain burdensome. According to Babajide and Bolaji (2013), lack of technical drawing instruments and textbooks frustrate both teachers and students in the teaching and learning process, by making the teaching of technical drawing to be theory oriented rather than practical oriented. The concepts of technical drawing require a lot of skills and practical which the teacher is bound to demonstrate. The findings also revealed that enhancing effective teaching and learning of technical drawing, the teachers should adopt the kind of instructional delivery mode that can play an important role in skills acquisition and meaningful learning. It is also important use of computer applications for effective teaching and learning of technical subjects. The effective utilization of applications in teaching and learning of technical drawing depends on the availability of these facilities and teacher’s competence with ability in using them. The instructional materials should be adequately supplied and well utilized so as to provide learning experiences needed by the learner for the expected learning outcomes. Bakare (2017), opined that the availability and effective organization of instructional materials and technical drawing instruments will not only increase the performance of the teachers but will also help the students to acquire the manipulative skills of engineering drawing required to prepare them for immediate employment in the world of work. This is in line with what Balarabe and Mannir (2018) said, apart from the usual instructional materials for technical drawing, there is need for the procurement of computer system with software application for teaching modern engineering and construction drawings that keep the students with the demand of global market.

V. Conclusion

The teachers teaching technical drawing and students vividly agreed that instructional materials, technical drawing instruments and teacher-made instructional materials, are essentially required for enhancing effective teaching and learning of technical in secondary schools in Education District zone III in Lagos State. The need for effective use of instructional materials in teaching of technical drawing cannot be emphasized. Therefore, there need to be enhanced provision of instructional materials, drawing instruments, use ICT applications for designs should be adequately provided to aid effective teaching of the subject.

VI. Recommendations

The following recommendation were made in line with the findings;

1. Technical drawing subject should be mandatory in the Senior secondary schools for science and technical Students.
2. Regular training should be organised for Teachers teaching technical drawing in digital instructional techniques using the application of software such Auto CAD to actively impart in the students' quality knowledge and skills.
3. Technical drawing as a subject should be made the entry requirements into all science, engineering and technology courses in the institutions of higher learning.
4. A well-equipped drawing studio with modern instructional materials should be available and adequate for teaching and learning technical drawing in schools
5. The qualified technical drawing teachers should have employed to teach the students so as to know how to stimulate learning and arouse students' interest.
6. The students should be properly counselled on how to develop a good attitude towards technical drawing as a subject and encourage to build career in engineering and science related field.

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