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Jane Itohan Oviawe

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## Benefits and Limitations of E-learning for Technical Drawing in Edo State Model Secondary Schools, Nigeria

Mrs. Jane Itohan Oviawe (Ph.D)

Department of Vocational and Technical Education, Ambrose Alli University, Ekpoma,  
Edo State, Nigeria

Email: [janeoviawe@yahoo.com](mailto:janeoviawe@yahoo.com)

### Abstract

This study examined the benefits and limiting factors of e-learning for technical drawing in Edo State Model Secondary schools by analyzing the perceptions of technical teachers and students using descriptive survey research design. The population of this study consisted of 2,500 students and 16 technical teachers. Purposive random sampling technique was used in the selection of 1000 students and all the 91 technical teachers were used as subjects of the study. A 30-item questionnaire with an internal consistency of 0.68 yielded by Cronbach alpha applied on results of 40 subjects outside the sample was used to collect data. Mean statistic was used to answer the research questions while t-test was used to test the hypothesis at 0.05 level of significance. Findings revealed that technical drawing teachers and students were aware of the benefits derivable from the use of e-learning for technical drawing but identified poverty, insufficient ICT facilities, deficient pre-service preparation of teachers in e-learning technologies as limiting factors in the use of e-learning approach for teaching and learning of technical drawing. Recommendations include among others: the re-curriculation of technical teacher education programmes to imbibe heavy doses of e-learning technologies, special budgetary provisions for e-learning technologies in schools, as well as erection of technical drawing studios.

**Keywords:** Technical Drawing, E-Learning, Benefit, Limitations

### Introduction

Due to globalization, computer has become a very vital tool in almost all workplace, economy, education, and in lives of individuals. In recognition of this necessity, the Federal Republic of Nigeria in 1987 set up the National Committee on computer education to determine the modes of integrating computer education into the country's education system. The committee later established a policy in computer education which states that Nigerians at various levels of education should be brought into contact with the new modern tool, so that they can

use it, appreciate its potentials, understand how it works, learn how to apply it to solve every day problem (Agbatogun, 2006).

Drawing is a graphical representation of a real thing, an idea or a proposed design for construction. Drawing has been developed along two purposes, namely: artistic and technical. Technical Drawing is a specialized graphic language. Its main function is communication of technical information. It is mostly used by people engaged in construction, manufacturing of machines, ships, aircrafts, among others. Technical Drawing is used when words alone will not convey all the information required. This language of lines, signs and symbols has to be learned before it can be expressed on paper. Okoro in Uzodinma (2007) emphasizing the importance of technical drawing stated that Technical Drawing is essentially a language by means of which technicians, engineers, craftsmen and industrialists communicate. Technical Drawing is a pictorial language which depends on pictures and lines for conveying the intended meaning. The objectives of Technical Drawing according to NERDC (2007) include:

- i. to provide an understanding of the theoretical and applied concepts relating to the use of ICT to facilitate visual communication of ideas in the construction and production industries;
- ii. provide introduction to modern Drawing Studio practice;
- iii. lay the foundation for technological development and further studies in Building and Engineering; and
- iv. stimulate, develop and enhance entrepreneurship skills in the diverse areas of Drawing Studio practice.

Technical drawing is offered in Nigerian Senior secondary schools, technical colleges and tertiary institutions that offer courses in the areas of Technical Education, Architecture, Urban and Regional Planning and Engineering. The conventional teaching and learning of technical drawing in most Nigerian educational institutions have been characterized by the use of manual facilities such as drawing board, dividers, compasses, set-squares, protractors, French curves, drawing paper, drawing pen, pencils, scales, eraser, among others. These manual tools make drawing to be more time and energy consuming. The arrival of information and communication technologies (ICTs) presented a more interesting and efficient facilities for the teaching and learning of technical drawing in educational institutions in Nigeria.

The educational system in Nigeria is guided by the provisions of the national policy on education as stipulated by the Federal government. The federal government's policy on education continues to be revised in the face of new challenges so as to make the education relevant. The national policy provides for the furtherance of ICT in the globalized setting. Such provisions, among others, include enhancing access to quality education for all learners, improving the education delivery system using ICT tools in the teaching and learning processes, as well as ensuring globally competitive educational system using ICT as delivery system as being radicalized in developed and developing countries (Federal Republic of Nigeria (FRN), 2013). It is not surprising thus, that the former minister of Education, Dr. Sam Egwu launched e-learning for use in the Nigerian education system early in 2010. To this end, government began to shop for ideas and equipment that would enable schools apply e-learning for educational purposes.

E-learning is all about learning that occurs at the computer. E-learning includes knowledge acquisition through on-line via the internet or off-line through CD-ROM, motion picture,

reprographic media, micro film, voice mail, the computer, multimedia systems, video conferencing, power-point presentation, short messaging service (SMS), radio among others. While the on-line processes require the use of browsers such as internet explorer, they can come in form of audio, visual and audio-visual applications. E-learning is browser based learning. It has the capability of using network technologies to create, promote, deliver and facilitate learning anytime and anywhere. It fosters the delivery of individualized, comprehensive, dynamic learning content in real time; aiding the development of communities of knowledge, linking learners and practitioners with experts (Laurillard, 2007). DFES (2003) posited e-learning has the potential to revolutionize the way people teach and learn.

The benefits of e-learning as presented by Onwuka & Koko (2010) include the fact that it promotes learners empowerment; enhances learning performances; promotes staff development; increases instructional resources; improves human welfare and makes it possible for people to satisfy their basic needs; serves as private tutor; provides rapid and accurate feedbacks to students which contribute towards positive motive; allows students to focus on strategies and interpretations of answers; promotes higher order thinking and better problem solving strategies; and provides educational service and outside-classroom learning for both teachers and students. According to Olakulehin (2007), pedagogy through the application of ICTs has the advantage of heightening the motivation; helping recall previous learning; providing new instructional stimuli; activating the learner's response; providing systematic and steady feedback; facilitating appropriate practice; sequencing learning appropriately; and providing a viable source of information for enhancing learning.

Ajadi et al (2008) posited that the commonest type of e-learning earlier adopted in Nigerian schools were in form of lectures notes on CD-ROM which could be played whenever learners desired. The challenge of the method, they added, was that the number of students per computer inside of which the facilities were available, were too many as compared to when lectures were received in the classroom. Oduah (2009) asserted that some institutions adopted the use of internet facilities in cyber cafés on special schedules to deal with the dearth of e-learning technologies in schools. Oduah added that the effort was not maintained easily because of incessant power failure and high cost of running generating sets. It is believed that people in cyber cafés have diverse intentions on the net at the same time. Challenges associated with the broad band all combined to make the application of multimedia interaction difficult in developing countries. The use of computer-based resources can help to foster teaching (Okele, 2008). Adirika (2011) reported that ICT facilities fosters teaching and learning as teachers and students are enabled to access, listen to, copy and respond to different models. Ikelegbe (2007) asserted that education in Nigeria cannot be relevant without adequate preparation of new generation of learners to effectively use the new ICT in their professional practices. Dabesaki (2005) opined that e-learning ensures broad viability and availability of educational opportunities and that learning materials can be accessed irrespective of time and space. Ohiwerie (2014) asserted that e-learning enables greater learners autonomy; unlocks hidden potential for those with communication difficulties; enables students to demonstrates achievement in ways which might not be possible with traditional methods; enables tasks to be tailored to suit individual skills and abilities; and provide greater opportunity for teacher-to-teacher and student-to-student

communication and collaboration. It can thus be inferred that Edo State government was on the right track when she set about supplying computers to her model secondary schools.

Great importance has been attached to ICT in Nigeria such that its knowledge is a now pre-requisite for examination (JAMB), Post-Unified Tertiary Matriculation Examinations (PUTME), employment and job retention. Despite this, a lot of challenges are facing an important innovation – the use of e-learning in the teaching and learning of technical drawing in secondary schools. The extent of awareness, use and application of these facilities supplied to schools seem unclear. Adeyemo, Falade & Adesope (2009) stated that several factors ranging from inadequate funding, non-recognition of ICT, poor power supply, lack of basic ICT infrastructures hamper the usage and implementation of ICT devices in teaching and learning. Oduah (2009) posited that both teachers and students frown at poor provision of ICT tools and equipment needed for instructional purposes. Adirika (2011) stated that teachers lack the skills for effective utilization of e-learning technologies in Nigeria. Agbatogun (2006) asserted that innovations in educational system are usually problematic to classroom teachers who will put the theory into practice because of difficulties in changing habits, anxiety, sense of futility in attempting to adopt the new idea, and fear of failure; lack of time needed to prepare teachers for acquaintance with the new idea, individual and gender differences, imbalance between the theory and practice, experience, lack of computer competence, could be source of barrier to teachers' inability to integrate the e-learning.

It stands to reason that the perception of teachers and students in schools that received computers from Edo State government be harnessed in order to gain insight into their level of usefulness in the education venture, after all, education is a natural response to the struggle for survival as individuals, (clearness and teachers) acquire knowledge and skills that would enable them to cope with life and society (Wikipedia, 2008). Teachers and students perceptions of educational facilities, processes and procedures could be explored to advantage for improvement purposes at least.

### **Statement of the Problem**

The indispensable role of e-learning in the education of students at all levels of education is acceptable by all. It is highly disadvantageous for educational processes in Nigerian secondary schools to continue to use non-technological mode for disseminating knowledge in technical drawing. It could be equally problematic not to use whatever is available as a result of other inhibiting factors. Technology based approaches would tremendously facilitate technical drawing teaching and learning; equip students appropriately, in record time and at a reduced cost (Okele, 2008). It is the believe of the researcher that ICT from which e-learning emanated, is limited by certain factors which affect the effective application of e-learning in schools, especially in the area of technical drawing teaching and learning. What are the factors, if any? How do technical drawing teachers and students perceive them? Are technical drawing teachers and students really aware of the benefits derivable from using the computer in their teaching and learning efforts? Answers to these questions form the concern of this study.



### **Purpose of the Study**

The purpose of this study was to find out the perception of technical drawing teachers and students on the benefits and limitations of e-learning pedagogy in the teaching and learning of technical drawing in Edo State Model secondary schools. Specifically, this study sought to find out the:

1. Benefits derivable from using e-learning for teaching and learning technical drawing
2. Factors hindering the utilization of e-learning in technical drawing.

### **Methodology**

This study adopted a descriptive survey research design on the perception of teachers' and students' on the benefits and limitations of e-learning pedagogy for teaching and learning technical drawing in Edo State secondary schools.

The population for this study consisted of all the 16 technical teachers and 2500 junior secondary school students in the five model secondary schools in Edo State. The entire 16 technical teachers in the model secondary schools was used, while 500 students out of the entire population 2500 students were randomly selected using the random sampling technique, and this formed the sample used for this study.

The instrument used for data collection was the researcher developed questionnaire titled: Benefits and limitations of e-learning pedagogy in teaching and learning of Technical Drawing Questionnaire. It consisted of two sections. Section A bordered on the bio-data of the respondents while section B consisted of 30-items with a five point Likert-type scale: Strongly agree -5; Agree -4; Undecided -3; Disagree -2; and Strongly disagree -1. The respondents made judgments upon the statement by ticking (x) in any of the scale.

The instrument was validated by three experts in test and measurement, computer science, and technical teacher education from Ambrose Alli University, Ekpoma. The reliability of the instrument was determined by administering the instrument on a pilot group of 40 students within the target population, but who were not part of the main study. Cronbach Alpha was used in determining the internal consistence of 0.68.

The questionnaires were administered with the assistance of five research assistants to the technical teachers and students in the Edo State Model secondary schools used for this study. The entire 516 questionnaires distributed were dully completed and returned which formed 100% return rate.

The data collected from this study were analyzed using mean, standard deviation and t-test statistics. The mean was used to answer the research questions while the t-test was used in testing the hypothesis. Any calculated mean equal to or above 3.50 was regarded as Agreed, and any mean below 3.50 was regarded as Disagreed. Any calculated t-test value above the table t-test value of 1.96 at 0.05 level of significance was regarded as significant and any calculated t-test value below 1.96 at 0.05 level of significance was regarded as not significant.

## Findings

**Research Question 1:** What are the benefits derivable from using e-learning for teaching and learning technical drawing?

**Hypothesis 1:** There is no significant difference between the perception of teachers and students on the benefits derivable from using e-learning for teaching and learning technical drawing.

**Table1: Mean ratings of Teachers and Students on the benefits of e-learning Pedagogy for teaching and learning Technical Drawing**

S/N	Benefits of e-learning	Teachers		Students		$X_t$	t-cal	Remark
		$X_1$	$SD_1$	$X_2$	$SD_2$			
1.	Facilitates students' individualized technical drawing learning.	4.36	0.88	4.51	1.10	4.44	1.06	Agree
2.	Facilitates retention of learned materials.	3.38	0.83	3.46	0.74	3.42	1.01	Agree
3.	Illustrates personal study habits.	3.84	0.89	4.02	1.05	3.93	1.88	Agree
4.	Generates enthusiasm for global information in technical drawing.	4.21	1.05	4.35	0.82	4.28	1.46	Agree
5.	Illustrates abstract concepts with clarity	3.04	0.97	3.12	1.01	3.08	0.89	Agree
6.	Enhances interactivity among students.	4.36	0.91	4.50	1.03	4.43	1.46	Agree
7.	Offers opportunity for practical training to more students at more places.	3.60	1.11	3.76	0.78	3.68	1.63	Agree
8.	Assists technical teachers to select and apply suitable online assessment of students' performances.	3.42	0.86	3.50	0.95	3.46	0.89	Agree
9.	Sharpens technical students' senses in understanding of topics/discussions.	4.05	0.87	4.15	0.96	4.10	1.09	Agree
10.	Encourages technical teachers to give online assignments to students.	3.02	0.91	3.14	1.01	3.08	1.25	Agree
11.	Assists in further developing of technical teachers professional skills and competencies.	3.84	0.76	4.00	0.89	3.92	1.95	Agree
12.	Makes technical drawing more enjoyable and							

practicable.	3.00	0.92	3.10	1.01	3.05	1.04	Agree
13. Gives greater exposure to vocational and workforce skills.	3.12	0.68	3.00	0.82	3.06	1.62	Agree
14. Create greater enthusiasm for learning amongst students'.	3.12	0.83	3.02	0.98	3.07	1.12	Agree
15. Provides learners with additional resources to access resource-based leaning.	3.38	0.83	3.46	0.74	3.42	1.01	Agree
16. Offer opportunity for Multiple technologies delivered by teachers.	3.31	1.05	3.35	0.82	3.33	1.46	Agree
17. Enhances professional development and the effectiveness of the application of ICTs with students through collaboration with peers	3.04	0.97	3.12	1.01	3.08	0.89	Agree

In response to research question 1, Table 1 reveals that all the respondents rated the 17 items as benefits of e-learning for teaching and learning technical drawing with mean scores ranging from 3.05 to 4.43. This implies that the respondents agreed that all the 17 items were benefits of e-learning for technical drawing. Technical drawing teachers rated the item 6, enhancement of interactivity among students highest with a mean score of 4.36, while students considered the facilitation of individualized learning as the most important benefit with a mean of 4.51.

**Research Question 2:** What are the factors hindering the utilization of e-learning in technical drawing?

**Hypothesis 2:** There is no significant difference between the perception of teachers and students on the factors hindering the utilization of e-learning in technical drawing.



**Table2: Mean ratings of Teachers and Students on the factor limiting the application of e-learning Pedagogy to Technical Drawing**

S/N	Items	Teachers		Students		$X_t$	t-cal	Remark
		$X_1$	$SD_1$	$X_2$	$SD_2$			
18.	Lack of knowledge about ways to apply e-learning.	3.97	1.07	4.10	1.17	4.04	-0.42	Agree
19.	Epileptic power supply.	4.03	1.01	4.00	1.17	4.02	0.10	Agree
20.	Lack of confidence among teachers.	4.23	0.73	4.20	0.62	4.22	0.15	Agree
21.	Lack of time in the school schedule for e-learning.	4.14	0.73	3.85	0.59	3.99	1.53	Agree
22.	Lack of skills on how to use e-learning.	3.94	0.73	4.00	0.79	3.97	-0.27	Agree
23.	Absence of access to e-learning facilities at the home of the teachers and students.	4.14	0.77	4.30	0.73	4.22	-0.74	Agree
24.	Lack of initial pedagogical training.	4.26	0.70	4.20	0.62	4.23	0.30	Agree
25.	Negative attitude of teachers and students to e-learning.	3.97	0.79	3.80	0.62	3.89	0.84	Agree
26.	Large number of students in the class for technical drawing lesson.	2.80	0.89	2.98	0.83	2.89	0.89	Disagree
27.	Absence of integration of e-learning in technical drawing curriculum.	3.97	0.79	3.80	0.62	3.86	0.84	Agree
28.	Absence of access of e-Learning facilities at the office of technical teachers.	4.06	0.68	4.15	0.67	4.11	-0.49	Agree
29.	Insufficient of ICT facilities for technical drawing learning.	4.23	0.73	4.40	0.68	4.32	-0.86	Agree
30.	Non-availability of internet connectivity.	4.43	0.65	4.30	0.73	4.37	0.67	Agree
31.	Lack of ICT awareness.	3.00	0.86	2.90	0.77	2.95	0.47	Disagree
32.	Lack of requisite skills to access students on-line assignments.	3.15	0.59	2.96	0.76	3.00	1.01	Agree
33.	Lack of funds to procure necessary technology for e-learning in technical drawing.	4.43	0.65	4.25	0.72	4.34	0.94	Agree
34.	Deficient pre-service							

training of teachers in e-learning technologies.	4.26	0.70	4.20	0.62	4.23	0.30	Agree
35. Lack of well designed e-learning syllabus for technical drawing.	4.23	0.73	4.20	0.62	4.22	0.15	Agree
36. ICT phobia syndrome.	2.85	0.93	2.96	0.76	2.91	0.58	Disagree
37. Lack of in-service training to prepare teachers for e-learning implementation in technical drawing.	4.06	0.68	4.15	0.67	4.11	-0.49	Agree
38. Teachers' inability to adapt to constant changes.	3.71	1.18	3.90	0.72	3.81	-0.64	Agree
39. High import tariffs and less Price competition.	4.23	0.73	4.40	0.68	4.34	-0.86	Agree
40. High Internet Services Provider (ISP) fees.	4.43	0.65	4.30	0.73	4.37	0.67	Agree

In response to research question 2, Table 2 indicates that respondents rated non-availability of internet connectivity and high internet services provider fees as the most inhibiting factors in the use of e-learning with a mean score of 4.37. Technical drawing teachers and students did not perceive lack of ICT awareness and phobia syndrome as limiting factors in e-learning application for technical drawing lesson. This implies that all the respondents agreed that 17 out of the 20 items were factors inhibiting the application of e-learning for teaching and learning technical drawing. Table 2 also indicates that the t-calculated value of all the items were less than the t-critical value of 1.96 at 0.05 level of significance. Therefore, the null hypothesis of no significant difference between the perception of teachers and students on the factors hindering the utilization of e-learning in technical drawing is retained.

### Discussion of Findings

Findings from Table 1 reveal that all the respondents agreed that the 17 items were benefits of e-learning related specifically to teaching and learning of technical drawing. The finding of this study indicates that both teachers and students' of technical drawing show a high awareness level of the benefits of e-learning. To this extent, therefore, technical teachers and students do not differ in their perception. This finding is line with assertion of Okele (2008) that ICT based education is of immense benefit and can improve teaching and learning. Dabesaki (2005) also inscribed the benefits of using the internet for instructional purposes. Similarly, Adirika (2011) posited that ICT technologies enhance teaching and learning as teachers and students have various models to listen to, hear and watch demonstrations with minimal interferences.

Findings from Table 2 indicates that technical teachers rated poverty and high internet services provider fees as the most inhibiting factors in the use of e-learning, while students rated insufficient ICT facilities and deficient pre-service preparation of teachers in e-learning technologies as the most inhibiting factors . Technical drawing teachers and students did not perceive lack of ICT awareness and phobia syndrome as limiting factors in e-learning application

for technical drawing lesson. This implies that all the respondents agreed that 17 out of the 20 items were factors inhibiting the application of e-learning for teaching and learning technical drawing. This finding is in line with that of Adeyemo, Folade & Adesope (2009) who reported that various factors such as inadequate funds, non-recognition of ICT, poor power supply among others hamper the implementation of ICT devices in instructional activities. In the same vein, the findings of this study is in line with that of Oduah (2009) who asserted that teachers and students frown at the poor provision of ICT equipment and other needed ICT devices for instructional purposes. Corroborating the findings of this study, Uzodima (2007) asserted that most Nigerian citizens are below poverty line and this inhibits the acquisition of new technologies by most Nigerians. What it takes to buy a drawing table, tee square, boards and pencil used in the traditional teaching and learning of technical drawing cannot buy a technical drawing software alone not to talk of computer.

Findings from Tables 1 and 2 revealed that there was no significant difference between the perception of technical teachers and students on the factors hindering the application of e-learning for teaching and learning technical drawing.

### **Conclusion and Recommendations**

From the findings of this study, it is concluded that effective teaching and learning of technical drawing require the use of appropriate and adequate e-learning facilities in teacher and students preparation. Several, varied and comprehensive teaching and learning tools and resources facilitate education. Since education is a natural response to the struggle for individual and societal survival, it should equip its recipients and the society with competitive skills. In this ICT age and globalized era, educating without appropriate and adequate e-learning technologies would make the achievement of educational objectives difficult. Adopting e-learning properly with appropriate technologies and other needs is important to make Nigeria a true member of the globalized community. The following recommendations are made based on the findings of this study:

1. Government at all levels should procure more ICT facilities to aid and foster teaching and learning. If the model secondary schools in Edo State that have received computers from the State Government were of the view that they are grossly inadequate, one can imagine what the views of other secondary schools who have not received at all would be.
2. To achieve the above recommendation, government at all levels should make special budgetary provisions for the procurement of more ICT facilities to ensure effective supply to all other secondary schools in Edo State.
3. All secondary schools should be provided with a technical drawing studio where the equipment can be safely installed, used and maintained. If accommodation were not provided for the ICT resources, they would be susceptible to pilfering, theft and easy damage. PTA can be established and explored for the erection of rooms and laboratories where they are non-existent. Gradual and consistent procurement, installation and use of e-learning technologies can be a good start in this era of global economic crises. Effort can be initiated at the school level.
4. Teacher education programmes should be re-curriculated to imbibe heavy doses of e-learning technologies, this way, teachers in training would to use and also master the

ICT/e-learning technologies themselves so that when they become certified, they would not find them strange.

5. Awareness is good but usage is better. Workshops, seminars and in-service training on the use of e-learning technologies for technical drawing should form priority issues for professional teacher associations. These associations can initiate, sponsor or partner with donor agencies for the procurement of consultants and experts that would put teachers and education managers through in the application of ve-learning technologies and other modern ICT resources.
6. All secondary schools in Nigerian should be provided with high capacity soundproof generators for the operation of existing e-learning tools and other power needing accessories. Allowances should be provided for fueling the generators to ensure that they can run whenever they are needed for instructional purposes.
7. Government should implement the provisions of the national policy on education on the employment of technicians and technology experts in schools for the operation, handling and maintenance of ICT equipment supplied to the schools.

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