

# Assessment Of The Use Of Autocad Package For Teaching And Learning Engineering Drawing In Afe Babalola University Ado-Ekiti

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**ABSTRACT:** Drawing is the language of engineers. Drawings encompass the architectural, civil, structural, and mechanical professions, and they are the means of conveying diagrammatic detailed aspects of the design components of a structure. This Study intends to investigate an assessment of the use of AutoCAD package for teaching and learning engineering drawing in Afe Babalola University, Ado-Ekiti in Ekiti State. The investigation was carried out by administering (100) questionnaires to engineering drawing lecturers and Students of the college of engineering in the university. The Findings revealed that there are positive impacts created by AutoCAD package on teachers and Students towards the teaching and learning of AutoCAD package to teach engineering drawing in all the seven programmes in the college. Engineering drawing is done in Nigerian universities, polytechnics and colleges that offer courses in the areas of technical and vocational education (TVE), Architecture, urban and regional planning and engineering. The traditional teaching and learning of technical drawing in most Nigerian universities has been characterized by the use of such manual equipment and materials part of drawing board, dividers, compasses, set-squares, protractors, drawing paper, drawing pen, pencil, scales, and eraser among others. These manual tools and materials make drawing to be more time and energy consuming. Thus, the arrival of the 21st century information and communication technological facilities or technologies presented a more interesting and efficient facilities for the teaching and learning of technical drawing in institutions in Nigeria. The information and communication technologies that are utilized in the teaching and learning of technical drawing include computer hardware and software, computers, projectors, interactive broad, internet, scanners and so on. These are also known as computer assisted drafting/design tools. The details of these technological facilities /technologies are: Hardware : desktop and laptop computers with complete parts as key board, mouse, UPS, digitizing graphic tablet, plotter, digitizing pen, icons, scanners, projector, satellite and V-sat Software: AutoCAD, micro station, solid work, solid edge, Alibre, CATIA, NX, GTX5000, Power point, VRML, CorelDraw, spreadsheet ,graphics, database.

**Keywords:** ICT, Assessing, Engineering, Education, Learning, AutoCAD, Drafting, Design

## 1. INTRODUCTION

The computer-aided drafting program, AutoCAD, is the most common such program. It has many, many aids to drawing construction plans and detail drawings. If changes ICT has greatly influenced Students-Skills in the use of computer programme and that the lecturer enjoys, teaching engineering drawing with computer aided instructional material. In view of the above findings, it is recommended that engineering drawing lecturers should be exposed to computer awareness courses. The computer machines in universities are not adequate as against students enrolment refresh courses in the computer utilization in basic technology could be available for the teacher. Computer literacy courses for AutoCAD students should be taught in a way that computer can be used for all engineering drawing related courses; this will give them confidences on the use of computer in teaching AutoCAD. AutoCAD laboratories should be established where there are none so that lecturers can have proper and hands-on training on the use of computers for teaching engineering Drawing. Federal and State government should assist institution of learning by provide financial association to obtain the facilities.

Computers have revolutionized the way documents are generated. Similarly, Information technology is bound to revolutionize the way people exchange information and documents. Information technology (IT) is defined as "the use of electronic machines and programs for the processing, storage, transfer and presentation of information" (Bork, 1999). IT encompasses many technologies such as computers, software, networks and even telephones and fax machines. The purpose of IT is to facilitate the exchange and management of information and has a lot of potentials for the information process component of the construction industry. These recent technologies will undoubtedly have a profound impact on how organizations operate on a daily basis. (FRN2004) Education systems all over the world are under increasing pressure to use the new information and communication technologies to teach students the knowledge and skills they need in the 21st century (UNESCO,2009). UNESCO described the radical implications the new information and communication technologies have over the conventional teaching and learning method and predicted a transformation of the teaching/learning process and the way teachers and learners gain access to knowledge and information. In a society that is constantly in a state of technological flux, it is compelling to monitor from time to time the competencies and skills required for efficient performance. The emergence of information and communication technology has brought with it changes in work processes as well as the process of imparting and acquiring knowledge. The resultant effect is the rendering of previous knowledge and competencies obsolete. Teaching is a means to learning. It is a process of making it possible for someone to learn. Obi, T.E.C (2000) contended that teaching involves guiding students to learn. Learning, according to Okorie, J.U

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(2000) is an active process which goes on within the learner by guiding his/her experience through planned activities. The student starts to learn when he/she becomes deeply involved in the learning situation. Learning means a process through which behaviour is initiated, modified or changed. The process of learning takes place in the learners' brain and cannot be seen or touched. It is only the output that can be seen as learned behaviour. A student being taught drawing in a class can only show evidence of learning by personally reproducing the drawing. Drawing generally 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 (Giesecke, et al, 1967 in Ede, 2005). The application of computer, as well as other tools in education is the process of using them to aid the teaching /learning process. Chinien, C. (2003). In the work place, technology has significantly change the way we go about our every day jobs, in design the introduction of computers and computer software has identified new and exciting ways to go about the design process. Computers have contributed to design for quite a while by providing analysis tools, data-bases and computer-aided drafting tools. Since its introduction 1960s CAD tools have been developed to more user friendly programs and today in higher institution.

## HISTORICAL BACKGROUND

AutoCAD or commonly known as Computer Aided Design is a software application for writing and design 2D and 3D. He came on stage during the month of December nineteen hundred and eighty two (1982). The AutoCAD or computer aided design machine has been a great help to engineers and also for several architectures that are finding it impossible to deal with drawings and plans of the project engineering work and then bring on the verge of perfection. AutoCAD is a software application for both 2D and 3D computer-aided design (CAD) and drafting — available since 1982 as a desktop application and since 2010 as a mobile web- and cloud-based app, currently marketed as AutoCAD 360. Developed and marketed by Autodesk, Inc., AutoCAD was first released in December 1982 — having been purchased a year prior in its original form by Autodesk founder John Walker. The software is currently marketed in its eighteenth generation.

## PAPER SIZES

Drawings are prepared in different sizes

Sl. No.	Designation	Trimmed Size in mm	Un Trimmed Size (Min) in mm
1	A0	841 x 1189	880 x 1230

2	A1	594 x 841	625 x 880
3	A2	420 x 594	450 x 625
4	A3	297 x 420	330 x 450
5	A4	210 x 297	240 x 330
6	A5	148 x 210	165 x 240

## TYPES OF DRAWINGS IN ENGINEERING

Civil engineering drawings indicate site and project locations, vehicle accessibility, topography, site drainage, and possibly landscape requirements, although this aspect may be performed by a licensed landscape architect rather than the project architect. Structural Drawings indicate the design loads and applicable building code criteria and define the structural framing systems and their supports and foundations. Mechanical Drawings. Mechanical drawings designate the heating, ventilating, and air-conditioning (HVAC) systems; electrical distribution requirements; fire and security systems; sprinklers and the necessary plumbing requirements. These drawings generally contain the ductwork sizes and locations and designate required openings in the structure for their paths. Architectural drawings convey the aesthetic and functional aspects of the project and include the fire-rated classification of the structure, occupancy, exiting requirements, and conformance to code of conduct. Elevations: These are a pictorial view of each façade of the building indicating windows, doors, etc. Building sections: A detailed sectional view through the building is taken usually in the project north-south and east-west direction. Sections and details: These are a larger-scale dimensional detailed presentation of pertinent construction components and their interface connections with other materials.

## Advantages in using CAD:

- Reduces time for conceptualization time for new designs
- Products can be created more quickly.
- Costly mistakes in design or production can be avoided
- Reduced Manufacturing time.
- Documentation can be printed in various forms for multiple users.
- Ease of document reproduction and cloning
- Visualization of complex technical elements

- The quality of designs.
- Clarity of documentation.
- Easier to apply new ideas.

### Challenges of using (CAD) which include:

- Training
- Expensive startup costs (hardware, software, and training).
- Difficulty of getting the conceptional form.

## RESEARCH METHODOLOGY

### Statement of the Problem

The use of this manual method of teaching technical and engineering drawing over the years has some set back like time consuming, inadequate due to human error in measurements, waste of materials and the stress of drawing on blackboards. These challenges contributes to many teachers/students avoiding the subject, thereby students recording failures in this very important subject in engineering course. Poor performance in engineering drawing would lead to withdrawal of students from studying engineering course. Therefore, this study sets to assess the use of AutoCAD package for teaching and learning engineering drawing in Afe Babalola University, Ado-Ekiti in Ekiti State.

### COMMAND IN AUTOCAD

The commands include copy, mirror, offset, hatching, rotate, erase, explode, stretch, array, scale, move, etc.

### Methodology

### Research Design

The design that adopted in this study is the survey. This is because the researcher sampled the opinions of the people on an assessment of the use of AutoCAD package for teaching and learning technical drawing in the college of engineering.

### State.

### Population

Population of study was the census of all items or subjects that possess the characteristics or that has knowledge of the phenomenon being studied. The population for this study comprised of all the teaching staff presently teaching Technical Drawing and the students in colleges of engineering.

### Samples

The stratified random sampling technique was adopted in selecting the respondents. The sample used comprises 69 lecturer from the colleges and 31 students from the colleges makes total number of 100. The lecturers and students were randomly selected without special consideration and

background of the respondents.

### Instrument

The instrument that was used in carrying out this study is a structured questionnaire.

The questionnaire was made up of two sections: section (A) required bio-data such as name of school, age, gender, religion, and section (B) was twenty items questions. The questionnaire was designed in four point responses model: Strongly agreed = 4, Agreed = 3, Disagreed = 2, and strongly disagreed = 1.

### Validation of Research Instrument

A sample of the questionnaire is given to the project supervisor and one other lecturer in the department of science and technology education, University of Lagos for face validity. Their correction and inputs were used to bring the final copy of the questionnaire.

### Reliability of Research Instrument

To establish the reliability of the instrument in this research work. Reliability is the degree of consistency with which a test may be applied, is the accuracy of data in relation to stability and precision. That is, if the instrument is re-administered whether the result obtained will be consistent. Twenty copies of the questionnaire were administered on lecturers in University of Lagos and their responses divided into two, split-half reliability was used and the halves were correlated using Pearson product moment correlating coefficient which yielded 0.88.

### Method of data collection

The copies of the questionnaire were directly and personally administered to the selected respondents by the researcher. The researcher waited for the completion of the items and then retrieved them from the respondents.

### Method of Data Analysis.

The data collected were analyzed using descriptive structure for demographic data. The t-test was used to test all the null hypotheses at 0.05 level of significance and relevant degree of freedom. Also the section B of questionnaire.

## PRESENTATION AND ANALYSIS OF DATA

All the information gathered and the interpretation of this information against the research questions constitutes the findings in the study. The analysis of data was based on the responses of teachers and students in Federal College of Education (T) Akoka, Lagos and Ijanikin Adeniran Ogunsanya College of Education, Lagos from each colleges through distribution of questionnaire.

## Section A

**TABLE 1:** Demographic Data Analysis

S/N	SCHOOLS	NUMBER OF TEACHERS	NUMBER STUDENTS	Percentage (%)
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1	Federal College of Education (T) Akoka, Lagos.	34	20	50
2	Ijanikin Adeniran Ogunsanya College of Education, Lagos	35	19	50
TOTAL		69	39	100

## Analysis of Research Questions

**Research Question 1:** What are the levels of usage of teachers and students with the use of AutoCAD?

Table 1: Responses of the Respondents on what are the levels of usage of teachers and students with the use of

### AutoCAD?

S/N	ITEMS	A (4)	SA (3)	D (2)	SD (1)	MEAN (X)	REMARK
1	Technical Drawing classes are always boring to most students.	28	40	-	1	4.36	AGREED
2	Technical Drawing lesson do not change student full concentration in class	30	15	10	14	3.54	AGREED
3	Students enjoy practical jokes that could sometimes annoy the T.D teachers in class	32	23	-	14	3.85	AGRRED
4	It is not all wrong to use other students' drawing materials even when they are not usually to let me use them in class	28	22	-	19	3.58	AGREED
5	Absenting from T.D classes a few times in a week does not usually have significant effect on their performance in test and exam	-	13	-	60	1.23	DISAGREED

The table above revealed that teaching basic technology with the use of computer aided instruction is the best, traditional methods of teaching basic technology are preferred to the use of computer aided instruction, computer aided instructions help broaden students' knowledge in basic technology, both traditional methods and conventional should be maintained in teaching basic technology, also it as revealed that it is not hard for teachers to teach basic technology using computer aided instruction. These have mean ratings of 4.36, 3.54, 3.85, 3.58 and 1.23 respectively.

**Research Question 2:** What are the level of awareness of students and teachers on the use of AutoCAD in teaching technical drawing?

**Table 2:** Responses of the Respondents on what are the level of awareness of students and teachers on the use of AutoCAD in teaching technical drawing?

S/N	ITEMS	A (4)	SA (3)	D (2)	SD (1)	MEAN (X)	REMARK
6	Students hardly cope with the use of computer aided instructional while teaching basic technology	18	30	-	11	2.93	AGREED
7	The use of computer aided instructional materials makes students friendly with basic technology.	25	20	5	19	3.39	AGREED
8	Students enjoy my teaching basic technology with computer aided instruction	22	20	-	19	3.77	AGREED
9	demonstrate basic technology lessons	23	27	-	19	3.51	AGREED

	to my student in class						
10	I really enjoy teaching basic technology with computer aided instructional materials in class	38	15	5	11	3.93	AGREED

The table above revealed that student cope with the use of computer aided instructional while teaching Technical Drawing, the use of computer aided instructional materials, makes student to be friendly with basic technology, student enjoy my teaching Technical Drawing with computer aided instruction, teachers can demonstrate basic technology lessons to the students in class, teachers enjoy teaching Technical Drawing with computer aided instructional materials in class. These have mean rating of 3.64, 3.39, 3.77, 3.51, and 3.93 respectively.

**Research question 3:** What are the levels of ascertain the skills possessed by teacher for teaching Technical Drawing?

**Table 3:** Responses of the Respondent on what are the levels of ascertain the skills possessed by teacher for teaching Technical Drawing?

S/N	ITEMS	A (4)	SA (3)	D (2)	SD (1)	MEAN (X)	REMARK
11	The use of computer aided instructional should be disregarded at the Junior secondary school.	1	1	33	31	1.71	DISAGREED
12	My students understands basic technology better when learning with the use of CIA materials to study.	24	15	10	14	3.75	AGREED
13	Teaching with computer aided instructional materials.	7	8	20	34	2.04	DISAGREED
14	The use of computer Aided drafting does not allow student ask questions.	6	6	21	35	2.03	AGREED

The table above revealed that the use of computer aided instructional should not be disregarded at the junior secondary school, students understand basic technology better when learning with the use of CIA material to study, teaching with computer aided instructional material does not make the teacher lazy, the use of computer aided does not allow student ask questions, students are eager to learn basic technology since they study it with computer. These have mean rating of 1.71, 3.75, 2.04, and 2.03 respectively.

**Research question 4:** What are the available facilities in teaching AutoCAD?

**Table 4:** Responses of Respondents on what are the available facilities in teaching AutoCAD?

S/N	ITEMS	A (4)	SA (3)	D (2)	SD (1)	MEAN (X)	REMARK
16	It has greatly influence students skills in the use of computer programme.	20	38	10	1	3.96	AGREED
17	Massive exposure of all science and Technology student to ICT.	25	15	10	14	3.39	AGREED
18	Students no longer shy towards the use of computer application	25	23	9	12	3.58	AGREED
19	Reduction of students stress in studying and reading.	20	22	10	17	3.26	AGREED
20	Reduction of teachers stress in teaching	20	20	9	11	3.55	DISAGREED



The table above revealed that students skills are influence by the use of ICT, students are exposed better by the use of ICT, students don't shy away from computer application, stress is reduced on the students in learning and is also reduced on the teacher in teaching. These have mean ratings of 3.96, 3.39, 3.58, 3.26 and 3.55 respectively.

## TESTING OF HYPOTHESES

### Hypothesis 1

There is no significant difference between the mean responses of teachers and students on the levels of usage of AutoCAD for teaching technical drawing. The t-test Analysis of the Mean Responses of the Teachers and Students on the Levels of Usage of AutoCAD for Teaching Technical Drawing

S/NO	GROUPS	N	X	SD	DF	T-cal	t-critical	Level of significance	REMARK
1	TEACHERS	69	3.43	0.9	98	0.91	1.98	0.05	NS
2	STUDENTS	31	3.99		0.88				

Table Above showed that the t-test analysis of t-cal has 0.91 values which is less than the t-critical of 1.98 at 0.05 level of significance. This indicated that there was no significant difference between the mean responses of teachers and students on the levels of usage of AutoCAD for teaching technical drawing. Therefore, the null hypothesis of no significant difference between the mean responses of teachers and students on the levels of usage of AutoCAD for teaching technical drawing was upheld.

### Hypothesis 2

There is no significant difference between the mean responses of teachers and students on level of their awareness in using AutoCAD for teaching technical drawing.

The t-test Analysis of the Mean Responses of the Teachers and Students on the level of their Awareness in using AutoCAD for Teaching Technical Drawing.

S/NO	GROUPS	N	X	SD	DF	T-cal	t-critical	Level of significance	REMARK
1	TEACHERS	69	3.55	0.8	98	0.68	1.98	0.05	NS
2	STUDENTS	31	3.95		0.81				

Table Above showed that the t-test analysis of t-cal has 0.68 values which is less than the t-critical of 1.98 at 0.05 level of significance. This indicated that there was no significant difference between the mean responses of respondents on level of awareness of students and teachers in using AutoCAD for teaching technical drawing. Therefore, the null hypothesis of no significant difference between the mean responses of respondents on the level of awareness of students and teachers in using AutoCAD for teaching technical drawing was upheld. There is no significant difference between the mean responses of male and female teachers on level of skills possessed for teaching Technical Drawing The t-test Analysis of the Mean Responses of the Teachers and Students on the Level of Skills Possessed for Teaching Technical Drawing.

S/NO	GROUPS	N	X	SD	DF	T-cal	t-critical	Level of significance	REMARK
1	Male Teachers	43	3.68	0.85	67	0.76	1.78	0.05	NS
2	Female Students	26	3.72		0.77				

Table Above showed that the t-test analysis of t-cal has 0.76 values which is less than the t-critical of 1.78 at 0.05 level of significance. This indicated that there was no significant difference between the mean responses of male and female teachers on level of skills possessed for teaching engineering Drawing. Therefore, the null hypothesis of no significant difference between the mean responses of male and female teachers on level of skills possessed for teaching Technical Drawing was upheld.

### Hypothesis 4

There is no significant difference between the mean responses of teachers and students on the available facilities for teaching AutoCAD. The t-test Analysis of the Mean Responses of the Teachers and Students on the Available Facilities for Teaching AutoCAD.

S/NO	GROUPS	N	X	SD	DF	T-cal	t-critical	Level of significance	REMARK
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1	Male Teachers	69	3.63	0.80	98	0.82	1.98	0.05	NS
2	Female Students	31	3.75		0.87				

Table Above showed that the t-test analysis of t-cal has 0.82 values which is less than the t-critical of 1.98 at 0.05 level of significance. This indicated that there was no significant difference between the mean responses of teachers and students on the available facilities for teaching AutoCAD. Therefore, the null hypothesis of no significant difference between the mean responses teachers and students on the available facilities for teaching AutoCAD was upheld.

## FINDINGS FROM THE STUDY

The following findings were discovered from the study:

1. CAI helps broaden student's knowledge in basic technology.
2. The use of computer aided instruction makes the students friendly with AutoCAD package.
3. Students enjoy the lesson when the teacher teaches with CAI
4. The teacher can demonstrate with the use of AutoCAD package to deliver their lessons to students in class Also the use of computer aided instructional material should not be disregarded in our schools.
5. Teaching with the use of computer aided instruction is the best.
6. The teacher enjoys teaching of AutoCAD package with computer aided instructional material.
7. ICT has greatly influenced students' skills in the use of computer program.

## SUMMARY

The purpose of this study was to assess the use of AutoCAD package the teaching and learning of technical drawing in Colleges of Education in Lagos State. Research questions were formulated to guide the study. The types of design used in this study were the survey. Four research questions were formulated and Hundred (100) questionnaires were given to One Hundred respondents - total which was the total number of teachers teaching Technical Drawing and students in Federal College of Education (Tech) and Ijanikin in Lagos State. The major findings of the study are:

- Teaching with the use of computer aided instruction is the best.
- The teacher enjoys, teaching Technical Drawing with computer aided instructional material.
- ICT has greatly influenced students' skills in the use of computer program.

## CONCLUSION

The following conclusion can be drawn from the findings in the study. Most Technical Drawing lecturer are exposed to computer awareness course. The engineering Drawing teacher have favorable attitude towards the use of computers in teaching AutoCAD based on what they know about computers. The few computer rooms available in

schools are occasionally used for teaching Basic Technology/AutoCAD. The computer machines in schools are not adequate as against students' enrolment. Refresher courses in computer utilization in Basic Technology could be available for the lecturer.

## RECOMMENDATIONS

The following are recommendations to enhance computer use in the teaching and learning of AutoCAD. These suggestions presume that greater use is desirable. That is, computers have something to offer when used in teaching AutoCAD in colleges of Education.

1. Computer literacy courses for AutoCAD students should be taught in a way that computers can be used to teach Technical Drawing, this will give them confidence on the use of computers in teaching AutoCAD.
2. Computer laboratories should be established where there are none so that teachers can have proper and hands-on-training on the use of computers for teaching Technical Drawing.
3. Teachers need more incentives to learn computer application and stay in teaching.
4. The ministries of education should organize education computing conference and workshop regularly to train lecturer and keep them abreast of the research on the application of computers in the classroom.
5. The Federal and State governments should assist Institutions of learning by provide financial assistance to obtain the facilities.
6. The curriculum planners should incorporate preventive maintenance in the computer literacy course meant to produce Basic Technology lecturer.
7. Stand-by generating set should be provided for the computer machines (use) to prevent loss of data.

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