



**NIGERIAN ONLINE JOURNAL OF
EDUCATIONAL SCIENCES AND
TECHNOLOGY**

nojest.unilag.edu.ng

nojest@unilag.edu.ng

**STUDENTS' ATTITUDE TOWARDS AND INTEREST IN BUILDING/ENGINEERING DRAWING: A
CASE STUDY**

JIMOH, Jelili Adebayo

Department of Technology and Vocational Education, University of Lagos, Nigeria
jjimoh@unilag.edu.ng

ABD-EL-AZIZ, Abd-El-Latif Adekunle

Department of Educational Technology, Faculty of Education, University of Ilorin, Nigeria

OGUCHE, Innocent Ojonugwa

Faculty of Education, Air force Institute of Technology, Kaduna

To cite this article:

Jimoh, J. A., Abd-El-Aziz, A. A. & Oguche, I. O. (2022). Students' attitude towards and interest in building/engineering drawing: a case study. *Nigerian Online Journal of Educational Sciences and Technology (NOJEST)*, 4 (2), 118-132

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

Authors alone are responsible for the contents of their articles. The journal owns the copyright of the articles. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of the research material.



STUDENTS' ATTITUDE TOWARDS AND INTEREST IN BUILDING/ENGINEERING DRAWING: A CASE STUDY

Jimoh, J. A., Abd-El-Aziz, A. A. & Oguche, I. O

Article Infor

Article History

Received:

13 August 2022

Accepted:

1 November 2022

Keywords

Attitude, Interest,
Building/Engineering Drawing

Abstract

Students learning of and performance in any subject is affected by several factors, including students' attitude towards and interest in the subject, teachers' instructional practices and classroom environment. This study, therefore, investigated engineering and construction trades students' attitude towards and interest in Building/Engineering Drawing (BED) in Government Technical College (GTC), Ibadan, Oyo state. Data were collected through structured questionnaires from students and teachers. Mean, standard deviation and independent sample t-test statistics at .05 level of significance were used for data analysis. Findings revealed that students had negative attitude towards BED. This study equally found that students had low interest in BED. The study found significant influence of gender on students' interest and attitude towards BED. Findings also revealed that provision of well-furnished drawing room with Computer-Aided Design (CAD) facilities, use of combination of demonstration with drawing instruments on chalkboard and CAD to teach BED, effective classroom management techniques, instructional techniques that include group work and hands-on activities which allow students to work collaboratively would help to improve students' interest in and attitude towards BED in the GTC, Ibadan. It is therefore recommended among others that; In-service training on the use of CAD should be constantly organized for the technical teachers, well-furnished drawing room with CAD facilities should be provided in the college, teachers should adopt instructional techniques that include students' diversities, group work and hands-on activities, minimize fear, enhance active interest, and enjoyment in BED to improve students' interest in and attitude towards BED.

Introduction

The performance of students in any subject is dependent upon several factors among which are learning environment, instructional methods and media, interest in learning and attitude towards learning. No matter how good the teachers planning for teaching and learning processes, there is a need to balance the planning with the motivational factors that exist within the students themselves. This is because stimuli that arise from within students have greater influence on students learning than external factors that come from outside. According to Raden & Anfas, (2020) students' internal factors are very influential in participating in learning because of the physiological needs of self-actualization. Some of the internal factors are interest and attitude.

Attitude towards learning is one of the best predictors of students' success in learning activities. According to Glynn et al. (2005) the fundamental reason that instructional objectives are not being achieved are due to the attitudes of students towards learning. Learning is a function of Intelligence. It is the working mind of human being resulting from intelligence that differentiates human being from other living things, hence except for certain special cases, it is not possible to state the fact that a student cannot learn. In this context, Meral (2019) pointed out that attitudes as the total of emotional and behavioural tendencies and thoughts developed depending on several factors affect the acquisition of teaching objectives. Therefore, the efforts of the students to show the expected behavioural change in terms of instructional objectives, as a positive or negative attitude towards learning, is regarded as a predictor of academic success of the students (McAuley et al., 2012).

The way students perceive and evaluate their experience with any kind of knowledge is very important in teaching and learning processes. If students are not interested in a subject, they tend not to make efforts to learn and understand the meaning of concepts that are being taught to them in the classroom. It has been observed that the most effective factor contributing to students' decisions to study any of the subjects in the technical colleges is their interest in the subject (Ogwo & Oranu, 2006). Interest influences students' learning and greater interest leads to greater persistence intrinsic motivation and high-level academic achievement (Rotgans & Schmidt, 2011). It is therefore essential that technical teachers provide conducive learning environment that will arouse students' interest in Building/Engineering Drawing.

Building/Engineering Drawing (BED) is one of the trade related subjects offered by engineering and construction trades students in the technical colleges in Nigeria. it is intended to introduce the students to the use of drawing as a language to enable them construct and interpret simple technical drawing; provide students with basic knowledge of the application of geometrical methods in the analysis, solution to elementary space problems and skills in constructing and interpreting engineering and construction (National Business and Technical Examinations Board (NABTEB), 2015). BED is a compulsory subject for all engineering and construction trades students in the technical colleges (National Board for Technical Education (NBTE), 2010) and candidates applying for admission into tertiary institutions at the end of technical colleges programme must have at least credit pass in five subjects which must include BED.

In Nigeria, National Business and Technical Examinations Board (NABTEB) was established in 1992 and charged with the responsibility to conduct technical colleges' final national examinations and awards certificates. Trainees that complete technical college programme in any of the engineering and construction trades are awarded National Technical Certificate (NTC). Over the years, it has been observed that in most engineering and constructions trades where students performed poorly or averagely, poor drawing and sketching skills were some of the candidates' weaknesses (NABTEB, 2017; 2012, 2011). In the same vein, students' performance in BED in the NABTEB examinations conducted in the Government Technical College (GTC), Ibadan, Oyo State from the year 2017 until 2019 as indicated in Table 1 revealed that the results did not seem to be entirely satisfactory. The rise and fall in the number of students who passed at distinction and credit levels and those who passed below credit level was becoming obvious.

Table 1: Summary of NABTEB Results in BED from the Government Technical Colleges Ibadan for the years 2017, 2018 and 2019

Year	No that sat for the exam	No that passed at Distinction and Credit Level	No with Ordinary Pass	No that Failed
		A1 to C6	P7 to P8	F
2017	223	110(43.24%)	98(53.38%)	15(6.72%)
2018	296	128(43.24%)	158(53.38%)	10(3.38%)
2019	325	233(71.69%)	83(25.54%)	9(2.80%)
Total	844	471(55.80%)	339(40.17%)	34(4.02%)

Source: NABTEB, 2017, 2018 and 2019, May/June NBC/NTC results

As presented in Table 1 out of a total of 844 candidates who sat for BED in the NABTEB examinations in GTC, Ibadan, in three years, 471 students representing 55.80 percent passed at distinction and credit levels thereby meeting the requirements for admission into tertiary institutions in Nigeria, while 339 students representing 40.17 percent had

ordinary pass and 34 students representing 4.02 percent failed. This situation is worrisome and assuming a disturbing dimension because those students who passed below credit level and those who failed would not be able to further their education due to lack of credit pass in BED.

Moreover, the issue of parity and disparity in the performance of male and female students in technical colleges has been an important focus of research for some years now. Gender parity and disparity in the performance of technical colleges' students was clearly detected by research studies that attributed the poor students' achievement in technical trades which involve workshop practice to gender (Jimoh, 2014; Umunadi, 2009). This is rest on the premise that by virtue of gender, male students tend to be more interested in learning technical trades and therefore have better achievement in the trades than the female students.

Interest and attitude are two congenial terms that need not to be isolated when analyzing students' academic achievement. Igwe (2017) pointed out that lack of interest may lead to the negative attitude and possibly results to continuous poor performance. Many research studies had confirmed the positive relationship between students' achievement, interest, and positive attitudes toward learning (e.g., Igwe, 2017; Osborne, et al., 2003). Students who have positive attitudes toward learning obviously will show increased attention to and interest in classroom instruction and participate more in learning activities. Hence, developing and improving positive students' attitude towards and interest in BED should be one of the key goals of teaching and learning in the technical colleges.

Purpose of the Study

The purpose of this study was to find out engineering and construction trades students' attitude towards and interest in BED in Ibadan, Oyo State, Nigeria. Specifically, the study investigated attitude of engineering and construction trades students towards BED, interest of engineering and construction trades students in learning BED, influence of gender of engineering and construction trades students on interest and attitude towards BED and ways of improving engineering and construction trades students' attitude towards and interest in learning BED in Ibadan, Oyo State, Nigeria.

Research Questions

The following research questions were posed for this study

1. What is the attitude of engineering and construction trades students towards building/engineering drawing?
2. What is the interest of engineering and construction trades students in learning building/engineering drawing?
3. What is the influence of gender on engineering and construction trades students' attitude towards building/engineering drawing?
4. What is the influence of gender on engineering and construction trades students' interest in building/engineering drawing?
5. What are the ways of improving engineering and construction trades students' attitude towards and interest in learning building/engineering drawing

Review of Related Literature

Building/Engineering Drawing in the Technical Colleges

Building/Engineering Drawing (BED) is a trade related subject and a compulsory subject for all engineering and construction trades students in the technical colleges. Engineering and Construction trades include Motor Vehicle Mechanics work (MVM), Electrical Installation and Maintenance work (EIM), Fabrication and Welding (FBW), Mechanical Engineering Crafts Practice (MCP), Blocklaying/Bricklaying and Concreting (BBC), Carpentry and Joinery (CPJ), Painting and Decoration (PTD) and, Plumbing and Pipe Fitting (PPF). BED offers engineering and construction trades wide range of advantages such as effective communication among all professionals involved in design and production process, reduces a lot of time, resources, labour and manufacturing errors, simplify design and production process of complex structure and help to check design defects (Azodo, 2017). BED is also one of the most prescribed activities for developing spatial ability of engineering and construction trades students as contained in the course outlines. Spatial ability is basic to engineering students' mathematical thinking and used for processing information presented in maps, graphs, diagrams, and other spatial layout. The spatial ability developed through BED improves perception of objects which is fundamental to engineering design activities (Jimoh, et al., 2021). Studies have shown that spatial ability improves academic achievement in engineering related subjects such as integrated

calculus, mathematics, computer-aided design, chemistry, engineering problem solving and structural design (Alias, et al, 2002). The ability of engineering students to visualize in three dimension is a cognitive skill that is link to success in engineering (Serdar & Harm de Vries, 2015; Ault, 2012).

Attitude, and Influence of Gender on Attitude of Students towards Engineering Drawing

One of the most important factors for improving students' achievement in learning is attitude. Attitude according to Oskamp (1991) means a mental state that pre-disposes an individual to act in a certain way towards objects or individuals. In the same vein, Barros & Marcos (1998) defined attitude as the predominating tendency of an individual to respond to an object, individual or group of persons, institutions, or events with or without prejudice. Mazano, et al. (2019) noted that attitude is regarded as a belief held by individual that reflects the individual's opinions and feelings and which can be manifested in the individual's behaviour. The concept of 'attitude' as studied in sociology and social psychology is focused substantially on human actions, as a function of social setting (Hassan, et. al, 2016). In this context, attitude is referred to as a social construct, which is not directly observable, but is only inferred from relationship between social stimuli and observable human responses (Alias, et al 2002; Oppenheim, 1992).

There are three components of observable responses of attitudes, namely, affective, behaviour and cognitive (Chaiklin, 2011; Hofstein & Mamlok-Naaman, 2011). The three components which are known as the ABC of attitude rest on the view that attitude is reinforced by usefulness, (cognitive component), with strong feelings (affective component) which lead to a particular form of intention and action (behaviour component). The cognitive component comprises ideas, and beliefs on usefulness of the attitude object, the affective component contains the feelings and emotions (like or dislike), self-confidence, anxiety and enjoyment of an attitude holder towards the attitude object and the behavioural component has the attitude holder's intention and action tendencies towards the attitude object (Syeda, 2016; Ajzen, 1993). The three components are interrelated and involve several aspects contributing to the overall attitude towards learning (Mazana et al., 2019). As an illustration of the interaction between the three components, Alias, et al. (2002), in their study on engineering students' attitudes towards sketching and drawing and the relationship with spatial visualization ability explained that the three components of attitude may interact in the following way: an engineering student who believes that sketching and drawing is meant for only draughts men (cognitive component) will most probably have a low preference for sketching and drawing (affective component) and will not voluntarily choose to use sketching and drawing for illustration (behavioural component). Students' attitude towards learning can either be positive or negative. Barros & Marcos (1998) explained that positive attitude is a value to a learner while negative attitude is bigotry to a learner and has the tendency to build a kind of repulsion in a learner to instruction and the subject learnt.

A review of the literature revealed mixed findings regarding influence of gender on attitude of students towards engineering drawing. In some cases, girls exhibited more positive attitude towards engineering drawing, and in other cases, boys had more positive attitude towards engineering drawing. Avila & Malquisto (2019) in their study conducted on attitude of students towards drafting technology showed that more girls than boys had favourable attitude towards drafting technology. However, research conducted by Carabtt & Mercieca (2001) on gender difference in attitudes to technical design among secondary school students found significant gender difference in the attitudes of students toward technical design in favour of boys. In a related study on the use of CAD for drawing, Pectas & Erkip (2006) found a significant gender difference in the attitude of students towards the use of computer for design with males having more positive attitude than females.

Interest, and Influence of Gender on Interest of Students in Engineering Drawing

Interest plays important role in learning; it determines in part what students choose to learn and how well students learn the information. Interest has been conceptualized both as an individual predisposition and as a psychological state which is characterized by focused attention, increased cognitive and affective functioning, and persistent effort (Ainley, et al., 2002) to re-engage in a particular content, particular classes of ideas, objects, or events. Schraw & Lehman (2001) noted that interest can be defined simply as liking and wilful engagement in cognitive activity. Interest manifest itself in some ways which include, active engagement, focusing of one's attentional resources, and learning more than one would otherwise learn (Schraw & Lehman, 2001). Thus, an individual is said to be interested in a particular activity when the individual is positively motivated to attend to it and give time for it.

Within the literature on interest, the relationship between interest and learning has two different conceptions of interest, namely; situational and individual or personal interest. Renninger & Hidi (2002) explained that situational

interest describes those interests that are triggered by certain aspect of environment which may include; content features such as human activity or life themes, and structural features such as the ways in which tasks are organized and presented (Ainley, et al., 2002). Simply put, it is an emotion aroused by situational stimuli (Schiefele, 2009). In their study on sources of situational interest, Schraw, et al. (1995) identified ease of comprehension and vividness i.e., vivid description of subject matter. Individual interest according to Renninger & Hidi (2002) refers to an individual relatively enduring predisposition to attend to or re-engage in certain stimuli, events, or objects. It is the interest that students bring into the learning environment, a relatively stable motivational orientation or personal disposition that develops over time in relation to a particular topic or domain and is associated with increased knowledge, value, and positive feelings (Dohn, et al., 2009). According to Schiefele (2009) individual interest is a relatively enduring preference for certain topics, subject areas, or activities. Both situational and individual interests refer to a psychological state of being interested (Renninger & Hidi, 2002) and the experience of being interested in a concrete learning situation is the result of an interaction between situational and individual factors (Dohn, et al., 2009). Situational interest approach focuses on response to environmental factors that promotes interest while individual interest approach centers on enduring preference. In this context, technical teachers need to provide favourable environmental factors and present lessons in BED to promote intrinsic motivation to improve students' interest.

Even though research studies have identified gender as one of the factors influencing performance in technology and engineering fields. A few literatures regarding interest and gender in engineering drawing revealed no gender disparity in the interest of students that constituted the sample of the studies. As an instance, Ogbuanya & Aniedi (2013) found no significant effect of gender on the interest of technical college students in technical drawing. Similarly, Jimoh (2011) found no significant effect of gender on interest of engineering students in Engineering graphics.

Improving Students' Interest and Attitude towards Learning

The teaching and learning of BED are most associated with technical drawing room. The technical drawing room, which is part of the schools' physical environment, may favour the positive impact of classroom environment on students' attitude, interest, and achievement. Therefore, researchers mostly report positive correlations between school environment and students' achievement. There is no doubt that without a good classroom environment, teaching/learning process has no fruitful results (Philemon, 2016). Research conducted by Azodo (2016) on attitude of engineering students towards engineering drawing found that students had positive attitude towards engineering drawing. However, Alias, et al., (2002) in their own study found that the scores of the civil engineering students' attitude towards sketching and drawing were lower on all three measures: affective, behaviour and cognitive and concluded that in view of the finding, civil engineering students was less positive in their views of the professional role of sketching and drawing, less likely to value sketching and drawing and less likely to use sketching and drawing. Similarly, Igbinomwanhia & Aliu (2013) in a qualitative study reported that engineering students had negative attitude towards engineering drawing. The negative attitude was attributed to poor method of teaching engineering drawing and the lack of engineering drawing teaching facilities as students' belief that, we are in the computer age and therefore manual engineering drawing which is very strenuous and time consuming is not necessary. Thus, effective classroom environment in the teaching of BED in this computer age should start from provision of well-furnished technical drawing room with computer aided design (CAD) facilities. Although there two school of thought among technology education teachers regarding the use of CAD for teaching engineering drawing. Some teachers are of the opinion that with the advent of CAD packages, there is no place for drawing boards and set squares in the drawing room. Others are adamant that engineering students need to 'know the basics' of technical drawing before working in a CAD environment (Bussey, et. Al., 2000; McLaren, 2007).

In addition, effective classroom environment rest on effective classroom management (Suleman & Hussain, 2014) because teacher who is interested in students' high achievement should be equipped with good classroom management strategies. Classroom management is the progression of strategies which teacher utilizes to promote order and students' engagement and learning (Miller, 2006). Teachers who have caring attitude towards learning and the learning environment help to instill and reinforce similar attitude in the students. The results will be more self-discipline students and fewer management problems. Besides, there are some overriding characteristics of the students namely: interest, aptitude, attitude, intelligence, motivation, sex, and ability. These characteristics have serious implications for teachers. Competent teacher should therefore respond constructively when problem get in the way of students learning and development (Ukoha, 1996).

Teacher is a key factor when discussing students' interest and attitude towards learning in the classroom. According to Said, et al. (2018) positive attitude towards learning is developed through personal support by the teachers. The abilities and characteristics required of teachers in order to be good teachers are part of the factors that define good education. A good teacher must be master of subject matter, teaching methods and psychology of learning and must possess abilities for problem solving, critical thought; recognizing students and learning needs (Spencer-Mueller, et al., 2022; Walker, 2008). Teacher who displays positive attitude towards teaching will influence positive students' character development. In their study on effects of teachers' attitudes on students' personality and performance Ulug, et al. (2011) found that teachers' positive attitudes have positive effects on students' performance and personality development and that negative attitudes have negative effects on both the performance levels and personality development of students. Since attitude and interest are two congenial factors that are link to students' performance, students' attitude towards learning will improve when teacher displays positive attitude towards teaching and students' learning.

The need to improve students' interest in and attitude towards learning and get students involved in the classroom activities rest on the need for teachers to use teaching methods which are students-centred to minimize rote learning and memorization of facts. According to Said, et al. (2018) the use of a variety of teaching strategies and innovative learning activities, and student-centered instructional design help to improve students' interest in, and attitude towards learning. To facilitate students-centred instruction in Technical and Vocational Education and Training (TVET) according to UNESCO (2002) institutions need to embrace new technology and appropriate computer technology as learning tools to transform the present isolated, teacher-centred and text bound classroom into rich, students-centred interactive knowledge environment. Interestingly, providing opportunities to interact with course material using computers and information technology tends to change the course from a competitive endeavour to one that is more collaborative, students-centred, and focused on the cognitive development and construction of knowledge in the students (Brewer, 2003). Students tend to experience the greatest enjoyment when they are involved in activities that require some investment of skill (Harter, 2009). Students, if given the choice according to Shumow & Schmidt (2014) would opt for activities that present moderate challenge over the ones that are mindless, because challenging ones are more enjoyable. Given this context, engineering and construction trades students offering BED will be interested and have positive attitude towards learning when instructions are designed with students-centered learning approach.

Methodology

Research Design

The study used case study research design to determine engineering and construction trades students' attitude towards and interest in learning building/engineering drawing in Government Technical College (GTC), Ibadan, Oyo State.

Population

The population of the study was 720 which comprised 697 final year students and 23 technical teachers in GTC, Ibadan as at 2020/2021 session. The final year students were considered suitable for the study because they were being prepared for NABTEB examination.

Sample and Sampling Technique

The participants were a total of 443 which comprised 420 (398 males and 22 female) students and 23 technical teachers. The participation of the students and technical teachers in this study was based on accessibility and willingness to participate in the study because as at the time of data collection the school had already finished the third term examination of 2020/2021 session and many students were not present in the school. Hence, a convenience sampling technique was used to select the participants. Convenience sampling is a technique used where members of the target population that meet certain practical criteria, such as easy accessibility, geographical proximity, availability at a given time, or the willingness to participate are included for the purpose of the study (Dornyei, 2007).

Instruments for Data Collection

Two instruments were used for data collection, namely; BED Attitude and Interest Questionnaire (BEDAIQ) and Teachers Questionnaire on Ways of Improving Students Attitude and Interest (TQWISAI).

BED Attitude and Interest Questionnaire (BEDAIQ)

The BEDAIQ was filled by the students and had three sections; A to C. Section 'A' sought information on gender of the students. Sections 'B' was an Attitude Scale with 22 items structured on five-point likert scale. It had three subscales in line with three components of attitude, namely, affective, cognitive, and behaviour described in the literature. The items of the Attitude Scale were adapted from Mathematics Attitude Scale developed by Fennema & Sherman (1976) and Students' Attitude toward Mathematics Questionnaire developed by Tahar et al. (2010). The adaptation involved changing the word 'Mathematics' to Building/Engineering Drawing (BED). Section C was an Interest Inventory which comprised 10 items structured on five-point likert scale. An Engineering Graphics Interest Inventory developed and validated by Jimoh (2019) was adapted to generate items of the Interest Inventory. The original form of Engineering Graphics Interest Inventory had twenty-eight (28) items. The adaptation of the instrument involved selection of ten (10) items and replacement of the word 'graphics' with 'Building/Engineering Drawing'. For instance, an item 'I don't feel at ease in a graphics class' was changed to 'I don't feel at ease in a Building/Engineering Drawing class'.

Teachers Questionnaire on Ways of Improving Students Attitude and Interest (TQWISAI)

The TQWISAI was a structured questionnaire developed by the Researchers. It contained 6 (six) items and structured on five-point Likert scale type of Strongly agree (SA), Agree (A), Undecided (UD), Disagree (D) and Strongly disagree (SD) for the teachers to indicate the degree to which they agree or disagree with the items.

Validation and Reliability of the Instrument

The instruments (BEDAIQ and TQWISAI) were subjected to face validation by three experts. The experts' corrections and suggestions were taken into consideration in the final copies of the instruments. The internal consistency of the instruments was determined, using Cronbach Alpha. The BEDAIQ was administered on twenty 20 engineering and construction trade students in the technical colleges in Lagos State. The reliability coefficients established were as follows: Section B $-\alpha = .82$ and Section C $-\alpha = .71$. The TQWISAI was also administered on 5 technical teachers in the technical colleges in Lagos State. The reliability coefficients established using Cronbach Alpha was $-\alpha = .91$.

Method of Data Collection

The instruments were administered to the respondents by the trained Research Assistants. Out of 420 of BEDAIQ administered, 391 were duly filled and returned by the students. The rate of return was 93.09%. And out of 23 of the TQWISAI administered 18 were duly filled and returned by the teachers which represented 78.26% rate of return.

Data Analysis

Mean and standard deviations were used to answer research question one, two and five. On a five-point scale, any item with a mean of 3.50 and above was considered agreed upon while less than 3.50 was considered disagreed upon for positively worded items, however, item with a mean of 3.50 and above was considered disagreed upon while less than 3.50 was considered agreed upon for negatively worded items. Mean, standard deviation and independent sample t-test at .05 level of significance was used to answer research question three and four.

Results

Engineering and Construction Trades Students' Attitude towards BED

Table2: Mean and Standard Deviation of Students' Responses on the Attitude Scale n=391

	S/N	Items	Mean \bar{X}	SD	Decision
Affective subscale	AFF1	I am sure that I can learn and understand BED	4.45	.57	Agreed
	AFF 2	Studying BED makes me feel nervous	3.00	1.20	Agreed
	AFF 3	I get a great deal of satisfaction out of solving BED problem	3.75	.53	Agreed
	AFF 4	BED is hard for me	2.75	.94	Agreed
	AFF 5	I have usually enjoyed studying BED in School	2.24	.84	Disagreed
	AFF 6	I am not the type to do well in BED	2.69	.90	Agreed
	AFF 7	I am sure of myself when I do BED	2.58	.76	Disagreed
	AFF 8	BED is my worst subject	3.96	.53	Disagreed
	AFF 9	I get good grade in BED	2.29	.95	Disagreed
Overall mean on Affective subscale			3.08	.34	
Behaviour subscale	BEH1	I plan to take as much BED as I can during my education	2.42	.84	Disagreed
	BEH 2	I will use BED in many ways as adult	4.21	.72	Agreed
	BEH 3	Most subjects I can handle ok, but I can't do a good job with BED	2.64	.80	Agreed
	BEH 4	I would like to avoid using BED in school	4.36	.61	Disagreed
	BEH 5	I tend to use BED to communicate	2.51	.80	Disagreed
	BEH 6	I apply the knowledge of BED to do sketches and drawings in other subjects	1.24	.43	Disagreed
Overall mean on Behaviour Subscale			2.90	.33	
Cognitive subscale	COG1	BED is worthwhile, necessary subject	4.22	.70	Agreed
	COG 2	Knowing BED will help me earn a living	2.48	.67	Disagreed
	COG 3	Taking BED is a waste of time	4.28	.70	Disagreed
	COG 4	I study BED because I know how useful it is	4.21	.71	Agreed
	COG 5	I don't expect to use much BED when I get out of school	4.23	.81	Disagreed
	COG 6	BED would be very helpful no matter what I decide to study	2.38	.91	Disagreed
	COG 7	I will need BED for my future work	2.62	.88	Disagreed
Overall mean of Cognitive subscale			3.39	.38	
Overall mean score on Attitude towards BED			3.16	.26	

Table 2 presents engineering and construction trades students' mean responses and standard deviations on attitude towards BED on the three subscales, namely, Affective, Behaviour and Cognitive and on the overall Attitude Scale. The overall mean score of 3.16 (SD=.26) which is less than 3.50 cut-off point on a five-point Likert scale revealed that the students had negative attitude towards BED. In addition, the overall mean scores on each of the three subscales; Affective 3.08(SD=.34), Behaviour 2.90 (SD=.33) and Cognitive 3.39 (SD= .260) are also less than 3.50 cut-off point. The results revealed that the students had low understanding of the usefulness of BED (Cognitive), as such had low preference in terms of self-confidence, enjoyment and were anxious of BED (Affective), hence, the students will not voluntarily use BED for illustration in their learning activities (Behaviour).

Engineering and Construction Trades Students' Interest in Building/Engineering Drawing (BED)

Data presented in Table 3 revealed that the overall mean interest score 3.14 (SD=3.14) of the students was less than 3.50 cut-off point which implies that the students had low interest in BED. A close examination of the items mean interest scores revealed that students disagreed with most of the positively worded items (e.g. I like being taught BED, I compete with other students for high scores in BED exercise and tests) and agreed with most of the negatively worded items (e.g. I do not like taking part in discussion based on properties of points and lines, I don't feel at ease in a BED class).

Table 3: Mean and Standard Deviation of Students' Responses on Interest in BED n=391

S/N	Items	Mean \bar{X}	SD	Decision
1	I like being taught BED	3.43	.62	Disagreed
2	I like to be involved in design activities	3.47	.70	Disagreed
3	I do not like reading books that contain illustration made with drawings	3.94	.81	Disagreed
4	I do not like studying in the technical drawing room	3.94	.78	Disagreed
5	I do not like taking part in discussion based on properties of points and lines	2.29	.93	Agreed
6	I don't like learning the properties of solid objects that has height, length, and width	2.40	.90	Agreed
7	Whenever I hear the word BED, I have a feeling of dislike	4.05	.86	Disagreed
8	I compete with other students for high scores in BED exercise and tests	3.27	.67	Disagreed
9	I don't feel at ease in a BED class	2.95	.73	Agreed
10	Construction of objects such as machines is boring	2.48	.63	Agreed
Overall Mean Response on Interest in BED		3.14	.36	

Influence of gender on students' attitude towards BED

To determine Influence of gender on students' attitude towards BED, an independence sample t-test was conducted to compare the mean attitude scores of male and female students on the three subscales and on the overall Attitude Scale. The independent sample t-test result was presented in Table 4.

Table 4: t-test Result of Influence of Gender on Students' Attitude towards BED

Scales	Gender	N	\bar{X}	SD	t-cal	P
Affective	Male	371	3.11	.33	7.77	.000
	Female	20	2.53	.20		
Behaviour	Male	371	3.64	.50	5.61	0.00
	Female	20	2.92	.32		
Cognitive	Male	371	3.52	.36	6.77	0.00
	Female	20	2.96	.30		
Overall, on Attitude scale	Male	371	3.19	.23	9.74	0.00
	Female	20	2.66	.16		

df=389; t significant @P<0.05

As presented in Table 4, male students had relatively higher mean attitude scores than the female students on the overall Attitude Scale and on the three subscales. Results also revealed that, there were significant differences between the male and female students mean scores on Affective subscale ($t=7.77, P<.05$); Behaviour ($t=5.61, P<.05$); Cognitive ($t=6.77, P<.05$); and Overall Attitude scale ($t=9.74, P<.05$). The results mean that gender had significant influence on students' attitude towards BED.

Influence of gender on students' Interest in BED

The mean interest score of male students 3.19 ($SD=.29$) was relatively higher than the mean interest score of female students 2.25 ($SD=.25$). To determine Influence of gender on students' Interest in BED, an independence sample t-test was conducted to compare the male and female students' mean interest scores as presented in Table 5.

Table 5: t-test Result of Influence of gender on students' Interest in BED

Gender	N	\bar{X}	SD	t-cal	P
Male	371	3.19	.29	13.99	.000
Female	20	2.25	.25		

df=389; t significant @ $P<0.05$

Table 5 revealed that there was a significant mean difference in the interest scores of male and female students ($t=13.99, P<.05$). The result means that gender had significant influence on students' Interest in BED.

Ways of Improving Students' Attitude towards and Interest in BED

Table 6 presents the teachers' mean ratings on ways of improving students' attitude towards and interest in BED.

Table 6: Mean and Standard deviation analysis of teachers' responses on ways of Improving Students' Attitude towards and Interest in BED n=18

S/N	Items	Mean \bar{X}	SD	Decision
1	Provision of well-furnished drawing room with Computer-Aided Design (CAD) facilities	4.16	.92	Agreed
2	Only demonstration with drawing instruments on the chalkboard should be used to teach BED	1.83	.92	Disagreed
3	Only Computer Aided Drawing (CAD) should be used to teach BED	1.77	.80	Disagreed
4	Teachers should use combination of demonstration with drawing instruments on chalkboard and CAD to teach BED	4.33	.48	Agreed
5	Teachers should use effective classroom management techniques in the classroom	4.50	.51	Agreed
6	Use of Instructional techniques that include group work and hands-on activities to teach BED	4.05	.63	Agreed
7	Teachers should use instructional techniques that allow students to work collaboratively	4.38	.60	Agreed

The result in Table 6 revealed that teachers agreed that provision of well-furnished drawing room with CAD facilities, use of combination of demonstration with drawing instruments on chalkboard and CAD, use of effective classroom management techniques in the classroom, use of instructional techniques that include group work and hands-on activities and use of instructional techniques that allow students to work collaboratively are the ways of improving students attitude and interest in BED.

Discussion

One of the objectives of this study was to find out the attitude of engineering and construction trades students' attitude towards BED. Attitude of the students towards BED was determined using an Attitude Scale with three subscales; Affective, Behaviour and Cognitive. The overall result on the Attitude Scale revealed that students had negative attitude towards BED. Findings also revealed that the students had low scores on the Attitude Subscales which invariably suggest that the students had low understanding of the usefulness of BED (Cognitive), low preference for BED (Affective), and as such would not voluntarily use BED for illustration in their learning activities (Behaviour). These findings supported that of Alias, et al. (2002) who found that the scores of the civil engineering students' attitude towards sketching and drawing were lower on all the measures of affective, behaviour and cognitive. The findings also buttressed a qualitative study of Igbinomwanhia & Aliu (2013) who reported that engineering students had negative attitude towards engineering drawing. This study also found that students had low interest in BED. This finding was not surprising because attitude and interest are two congenial factors that predict academic success of students (Igwe, 2017).

Of interest to this study was the influence of gender on attitude towards and interest in BED. This study revealed that gender had significant influence on students' attitude towards BED. This finding is like the finding of Carabtt & Mercieca (2001) who found significant gender difference in the attitudes of students towards technical design in favour of boys. The study also found that gender had significant influence on students' interest in BED. The finding contrasts with those of Ogbuanya & Aniedi (2013) and Jimoh (2019) who found no significant effect of gender on the interest of students in drawing. This influence of gender on attitude towards and interest in BED is a common phenomenon which is always associated with a feeling of less confidence of girls than boys about technical/engineering related courses and dealing with technological instruments.

This study found provision of well-furnished drawing room with CAD facilities and use of combination of demonstration with drawing instruments on chalkboard and CAD as some of the ways to improving students' attitude and interest in BED. Perhaps the teachers agreed with these findings because they believed students should have both manual drawing skills as well as CAD knowledge and skills to be able to function in this present world of work.

This study revealed that teachers should use effective classroom management techniques in the classroom to improve students' interest and attitude towards learning BED. A well-managed classroom does not just appear out of nowhere. It takes a good deal of effort to create. The person who is most responsible for creating it is the teacher. Therefore, one of the important roles of a teacher in the classroom is that of classroom manager. Effective teaching and learning cannot take place in a poorly managed classroom. In a classroom where students are disorderly and disrespectful, and no apparent rules and procedures guide behaviour, chaos becomes the norm. In these situations, teachers struggle to teach, and students most likely learn much less than they should (Marzano et al., 2003).

This study also found that teachers' use of instructional techniques that include group work and hands-on activities and use of instructional techniques that allow students to work collaboratively are some of the ways to improving students' attitudes and interest in BED. When students work together in groups so that everyone can participate on a cooperative task that has been clearly assigned, the students are more likely to form friendly ties, trust each other, and influence each other to learn (Patesan, et al., 2016) and at the same time improve the students' interest and attitude towards learning.

Conclusion and Recommendations

This study found that engineering and construction trades students had negative attitude towards BED. It was also found that the students had low scores on the attitude subscales which imply that the students had low understanding of the usefulness of BED, low preference for BED, and as such would not voluntarily use BED for illustration in their learning activities. This study revealed that students had low interest in BED. The negative attitude and low interest should not be ignored because the variables may be partly responsible for the low achievement of students in BED in the NABTEB examinations. In addition, this study found significant influence of gender on students' interest and attitude towards BED. This gender influence could probably be because of the feeling of less confidence of girls than boys about technical/engineering related courses. The findings also revealed that provision of well-furnished drawing room with CAD facilities, use of combination of demonstration with drawing instruments on chalkboard and CAD, use of effective classroom management techniques in the classroom, use of instructional techniques that include group

work and hands-on activities and use of instructional techniques that allow students to work collaboratively would help to improve students' interest in and attitude towards BED in the GTC, Ibadan, Oyo State. It is therefore recommended that,

1. The government and administrators of the college should ensure provision of well-furnished drawing room with CAD facilities.
2. Teachers should adopt instructional techniques that include students' diversities, minimize fear, enhance active interest, and enjoyment in BED.
3. Teachers should apply corrective measures that will reduce tension in the students and provide support to the students whenever is needed in order to foster mutual understanding in a non-threatening teaching and learning environment.
4. Teachers should encourage students to use their time wisely so that they can have enough time to practice and internalize BED learned in drawing room.
5. In-service training on the use of CAD should be constantly organized for the technical teachers.
6. Teachers should ensure use of effective classroom management techniques to maintain order in the drawing room.
7. Teachers should adopt the use of group work involving male and female to bridge the gap between male and female interest and attitude towards BED.

References

- Ainley, M., Hidi, S., & Berndorff, D. (2002). Interest, learning, and the psychological processes that mediate their relationship. *Journal of Educational Psychology*, 94, 545-561.
- Ajzen, I. (1993). Attitude theory and attitudinal-behaviour relation. In D. Krebs, & D. Schmidt, (Eds.), *New directions in attitude measurement*. 41-57. Walter De Gruyter
- Alias, M., Gray, D. E., & Black, T. R. (2002). Attitudes towards sketching and drawing and the relationship with spatial visualization ability in engineering students. *International Education Journal*, 3(3), 165-175
- Ault, H. K. (2012). Engineering design graphics as a communication tools for mechanical design: A broader view. <http://www.peer.asee.org/the-role-role-of-engineering-design-graphics-as-a-communication-tools-for-mechanical-design-a-broader-view.pdf>
- Avila, M. R., & Malquisto, P. R. (2019). Gender disparity, competence in drafting technology among government secondary learning institutions. *European Scientific Journal*, February 2019, 15 (5), 196-214. <https://doi:10.19044/esj.2019.v15n5p196>
- Azodo, A. P. (2017). Attitude of engineering students towards engineering drawing: A case study. *International Journal of Research Studies in Education*, 61-74. <https://doi:10.5861/ijrse.2016.1401>
- Barros, S., & Marcos, F. E. (1998). Physics teachers' attitude how do they affect the reality of the classroom and models for change? In A. Tiberghien, L. E. Josem, & J. Barojas (Eds.), *Connecting research in physics education with teacher education*. The International Commission on Physics Education.
- Brewer, C. (2003). Computer in the classroom: How information technology can improve conservation education. <http://www.ibscre.dbs.ur.nt.edu/publication/Brewer-conBioarticle.pdf>
- Bussey, J. M., Dormody, T.J. & VanLeenwen, D. (2000). Some factors predicting the adoption of Technology in New Mexico Public Schools, *Journal of Technology Education*, 12 (1) 4-17. <http://scholar.lib.vt.edu/ejournals/JTE/v12n1/pdf/index.html>
- Carabtt, R. & Mercieca, M. (2001). Gender difference in attitudes to technical design. <https://www.um.edu.mt/library/oar/handle/123456789/67369>
- Chaiklin, H. (2011). Attitudes, behavior, and social practice. *The Journal of Sociology & Social Welfare*, 38 (1). <https://www.scholarworks.wmich.edu/jssw/vol38/iss1/3>
- Dohn, N. B., Madsen, P. T., & Malte, H. (2009). The situational interest of undergraduate students in zoophysiology. <https://doi:10.1152/advan.00038.2009>
- Dörnyei, Z. (2007). *Research methods in applied linguistics*. Oxford University Press.
- Fennema, E., & Sherman, J. A. (1976). Fennema-Sherman mathematics attitudes scales: Instruments designed to measure attitudes toward the learning of mathematics by females and males. *Journal for Research in Mathematics Education*, 7 (5), 324-32. <https://www.jstor.org/stable/pdf/748467.pdf>
- Glynn, S. M., Aultman, L. P., & Owens, A. M. (2005). Motivation to learn in general education programs. *The Journal of General Education*, 150-170
- Harter, S. (2009). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: motivational and informational components. *Developmental Psychology*, 17, 300-312.

- Hassan, B. Alias, M. B., & Awang, H. (2016). The influence of teachers' attitude on their occupational task performance in teaching engineering drawing. *Journal of Education and Social Sciences*, 4, (June), 164-169
- Hofstein, A. & Mamlok-Naaman, R (2011). High-school students' attitudes toward and interest in learning chemistry. *Educ. quim.* 22(2), 90-102. <http://www.creativecommons.org/licenses/by-nc-nd/4.0/>
- Igbinomwanhia, D. I. & Aliu, S. A. (2013). Investigation of the continuing poor performance in engineering drawing in Nigerian universities- a case study of the University of Benin. *Research Journal in Engineering and Applied Sciences*, 2(5), 346-350.
- Igwe, I. (2017). Students' interest, attitude and achievement as teachers' classroom management behaviours in senior secondary schools. *International Journal of Current Research*, 9(5), 50062-50068. <http://www.journalcra.com>
- Jimoh, J. A. (2019). Comparative effects of 2D and 3D methods of graphics in AutoCAD on Interest of national diploma students in engineering graphics in South-West, Nigeria. *International Journal of Educational Research*, 6 (1), 91-101
- Jimoh, J. A (2014). Effects of cooperative learning with computer simulation on achievement of motor vehicle mechanics work students in the technical colleges in Oyo state. *Lagos Education Review*, 14(2), 89-102
- Jimoh, J. A., Ayoola, A. A., & Usman M. R. (2021). Building/engineering drawing performance as a predictor of students' performance in engineering and construction trades of NABTEB examination in Ibadan, Oyo State Nigeria. *MSU GENSAN Graduate Education Research Journal*, 10 (June), 33-46
- Marzano, R. J., Marzano, J. S., & Pickering, D. J. (2003). The critical role of classroom management. <http://www.ascd.org/portal/site/ascd.html>
- Mazana, M. Y., Calkin, S. M., & Casmir, R. O. (2019). Investigating students' attitude towards learning mathematics. *International Electronic Journal of Mathematics Education*. 14(1), <https://doi.org/10.29333/iejme/3997>
- McAuley, J., Leskovec, J., & Jurafsky, D. (2012). Learning attitudes and attributes from multi-aspect reviews. In 2012 IEEE 12th International Conference on Data Mining, 1020-1025. <https://doi.org/10.1109/icdm.2012.110>
- McLaren, S. V. (2007). Exploring perceptions and attitudes towards teaching and learning manual technical drawing in a digital age. *International Journal of Technology and Design Education*. <https://doi:10.1007/s10798-006-9020-2>
- Miller, G. (2006). Classroom Management. <http://www.cast.org/publication/urac/ncac-classroom.html>
- National Board for Technical Education (NBTE). (2010). Advance national technical certificate in electrical installation and maintenance work curriculum and module specifications. <https://www.net.nbte.gov.ng>
- National Business and Technical Examinations Board (NABTEB) (2011). *NABTEB Chief Examiner's report on the 2011 May/June NBC/NTC ANBC/ANTC examinations*. Benin: NABTEB
- National Business and Technical Examinations Board (NABTEB) (2012). *NABTEB Chief Examiner's report on the 2012 November/December NBC/NTC ANBC/ANTC examinations*. NABTEB
- National Business and Technical Examinations Board (NABTEB) (2017). *NABTEB Chief Examiner's report on the 2017 May/June NBC/NTC ANBC/ANTC examinations*. Benin: NABTEB
- National Business and Technical Examinations Board (NABTEB) (2017). *NABTEB May/June NTC computerized examination results sheets of engineering and construction trades students in GTC, Ibadan*. NABTEB
- National Business and Technical Examinations Board (NABTEB) (2018). *NABTEB May/June NTC computerized examination results sheets of engineering and construction trades students in GTC, Ibadan*. NABTEB
- National Business and Technical Examinations Board (NABTEB) (2019). *NABTEB May/June NTC computerized examination results sheets of engineering and construction trades students in GTC, Ibadan*. NABTEB
- Ogbuanya, C. T., & Aniedi, U. (2013). Effects of automated technical drawing computer assisted drafting technique on students' academic achievement, interest and gender in technical drawing. <https://www.researchgate.net/publication/>
- Ogwo, B. A. & Oranu, R. N. (2006). *Methodology in informal and nonformal technical/vocational education*. University of Nigeria press Ltd
- Oppenheim, A.N. (1992) *Questionnaire Design, Interviewing and Attitude Measurement*. Pinters Publishers.
- Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education*, 25(9), 1049-1079. <https://doi.org/10.1080/0950069032000032199>
- Oskamp, S. (1991) *Attitudes and opinions, 2nd ed.* Prentice Hall Alias.
- Patesan, M., Balagiu, A., & Zechia, D. (2016). The benefit of cooperative learning. https://www.researchgate.net/publication/305760955_The_Benefits_of_Cooperative_learning
- Pectas, S. L. & Erkip, F. (2006). Attitudes of design students toward computer usage in design. *International Journal of Technology and Design Education*, 16, 79-95, <http://doi. 10.1007/s10798-005-3175->

- Philemon, P. (2016). Impact of classroom environment on students' academic performance in basic science. <https://www.grin.com/document/1011211>
- Raden, S., & Anfas, A. (2020). The influence of interest and attitude on students' learning motivation in distance education, *International Journal of Arts and Social Science*, 3(6), 225-261.
- Renninger, K. A., & Hidi, S. (2002). Student interest and achievement: Developmental issues raised by a case study. In A. Wigfield & J. S. Eccles (Eds.), *Development of achievement motivation*, 173–195: *Academic Press*. <http://doi.10.1016/B978-012750053-9=50009-7>
- Rotgans, J. I., & Schmidt, H. G. (2011). Situational interest and academic achievement in the active-learning classroom. *Learning and Instruction*, 21, 58–67. <http://doi.10.1016/j.learninstruc.2009.11.001>
- Said, Z., Adam, E., & Abu-Hannieh, Z. (2018). Enhancement of school students' interest in, and attitude toward science by training their teachers on effective delivery of practical activities. *The Eurasia proceedings of Educational and Social Sciences*, 9, 52-58
- Schiefele, U. (2009). Situational and individual interest. In K. K. Wenzel & A. Wigfield (Eds.), *Handbook of motivation at school*, 197-222
- Schraw, G., & Lehman, S. (2001). Situational interest: A review of the literature and directions for future research. *Educational Psychology Review*, 13(1), 23–52. <https://doi.org/10.1023/A:1009004801455>
- Schraw, G., Bruning, R., & Svoboda, C. (1995). Sources of situational interest. *Journal of Reading Behavior*, 27, 1–17
- Serdar, T. & Roelof Harm de Vries, P. E (2015). Enhancing spatial visualization skills in engineering drawing course. <http://www.asee.org/public/conferences/56/papers/11367>
- Shumow, L., & Schmidt, J. A. (2014). *Enhancing adolescents' motivation for science: Research-based strategies for teaching male and female students*. Corwin Press
- Spencer-Mueller, M. K., & Mueller, J. & Archer, K. (2022). An examination of K-12 teachers' educational experience and subsequent learning outcomes related to classroom integration of global competencies. <https://www.researchgate.net/publication/360687753>
- Students' attitudes towards learning, a study on their academic achievement and internet addiction, *World Journal of Education*, 9(4), 109-122, <https://doi:10.5430/wje.v9n4p109>
- Suleman, M. & Hussain, C. A. (2014). Effect of guidance services on study attitudes, study habits and academic achievement of junior secondary school students. *Bulletin of Education and Research*, 28,(1), 35-45.
- Syyeda, F. (2016). Understanding attitudes towards mathematics (ATM) using a multimodal model: An Exploratory Case study with secondary school children in England. *Cambridge Open-Review Educational Research e-Journal*, 3. <http://www.corerj.educ.cam.ac.uk>
- Tahar, N. F., Ismail, Z., Zamani, N. D., & Adnan, N. (2010). Students' attitude toward mathematics: The use of factor analysis in determining the criteria. *Procedia- Social and Behavioral Research*, 8, 476-481. <https://www.sciencedirect.com/science/article/pii/S1877042810021701>
- Ukoha, U. A. (1996). Educational media and instruction. In Ogwu, B. A. (Ed) *Curriculum Development and Educational Technology*. Onairi Publishing Co. Ltd
- Ulug, M., Ozden, M. S., & Eryilmaz, A. (2011). The effects of teachers' attitudes on students' personality and performance. *Procedia-Social and Behavioral Sciences*. 30, 738-742, <https://doi.org/10.1016/j.sbspro.2011.10.144>
- Umunadi, K. E. (2009). A relational study of students' academic achievement of television technology in technical colleges in Delta State of Nigeria. <http://www.scholar.lib.vt.edu/ejournals/JITE/v46n3/umunadi.html>
- United Nations, Educational, Scientific and Cultural Organization (2002). Information and communication technology in teacher education. <http://www.unesdoc.org/images/0012/001295/129533epdf>