International Journal of Research Publication and Reviews

Computer Graphics and Technical Drawing Students' Attitude and Engagement in Mechanical Drawing in Unity Schools, Rivers State.

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ABSTRACT

This study investigated effect of computer graphics on Technical Drawing students' attitude, and engagement in Mechanical Drawing in Unity Schools, Rivers State. The aim of the study is to investigate the effect of AutoCAD and CorelDraw as computer graphic software on students' attitude and engagement towards the Mechanical Drawing aspect of Technical Drawing. Two objectives were stated in the study, and descriptive survey was adopted for the research designs. The study was guided by two research questions and two null hypotheses tested at 0.05 level of significance. The population for the study consisted of 511 Technical Drawing students from two Unity Schools in Rivers State. Purposive sampling technique was used to select a sample size of 48 Senior Secondary School 11 (SS2) Technical Drawing students all in intact classes. The instruments used for data collection, were; Technical Drawing Students' Attitude Questionnaire (TDSAQ), and Technical Drawing Students' Engagement Scale (TDSES), which were validated and tested for reliability. The reliability of the instruments was determined using Cronbach Alpha, and co-efficient of 0. 85 and 0.61 were obtained respectively. Mean and standard deviation were used to answer the research questions, while the hypotheses were tested using dependent sample t-test. Results from findings showed that students showed positive attitude towards Mechanical Drawing after the application of the computer graphic software. The study also revealed a high level of engagement of students in Mechanical Drawing after the use of computer graphics. It was therefore recommended among others, that since computer graphics was found to positively affect Technical Drawing students' attitude and level of engagement in Mechanical Drawing, the software (AutoCAD and CorelDraw) should be incorporated into the teaching and learning of Mechanical Drawing in secondary schools.

Keywords: Mechanical Drawing Computer graphic software, Attitude, and Engagement.

INTRODUCTION

With the constant and rapid move of educational technology trends; where the traditional classroom is fast moving into the 'modern technology classroom'; where the teaching and learning is moving from the hands-on activities (that is, where the teacher only relies on the text books), to the 'minds-on experience' (where the teacher deals with the analysis and reflective pedagogical actions), Obanya, (2014). This educational technology moves cuts across all levels of education and all subjects' areas. This drastic move of educational technology, calls for quick responds of paradigm shift from the way instructions are delivered in the classrooms to fit the need of the time (i.e. 21st century learners). According to Ainselee (2018), the 21st learners are curious learners who want to explore the world of technology around them.

Technical Drawing is one of the ways the draughtsman (a person skilled at drawing) communicates his ideas. The draughtsman is able to tell his stories or convey his ideas through drawings, graphic illustrations or even symbols. Technical Drawing is a means of communicating among the engineers and technical illustrators, and it is an integral and foundational base of all Engineering and related courses studied in tertiary institutions. It is one of the technology-based subjects offered in senior secondary schools, and is a pre-requisite subject for studying any Engineering course in tertiary institutions in Nigeria. Technical Drawing is employed in all fields of Engineering, which include among others; Auto mobile, Civil Engineering, Architectural Engineering, Structural and Mechanical Engineering.

Technical Drawing, basically comprises of three major aspects of drawing: Geometrical construction, Building Drawing and Mechanical Drawing. Geometrical drawing or construction is centered on the use of geometric shapes to produce or create designs, patterns and more complex drawing (Hak, 2022). Building Drawing on the other hand, is that aspect of Technical Drawing that is concerned with the drawing of building plan which include the drawing of the floor plan, the elevations and the sectional view. While Mechanical Drawing, which is also referred to as Machine Drawing or Engineering Drawing is that aspect of Technical Drawing that deals with the drawing of machines and assembling of machine parts, it is a very vital part of Technical Drawing.

For the purpose of this study, only the Mechanical Drawing aspect of Technical Drawing was considered.

LITERATURE REVIEW

The Mechanical Drawing is an aspect of Technical Drawing. It is the representation of different machine components according to set standards, providing all the external and internal details of machine that can be used for manufacturing (Masroor, 2012). Since producing of the article is not done by the designer or the draughtsman, it is important that the drawings are made with strict adherence to the set standards rules and guidelines, so that it can easily be interpreted by the person(s) producing the articles or products irrespective of the person(s) location. Therefore, in Mechanical Drawing and Technical Drawing in general, accuracy and neatness of drawing are very essential part in the drawing process. Apart from accuracy and neatness of the drawing, it also requires that the drawings conform to set standards so that it can easily be understood and interpreted by others in the same field irrespective of the locations (Bello, 2015).

The term 'Graphics' according to the Learners' Dictionary (2022) refers to pictures or images on the screen of a computer, Television, et cetera, or pictures, drawings or graphs that can be used as decorations or to produce something for easy understanding. Graphics according to the Cambridge Dictionary (2022) has to do with the presentation of information using graphs, or the application of drawings and pictures in the production of software, books, et cetera. Graphic software as defined by Olele and Abraham (2016) refers to any computer software that can be used to present and manipulate images; and graphic applications are often embedded in word-processing, presentation and spreadsheet software with drawing tools. Also, graphics according to GCF LearnFree.org (2017), refers to ways of communication using graphic elements such as lines, shapes, et cetera. Digital graphics as defined by Clark and Mayer (2008, as cited in Agwu and Gogo, 2018) refers to illustrations such as drawings, charts, maps or photo and active graphics such as animations and videos.

Benefits of application of computer graphics software in Mechanical Drawing

The following are some advantages of using computer graphic software as highlighted in (Grabowski, 2002, cited in Siminialayi, 2018):

(i) **Accuracy:** computer-aided drawings are usually drawn and plotted to an accuracy of up to 14 decimal places of the units used, making the numerical entry of dimensions and tolerance more reliable than the conventional method of manual scaling. Accuracy in drawing is of almost important in Technical Drawing and Mechanical Drawing in particular, inorder to produce a drawing that will be suitable for construction and manufacturing purposes. (ii) **Speed:** computer graphics software has the ability to copy, offset, move and array items as well as edit work on the screen. When the user customizes the system for specific tasks, speed of work greatly increases. Speed is another factor that poses challenges in using the manual drawing instruments. Drawing of Machines and their components can be tedious and very challenging and as such, could be time consuming, but the application of the computer graphic software can help to speed-up the drawing process. (iii) **Neatness and Legibility:** the ability of the computer graphic software to produce exact and legible drawings with the help of the plotter in its environment is an evident benefit of the software packages. The traditional or conventional method requires students drawing using pencils and manual drawing instruments; and as such are prone to many mistakes which might result in untidy work and inaccuracy. So with use of the computer graphics neatness and clarity of drawings can be achieved. (iv) **Consistency:** the use of computer graphic software can help to eliminate the problem of inconsistency in drawing due to human error. This implies that with the application of the software, students can easily produce Machine Drawings that are consistent both in line work and design. This therefore suggests that application of the software packages in drawing can help to promote uniformity in the drawing process.

Attitude according to the Oxford Dictionary (2021) is a way someone thinks and feels about a thing. Oxford Advanced Learners' Dictionary (2021) defined attitude as the way a person behaves towards something or somebody which is an indication of how the person feels or think. Attitude is a feeling or the manner of thinking that can have impact on a person's behavior which can be positive or negative (Merrian-Webster Dictionary, 2021). Gogo (2018) defined attitude as a way someone exhibit 'likeness' or 'dislikes' for something which may be both in words and activities. The authors however, defined attitude as a person's mindset about a thing which could either be negative or positive. According to Uche and Agbakwuru (2013), the understanding of the attitude of someone towards a particular thing can help to sustain any positive attitude in that person and the same time correcting any negative attitude of the person.

Attitude structures can be classified in terms of three components which is commonly known as ABC models of attitude; Affective component (which has to do a person's feelings/ emotions about the attitude object); Behavioral component (has to do with the impact of attitude on a person's behavior) and cognitive component (has to do with a person's belief/knowledge about an attitude object), McLeod, (2018).

The term 'Engagement' on the other hand, refers to the amount of attention, curiosity, interest, optimism and passion that a learner exhibit in the learning process (Glossary of Education Reform, 2016). According to the glossary, concept of "students' engagement" is based on the fact that learning improves when learners become inquisitive, interested or inspired and on the other hand, learning suffers when learners become bored, dispassionate, and disengaged. Student engagement refers to "students' willingness, need, desire and compulsion to participate in, and be successful in the learning process promoting higher level thinking of enduring understanding (Mantiza, 2013). The authors therefore defined student engagement as the level of commitment and interest a student shows towards a given task.

The study is anchored on two theories; connectivism and engagement theories;

The study is anchored on the connectivists' theory of learning. Connectivism theory is a network learning theory that gives educators opportunity to bring their learners to the forefront in presenting and making sense of knowledge that will benefit the learners without having to make use of the textbooks or the conventional approach (Darrow, 2009). According to the connectivism theory, learning is promoted when students are allowed to make connections

or link between various nodes (node here refers to any object that can be connected to another object like a book, webpage, et cetera) of information and is able to maintain connection to form knowledge (WGU, 2021). The theory is also of the view that students learn more when they are given the opportunity to explore information and create social network by applying technology in the learning process (Greenwood, 2020). Connectivism theory is a theory that is heavily dependent on the use of the internet to access information to aid learning. The theory is of the opinion that since most learners have access to smart phones and laptops they can easily make use of this medium to connect to the internet to search for information for learning. Connectivism also as a theory, believes that leaning does not only take place in the classroom environment, but learning can also take place outside the classroom environment.

The major proponents of this learning theory are: George Siemens and Stephen Downes in 2005. The study is connected to the connectivism theory, because the students need internet source to be able to apply the computer graphics in the learning process. More so, the teachers need internet access to import images to aid the teaching and learning process and this can make learners to develop interest in the learning process and thereby developing positive attitude towards Mechanical Drawing.

The Engagement theory, is a theory that believes that learners should be meaningful engaged in the learning activities by way of interaction with peers and through useful task. The theory is of the strong view that with the integration of technology into the teaching and learning process, learners' engagement in learning can be enhanced, which might be difficult using the conventional approach (LONGDOM, 2021). The theory is built on the premise that effective learning can only be possible when learners find lessons very useful or meaningful to them and develop high interest in solving given problems (Daway, 2014). This implies that teaching approach employed by the teacher has a strong connection to student engagement as the method used in the teaching process is able to motivate the learners and thus promoting engagement, while also on the other hand, the teaching approach used by the teacher can make learners dislike the learning process and thus resulting to disengagement. The engagement theory is propounded by Greg Kearsley and Ben Shneiderman. The theory is connected to the present study, because it advocates for interactive activities, meaningful and authentic activities that are able to engaged the learners; the theory also promotes collaborative project-based learning. All these activities promoted by this learning theory can make the teaching and learning of Mechanical Drawing engaging and thus promoting better learning outcome.

On empirical study, Andrew, et al. (2018) investigated a study on student attitudes towards technology and their preferences for learning tools/devices. The study examined students' attitude towards 'digital technology' A mix of quantitative and qualitative data were collected from 1102 participants in two Universities in the United Arab Emirates from an English-Language foundation studies program and a first-year General studies program. The authors employed a questionnaire which contained closed-ended and open-ended questions, and this was followed by three focus-group interviews (n = 4, 3, 2). ANOVA and t-tests were used to test for statistically significant difference in the survey data, while qualitative survey and interview data were analyzed for recurring themes. The closed-opened questions that were used to obtained quantitative data consisted of a four-point Likert type scale. Mean and standard deviation were calculated for survey items, while one-way analysis of variance (ANOVA) was used to test for significant difference between means of three or more groups. Results from findings reveals among others, that participants showed positive attitude towards technology usage. It was therefore, recommended among others; that educators and administrators should adopt learning outcomes that is related to digital literacy in the classroom to sustain students' positive attitude in the use of digital technology.

Prema et al. (2015) on a study on students' attitude towards Computer-Aided Design and Drafting(CADD) of Engineering students in Kattakulathur in India. The authors here, used 120 students as sample size, and four research questions and four hypotheses were used to guide the study. Mean and standard deviation were used to provide answers to the research questions, while, ANOVA and Chi square were used to test for the hypotheses. Findings from the study revealed among others; that students' attitude taught with the CADD was high, and the authors therefore, recommended that learners need to be taught more using CADD so as to improve on their competency in the use of the graphic software.

Also, Kareem (2015) carried out an investigation on the effects of Computer Assisted Instruction (CAI) on students' attitude in Biology in Osun State. The author randomly selected a science class in each three purposively selected schools, and sample size of 152 students was used in the study. Students' Attitude to Computer Instruction Questionnaire (SACIQ) was used to assess students' attitude towards CAI. Descriptive and inferential statistics were used to analyzed the collected data. Results revealed that there was no significant different in student' attitude towards computer assisted instruction usage.

On students' engagement, Hans (2021) in a study on the relation between teaching strategies and students' engagement in learning. Adopted a quantitative design survey, and a sample size of 208 Australian primary school teachers. Hans used a five-point Likert-scale questionnaire anchored 1 to 5. Students' engagement as perceived by the instructor was measured by asking instructors about their perceptions of students' involvement in learning. Items included both learners' behavior and emotions like 'work hard' and 'enjoy doing the work'. Data analysis was done in three (3) stages, and Cronbach alpha was used to obtain a reliability coefficient of 0.70. Finding reveals that students exhibit high level of engagement when technology was employed as instruction.

Also in another study, Marcel, (2021) investigated a study on the impact of technology on students' engagement and achievement in English and Mathematics in Adamawa State. The study adopted survey research design. The author in the reviewed study, used simple random sampling technique to select 250 SS 11 students drawn from a population of 14,982 SS 11 in Mubi South L. G. A, Adamawa State. The study was guided by three research questions and three hypotheses, and simple random sampling technique was used to select four schools out of 11 schools, and intact classes were used as respondents to the questionnaires. The instrument employed for data collection was Mathematics/ English Engagement and Achievement Questionnaire (MEEAQ), and each item was scaled on 5-point Likert scale of Strongly Agree, Agree, Disagree and Strongly Disagree (SD). The reliability of the test items was computed using Cronbach Alpha. Research questions were answered using mean and standard deviation, while the hypotheses were tested

using analysis of t-test statistics at 0.05 level of significance. Findings from study revealed among others; that students from highly technology integrated schools had high level of academic engagement which was significantly higher than those from less technology integrated schools. It was therefore, recommended; (i) more ICT training should be done for teachers, (ii) Provision should be made for necessary facilities for technology integration and (iii) partnership of government agencies and software developers for various educative usage.

Similarly, Benhadj et al. (2019) investigated a study on the impact of gamification learning platform called 'kahoot' on students' engagement. Purposive sampling technique was used to select 97 students in senior high school in Morocco. The authors used survey method to collect data, and descriptive statistics was used to analyze quantitative data. They used questionnaire which comprises close-ended 5-point Likert scale of Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD) questions; and the items were developed based on analysis of previous related literature. The survey was administered using Google doc. Collected data was analyzed using SPSS, while Cronbach's Alpha was used as scale for internal consistency and the Cronbach Alpha for students' engagement was 0.97. Results from findings showed that 'kahoot' as a technology instructional tool had positive impact on students' engagement.

STATEMENT OF THE PROBLEM

The analysis reports on Technical Drawing over the past eight years (from 2014 to date) from the West African Examination Council (WAEC) chief examiner, has continually shown reports of candidates' weakness in the area of Mechanical Drawing. The reports are either showing that the candidates performed below average in Mechanical Drawing, or that very few candidates attempted questions on the Mechanical Drawing aspect of Technical Drawing. Mechanical Drawing aspect of Technical Drawing is an integral part of Technical Drawing; as it plays vital role in the production and manufacturing process of various products, ranging from automobiles, aircrafts to locomotives. The attitude of Technical Drawing students towards Mechanical Drawing, and the recurring reports from the WAEC chief examiner on the poor performance of Technical Drawing students in the area of Mechanical Drawing is worrisome and calls for concern. The situation if not checked, would result in low enrolment of students in Mechanical Engineering and related courses in the tertiary institutions which may result in low output of Engineering graduates particularly in the area of Mechanical and Auto-mechanics Engineering. And this, may in turn affect national development considering the role of Mechanical and Auto-mobile Engineering in nation building. Therefore, the study seeks to find out whether the application of computer graphics software into the teaching and learning of Mechanical Drawing will help to change students' attitude towards Mechanical Drawing, increase their level of engagement and thus fostering better learning outcome in that area in Unity Schools, Rivers State.

AIM AND OBJECTIVES OF STUDY

This study aimed at determining the effect of computer graphics (CorelDraw and AutoCAD) on Technical Drawing students' attitude and engagement in Mechanical Drawing (MD) in Unity Schools, Rivers State. Therefore, the study sought to;

1. examine the attitude of Technical Drawing students towards Mechanical Drawing before and after the use of the computer graphics software.

2. investigate the level of students' engagement in Mechanical Drawing before and after the use of the computer graphics.

RESEARCH QUESTIONS

The following research questions were raised and answered in this study:

1. How will the use of computer graphic software before and after; affect the attitude of Technical Drawing students towards Mechanical Drawing?

2. How will the use of the computer graphics before and after; affect Technical Drawing students' engagement in Mechanical Drawing?

HYPOTHESES

The following null hypotheses were formulated and tested at 0.05 level of significance

1. Computer graphics does not significantly influence the attitude of Technical Drawing students towards Mechanical Drawing.

2. Use of computer graphics has no significant effect on Technical Drawing students' engagement in Mechanical Drawing.

METHODOLOGY

Descriptive survey was adopted in the study, which was used to find out the attitude of students towards computer graphic usage and the level of students' engagement in the use of computer graphic software. Descriptive survey design is deemed appropriate because data was collected from sample drawn from given population of Technical Drawing students in the two Unity Schools in Rivers State and certain characteristics of the sample were explained without manipulating the independent variables. According to Nwankwo, (2013), descriptive survey involves the collection of data from sample drawn from a given population and explaining certain characteristics of such sample as they are, and as required by the study at that particular time of study without influencing the independent variable of the study. Technical Drawing Students' Attitude Questionnaire (TDSAQ) and Technical Drawing

Students' Engagement Scale (TDSES) were used as instruments for data collections. The two instruments were administered to the two groups before and after the introduction of the lesson.

RESULTS

Research Question 1: What is the effect of Computer graphics on the attitude of Technical Drawing students towards Mechanical Drawing?

Table 1: Mean and Standard Deviation Analysis of Effect of Computer Graphics on the Attitude of Technical Drawing Students Towards Mechanical Drawing

Attitude	n	Mean	Std. D	Std. Error
Before-Attitude	48	33.77	2.983	.43069
After-Attitude	48	46.50	12.32	1.7790

Hypothesis 1: Computer graphics does not significantly affect the attitude of Technical Drawing students towards Mechanical Drawing.

Table 2: Dependent Samples T-test Analysis of Computer Graphics Significant Influence on the Attitude of Technical Drawing Students Towards Mechanical Drawing

Attitude	n	$\bar{x}$	SD	df	T	Sig.	P	Decision
Pre & Post Attitude	48	12.72	12.67	47	6.959	.000	0.05	Reject Ho_1
						P<0.05		

Table 1, shows a mean of 33.77 a standard deviation of 2.983 as the before or pre attitude score of students towards Mechanical Drawing before the use of computer graphics of CorelDraw and AutoCAD applications. After the use of computer graphics of CorelDraw and AutoCAD applications, the post of after attitude mean scores of the students was 46.50 and SD was 12.32. This evidently reveal that students' attitude towards Mechanical Drawing favorably increased as seen from the mean score which was higher after the introduction of computer graphics towards Mechanical Drawing. Thus the attitude of students towards Mechanical Drawing was higher when computer graphics was used for instruction.

Table 2, shows that t (47) = 6.959 p <0.5, i.e. p = .000 is less than 0.05 and this is statistically significant at the chosen alpha level of 0.05. Therefore, there is a significant effect of computer graphics on the attitude of Technical Drawing students towards Mechanical Drawing as t (47) = 6.959 p <0.5, i.e. p = .000. p is .000 is less than .005. The difference that exists between the pre mean and post mean attitude is significant. The null hypothesis of Computer graphics does not significantly affect the attitude of Technical Drawing students towards Mechanical Drawing is rejected and the alternate is accepted.

Research Question 2: What is the effect of computer graphics on the engagement of Technical Drawing students towards Mechanical Drawing?

Table 3: Mean and Standard Deviation Analysis of Effect of Computer Graphics on the Engagement of Technical Drawing Students Towards Mechanical Drawing

Engagement	n	Mean	Std. D	Std. Error
Before/PreEngagement	48	40.20	16.47	2.377
After/PostEngagement	48	50.50	15.19	2.193

Hypothesis 2: Computer graphics does not significantly affect the engagement of Technical Drawing students towards Mechanical Drawing.

Table 4: Dependent Samples T-test Analysis of Computer Graphics Significant Influence on the Engagement of Technical Drawing Students Towards Mechanical Drawing

Engagement	n	x	SD	df	T	Sig.	P	Decision
Pre & Post Engag.	48	21.63	12.67	47	3.296	.002	0.05	Reject Ho_1
						P<0.05		

Table 3, shows a mean of 40.20 a standard deviation of 16.47 as the before or pre engagement score of students towards Mechanical Drawing before the use of computer graphics of CorelDraw and AutoCAD applications. After the use of computer graphics applications, the post or after engagement mean scores of the students was 50.50 and SD was 15.19. This evidently revealed that student engagement towards Mechanical Drawing favorably increased as seen from the mean score which was higher after the introduction of computer graphics (CorelDraw and AutoCAD) towards Mechanical Drawing. Thus, the engagement of students towards Mechanical Drawing was higher when computer graphics was used for instruction.

Table 4, shows that t (47) = 3.296 p <0.5, i.e. p = .002 is less than 0.05 and this is statistically significant at the chosen alpha level of 0.05. Therefore, there is a significant effect of computer graphics on the engagement of Technical Drawing students towards Mechanical Drawing as t (47) = 3.296 p <0.5, i.e. p = .002 is less than 0.05. The difference that exists between the pre mean and post mean engagement is significant. The null hypothesis of computer graphics not significantly affecting the engagement of Technical Drawing students towards Mechanical Drawing is rejected and the alternate is accepted.

DISCUSSION OF FINDINGS:

Effect of Computer graphics on the Attitude of Technical Drawing students towards Mechanical Drawing

The data on table 1 provided answer to research question one. Result from findings showed that students before application of computer graphics software had a mean score of 33.77 and standard deviation (SD) of 2.983, while after the application of the computer graphics software had a mean score of 46.50 and SD of 12.32. This implies that the attitude of students after the application of the software was higher than the attitude of the students before the treatment application which therefore means that the application of the computer graphics software had positive effect on the attitude of the students. In the same vein, the statistical analysis on table 2 also showed that there is significant effect of the computer graphics on the attitude of Technical Drawing students towards Mechanical Drawing. The implication of this, is that incorporation of computer or technology software into teaching and learning of Mechanical Drawing can bring about a positive change in the attitude of Technical Drawing students towards Mechanical Drawing and thereby improving learning outcome.

The positive attitude exhibited by students towards Mechanical Drawing after the use of the computer graphics software is not surprising, because with the modifying and editing tools in the computer graphics environment, the students are able to produce drawings faster and accurately too and thus increasing their interest and making the students develop positive attitude towards Mechanical Drawing. The result of the finding is in agreement with the findings of Andrew, et al. (2018) and Prema, et al. (2015), but the finding of Kareem (2015) is not in agreement with the present finding. According to Kareem computer graphics does not have significance effect on students' attitude.

Level of students' Engagement on the use of computer graphic software in Mechanical Drawing.

The data gathered under research question 2 and presented on table 3 showed that students were more engaged after the computer graphics software was administered as indicated by their mean scores. The statistical analysis on table 4 also reveals significant effect of the graphics software as t (47) = 3.296 p< 0.5, i.e. p = .002 is less than 0.05 which is statistically significant at the chosen alpha level of 0.05. This therefore implies that the level of engagement of Technical Drawing students towards Mechanical Drawing after the treatment was to a high extent.

This finding is not surprising, because the application of the computer graphic software requires the students producing their drawings with the aid of the technology tools, and the 21st century learners are always excited when digital tools are employed as instructions. So they are very likely to show lots of commitment in the drawing process and thus resulting in high engagement. The high engagement of students towards Mechanical Drawing after the computer graphics applications can however, be attributed to the fact that the computer graphic platform has so many features in its environment which can make the students curious to learn more and thus resulting in high engagement of the students; as stated by Ainslee, (2018), 21st century learners are curious learners who are eager and ready to explore the world of technology around them. This finding is in agreement with the findings of Hans, (2021), Marcel, (2021), and Benhadj, et al. (2019).

CONCLUSIONS

The importance of computer graphic software such as AutoCAD and CorelDraw in the teaching and learning of graphic subjects in the 21st century classroom cannot be overemphasized. The findings from the study proved that students' attitude and level of engagement in Mechanical Drawing aspect of Technical Drawing can be enhanced with the integration of computer graphic software and hence promoting learning outcome.

RECOMMENDATIONS

In view of the findings from the study, the following recommendations were made:

1.The Federal Ministry of Education, Schools' Administrators and other stake holders should organize ICT training and seminars on computer software graphics to train the Technical Drawing teachers on how to use and apply the software in the classroom. This can help to maintain the positive attitude of the Technical Drawing students towards Mechanical Drawing.

2.There should be willingness and readiness on the part of Technical Drawing teachers to adopt the technology integrated lesson into their classrooms, so as to sustain the high level of engagement of students in Mechanical Drawing.

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