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STUDENT-CENTERED VERSUS TEACHER CENTERED METHODS OF INSTRUCTION AND ACADEMIC ACHIEVEMENT OF TECHNICAL COLLEGE STUDENTS IN TECHNICAL DRAWING IN OYO STATE, NIGERIA

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ABSTRACT

Most students of Technical College in Oyo State approach Technical Drawing with Phobia the result of which in most cases is low academic achievement. This could probably be traced to the method of instruction which has been teacher-centered. This study however examined the effects of student-centered and teacher-centered method of instruction on academic achievement of technical college students in Technical Drawing. Three hypotheses guided the study while the research design adopted for the study was factorial design. The population for the study was 378 students in their year two while 104 students of the population constituted the sample for the study. The instrument for the study namely TDAT was developed by the researcher and validated by experts in measurement and evaluation and Technical Drawing. The experiment started with a pre-test followed by the treatment and ended with a post-test. The hypotheses were tested with ANCOVA. Student-centered was found to be more effective in improving students' academic achievement in Technical Drawing than the teacher-centered.

Keywords: method of instruction, student-centered, teacher-centered, technical drawing, technical college.

Introduction

The commonly used method of instruction in various fields of teaching is either student-centered or teacher-centered. The teachers in most cases use any one they consider as the most suitable and convenient to ease up their job. Invariably their belief and perceptions play significant roles in the choice of a particular method. There have been controversies surrounding which one should be considered generally as being the best. There have been several studies that have attempted to answer the question of which approach should be adopted as the best that can help students achieve better in the classroom (Barrett, Denegar & Mazerolle, 2018; Connell, Donovan, & Chambers, 2016; Garceau, Ebben, & Knudson, 2012; Prins, 2009). From experience, the best approach may be subject related as the method that helps to achieve the best results in the classroom varies. According to Murphy, Eduljee & Croteau (2021), there have been significant research on the college professor's utilization of particular teaching methods and the findings revealed that the methods that achieve the best results in the classroom are varied (Marmah, 2014; Novelli & Fernandes, 2007). The implication of this is that what is said to be good as method of instruction in a field of study may not be in another field.

Student-centered teaching to some is the best approach because it allows the students to take ownership of their learning process. According to Tzenios (2022**)**, the learner-centered teaching (LCT) approach, also known as student-centered or child-centered teaching, is characterized by student participation and a focus on tailoring teaching methodologies to individual student needs, learning styles, skills, and goals. According to him, it involves clear skill instruction, reflection on learning and how it is achieved, student control over learning, and collaboration within the classroom community. He identified the benefits of Learner-centered teaching as increased student engagement, improved learning outcomes, and the development of lifelong learning skills. Student-centered learning presents students with freedom to explore on their own which activates and develops in them the skill of critical thinking and problem-solving (Cummins, 2007). According to Altun (2023), student-centered education is often seen as more engaging and motivating for students, as they are given the opportunity to take ownership of their own learning which enables them to connect what they are learning to their prior knowledge. Student-centered approach depends on the teacher's ability to curate materials suitable to the learners' known needs, should the teacher fail to design helpful materials, student-centered learning becomes ineffective (Tzenios, 2022). Invariably, the roles of the teacher in Student-centered method of instruction cannot be overemphasized as teachers must ensure that students are involved in their classroom learning activities throughout the period of student-centered learning process. According to UNESCO (2002) educational institutions need to embrace new and appropriate

technology as learning tool to transform the isolated, teacher-centered and text bound classroom into rich students-centred interactive knowledge environment. Teachers in the student-centered teaching or Learner-centered teaching should be able to provide the most suitable teaching methodologies for students after assessing their learning styles, speed, skills, needs, and learning goals (Kumar, 2020).

Teacher-centered method of teaching on the other hand enables the teacher to act as the primary source of knowledge who conveys that knowledge to the students primarily in the form of a lecture (Mahmood & Iqbal, 2018; Weimer, 2013). According to Murphy, Eduljee and Croteau (2021) Teacher-centered activities rely upon teacher input or output (lecture) and students work alone. According to them, the teacher provides the required information and students passively receive that information. In a teacher-centered strategy, the teacher presents information in an explicit, logically organized, and sequenced manner (Stockard, Wood, Coughlin & Rasplica, 2018). In their opinion, teacher-centered is an effective and efficient form of instruction that allows students to learn new material in less time. According to them, it is positively impacted student outcomes in most academic subjects. According to Lattimer (2015), students in a teacher-centered classroom appear to be motivated by classroom rules, rather than the content. In a teacher-centered classroom, classroom management appears to be more effective (Cain 2020) however, as the teacher controls the learning experience in teacher-centered teaching, the students tend to have fewer opportunities to interact with other students or think out loud (Emaliana, 2017; Serin, 2018) resulting in passiveness of the students in most cases in the class because they tend to rely on the teacher for information and guidance instead of engaging themselves in critical thinking and problem-solving activities. This method however seems to limit the interest of students in the classroom because learning activity is sustained when students are actively involved in the classroom process. It beholves the teachers of Technical Drawing in Technical Colleges who are currently used to teacher-centered method of instruction to appropriately select the most relevant method that will result in better students' academic achievement.

Academic achievement according to Zheng and Mustappha (2022) is a result of the subjective and objective assessment of learners through school teaching or self-study, which is a more permanent behavioural outcome, but which can also accumulate over time. Academic achievement enables teachers to identify their own shortcomings in the teaching process, to improve the quality of their teaching, to improve their teaching methods, and to make appropriate adjustments to their teaching methods (Stabback Philip, 2016). The assessment of student achievement is therefore an essential part of the teaching and learning process in schools (Fisher & Bandy, 2019). Academic achievement enables

teachers to appropriately measure the results of their teaching and also the learning outcomes of students through which they are able to make necessary adjustments to their teaching method. It is however pertinent to note that various factors influence academic achievement of students. In the research work of Liu (2010), students' self-efficacy is closely related to academic achievement of students while parenting styles have a corresponding impact on students' self-efficacy, which in turn affects their academic achievement. This self-efficacy has to a large extent affected performance of students in their Technical Drawing classes, some even see Technical Drawing as a subject where they can have little achievement. School environment, academic qualifications of the both the teacher and the parents, learning commitment, family background and the basic characteristics of students may also significantly affect students' academic achievement (Feng, Xu, Huang, Yang & Pei 2015). Institutional influence theory suggested that two of the more important factors influencing individual students are student behaviour and institutional characteristics (Jabeen & Rafiuddin, 2015). Students can achieve better in Technical Drawing if they have change of attitude towards it and institutions adopt right method of instructional delivery.

Technical Colleges is a co-educational institution otherwise known as Technical School or Technical Institute where education which prepares students for trades and careers are offered. In Nigeria, it spans between three and five years depending on the level of entry. According to Wikipedia (2013), a Technical School is a type of educational institution designed to provide vocational education or technical skills required to complete the tasks of a particular and specific job while Technical Drawing is one of the core subjects offered in technical college in Nigeria and it is described as a detailed graphic rendition of how something functions or how it is built. It is made at a precise scale and includes elements that make it unambiguous (UNIKO Media Group, 2023). According to Ihagh (2019), Technical drawing is an elaborate graphic representation of an object, concept, or idea through a universal language or code of practice that uses scales, graphic symbols, dimensions, and perspectives, either with the aid of drawing equipment/tools, freehand, or computer-aided design (CAD). It is a universal language often used to communicate ideas using symbols, perspectives, scales, tools, codes and conventions by engineers, architects and other related professionals. The importance of Technical Drawing in technology education cannot be overemphasized yet the achievement of students in Technical Drawing has been a thing of concern to the educators in Technical Education. Despite the compulsory status of Technical Drawing in Technical Colleges it is still evident that several Nigerian students studying engineering and related courses in Universities Polytechnics and Technical Colleges always see this cardinal course as a necessary evil that should just be passed, even at the lowest grade level (Medupin, Abubakre, Adebayo, Enock & Sulayman.,

2015).

Several studies however revealed the significant roles of gender in academic achievement in engineering and technical drawings. The study of Rafi and Samsudin, (2007) revealed that gender was found to be a factor affecting students' performance in engineering drawing. In another study by Scales (2000), the result indicated a slight relationship between gender and achievement in introductory engineering graphics, with females having lower final grades. Also, the study of Opara, Banjoko, Ayoola & Opara (2019) revealed an effect attributable to gender on students' achievement in Principle of Architectural Design and Drawing. Gender is a psychological term, which describes behaviours and attributes expected of individual on the basis of being a male or a female (Uwameiye & Osunde, 2005). Avila & Malquisto (2019) however observed that regardless of the students' gender, it is a fact that as an individual, everyone is made to be unique and will inevitably face different situations regarding the type of school that will test their attitudes and study habits towards a subject, unfortunately, males and female learners have diverse views about technology related subjects which make them to take diverse concern about undertaking them and their uses (Kalka, 2010). Being a male or female is not expected to hinder any student's achievement in Technical Drawing yet, gender inequality has been a thing of concern generally. Efforts are being made globally to remove the barrier of gender inequality even in technology education and Unite Nations recently made a comprehensive global arrangement to sets out a blueprint to end up gender inequality and provide equal opportunity as a vital part of the plan (United Nations. 2018). It is expected that the instructional method for Technical Drawing should be able to provide students with gender responsive learning environment which will give various opportunities without being bias against any gender but to eliminate gender inequalities.

Statement of the Problem

There are several techniques and strategies that can be employed in the teaching of a subject but these techniques and strategies motivate students and improve learning and academic performance differently (Friesen, 2011). There have been concerns regarding the teaching methods or strategies that will be best used for Technical Drawing in Oyo State Technical Colleges for better learning outcome. It is therefore requiring that a teacher selects from the wide range of the teaching methods that will best engage the students, increase their learning outcome and increase their retention (Bidabadi, Isfahani, Rouhollah, & Khalili, 2016 and Granjeiro, 2019). Commonly used method of instruction for Technical Drawing in Oyo state Technical Colleges is however teacher-centered, which does not encourage full participation of the students but makes the classroom environment dominated by the teacher who disseminates information to the students while the students are expected to absorb such information and develop understanding (Altun, 2023), this always

results in a little sustenance of the learners' interest and attention. Student-centered as a method of instruction on the other hand also has some deficiencies such as its inability to encourage students who prefer to work alone as some students are not comfortable working with others while in some cases, students may miss important information necessary for better academic achievement if the teacher does not possess ability to curate materials suitable to the learners' known needs, the learner-centered method becomes ineffective (Tzenios, 2022). There will definitely be best cognitive understanding and better academic achievement where the best teaching method is applied to solve tasks for a growing mind in a manner that will improve the quality of learning. Teaching of Technical Drawing therefore requires learning process that is capable of improving academic achievement and retention of the concepts of Technical Drawing in the students of Technical College. This study therefore wishes to determine the method of instruction between the student-centered and Teacher-centered that will be best at improving the academic achievement of students in Technical Colleges.

Significance of the Study

This study will be helpful to the policy makers and curriculum planners in the recommendation of the appropriate method of instruction for teaching Technical Drawing in the Technical Colleges. It will also be beneficial to the teachers because it will give them the understanding into the method of instruction that will enable the students to have better academic achievement in Technical Drawing and the need for the classroom environment to be organized in a manner that will support the best method of instruction. Adopting appropriate method of instruction will result in improving students' interest in Technical Drawing as a subject and thereby improving their achievement.

Purpose of the Study

The main purpose of the study is to determine the best method of instruction between teacher-centered and student-centered methods of instruction for better academic achievement of Technical College students in Technical Drawing in Oyo state Technical Colleges. Specifically, the study investigated:

1. The effects of student-centered and teacher-centered method of instruction on students' academic achievement in Technical Drawing class in Technical Colleges. 2. The effects of student-centered and teacher-centered method of instruction on gender in Students' academic achievement in Technical Drawing.

3. The main effect of gender on academic achievement of students in Technical Drawing class when student-centered method of instruction is used.

Hypotheses

This study was guided by the following null hypotheses tested at 0.05 level of significance:

HO_1. There is no significant difference between the effects of student-centered and teacher-centered method of instruction on

students' academic achievement in Technical Drawing class in Technical Colleges.

HO_2. There is no significant difference in the academic achievement of male and female students in Technical Drawing when student-centered method of instruction is used.

HO_3. There is no significant difference in the academic achievement of male and female students in Technical Drawing when teacher-centered method of instruction is used.

Methodology of the Study

Factorial design with students in their intact classes assigned to either student-centered or teacher-centered method of instruction was adopted for this study. This is because factorial design allows more than one independent variable in a study thereby enabled the researchers to assess the effects of the independent variables (student-centered and teacher-centered) on the moderator variable (gender). 378 Technical College Students in their year two in all the technical colleges in Oyo State in 2023/2024 academic session made up the population of the study. 104 students comprising of 72 male and 32 female students randomly were selected from the population to form the sample for the study using a multi-stage stratified sampling technique. Purposeful random sampling technique was firstly used to select two Technical Colleges from the list of Technical Colleges in Oyo State, Nigeria after which simple random sampling technique was used to randomly assign intact classes to the two treatments (student-centered and teacher-centered). 40 male and 13 female students constituted treatment group assigned to Student-centered, while 32 male and 19 female students also constituted another treatment group assigned to Teacher-centered.

The instruments used in this study is Technical Drawing Achievement Test (TDAT) which was developed by the researcher through the preparation of the Table of specification, taking into consideration the topics in subject outline of the Technical Drawing in Technical College. The Student-centered and the Teacher-centered Lesson Plans which were used to teach the groups were developed by the researcher. To ensure content validity of the Technical Drawing Achievement Test (TDAT), a table of specification was built giving due consideration to the objectives of the topics in the outline for the year two Technical Drawing. In order to ensure that the items did not deviate from the specifications of the test blueprint, test of goodness of fit was carried out. The result of the goodness of fit computed showed that the question items distribution did not deviate from the table of specification. Based on the table of specification, 60 multiple choice items were drawn. The TDAT, the Student-centered lesson plan and Teacher-centered lesson plan for Technical Drawing were subjected to face validation by five experts three of which are lecturers of Technical Drawing and two measurement experts. In the face validation exercise, each of the validators was presented with a copy of each of the instruments for validation.

Based on the experts' corrections and suggestions, a final copy of TDAT, Student-centered lesson plan and Teacher-centered

lesson plan were prepared by the researcher. A trial test was conducted on the TDAT for the purpose of determining the psychometric indices of the test. In the trial test, the TDAT was administered on a sample of 28 students drawn from year two students of Technical Drawing in a Technical College in Ogun State, Nigeria. The answer sheets resulting from the trial-test were marked and used for computing the difficulty index, discrimination index and distractor index of the test items. A total of 30 items of the TDAT had good difficulty, discrimination and distractor indices. The coefficient of reliability of TDAT was determined using test-re-test. In order to achieve this, the trial test of TDAT was administer twice to the same sample within two weeks and the scores obtained in the first and second administration of the tests were correlated. The reliability coefficient obtained on a sample of 28 was found to be 0.88 using Pearson Product Moment correlation coefficient.

To reduce experimental bias which may result when the students are aware that they are being observed, the teacher of Technical Drawing in each school taught his or her students. For the purpose of uniformity in teaching, the researcher developed two lesson plans one for Student-centered group and the other for Teacher-centered group. This is to control variability in the development of individual lesson plans. The experiment commenced with a pre-test of Technical Drawing Achievement Test (TDAT) administered to the two groups by the teachers of Technical Drawing in their respective schools. Through the pretest, the base line data was obtained on the dependent variable (Achievement). After the pre-test, the two groups were taught Technical Drawing as contained in the year two syllabus for six weeks using Student-centered method of instruction (AutoCAD) and Teacher-centered method of instruction (Traditional Teaching). Immediately after the treatments, a post-test of TDAT was administered to the groups to obtain post-treatment data for the dependent variable (Achievement).

Mean and standard deviation of the pre-test and the post-test of each group were compared to determine the effects of the two methods of teaching (Student-centered using AutoCAD and Teacher-centered using traditional teaching method) on cognitive achievement in Technical Drawing. The differences between the pre-test and post-test mean scores otherwise known as mean gain of the treatment groups were compared to take decision on the group with better academic achievement.

Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. Where the significance of F is greater than 0.05 ($\rho > .05$), F-value was considered not significant and the null hypothesis was accepted but where the significance of F is less or equal to 0.05 ($\rho < .05$), F-value was considered significant and the null hypothesis was rejected.

Table 1: Mean and Standard Deviation of Pre-test and Post-test Scores of Treatment Groups

Treatment Groups	n	Pretest	SD	Post-test	SD
Student-centered	51	12.53	1.86	25.64	3.66
Teacher-centered	53	11.54	1.54	20.41	2.10

From the table 1 above, student-centered group pre-test score of 12.53 with a standard deviation of 1.86 and a post-test mean score of 25.64 with standard deviation of 3.66. The difference between the pre-test and post-test scores was 13.11 while the group of Teacher-centered had a pre-test mean score of 11.54 with a standard deviation of 1.54 and a post-test score of 20.41 with a standard deviation of 2.10. The difference is 8.87. The deviation from the mean in the pre-test in each case is lower than the deviation in the post-test. It is evidenced from these results that students-centered group did better in the achievement test than the group of teacher-centered.

Table 2: The effect of gender and interaction effect of gender on the achievement of students with student-centered method of instruction and students with teacher-centered method of instruction

	Student-centered			Teacher-centered		
Gender	**n**	**Pre-test**	**Post-test**	**n**	**Pre-test**	**Post-test**
Male	40	17.11	25.38	32	17.93	22.26
Female	13	16.97	22.37	19	17.52	20.66

The result emanating from the table 2 above showed male gender in the student-centered group having a pre-test mean score of 17. 11 and a post-test score of 25.38 with a difference of 8.27 while females in the same group had a pre-test mean score of 16.97 and post-test mean score of 22.37 having a difference of 5.4. The male students in the teacher-centered group had a pre-test mean score of 17.93 and post-test mean score of 22.26 having a difference of 4.3 while female in the same group had a pre-test score of 17.52 and a post-test score of 20.66 with a difference of 3.14. From the results, students with male gender did better than their female counterpart in Technical Drawing achievement test which means that there was an effect attributable to gender in Technical Drawing achievement test. The result however did not show that combination of gender and a particular method of instruction will produce greater achievement. The implication is that the effectiveness of student-centered on students' achievement in technical drawing does not depend on level of gender; therefore, there is no interaction effect of treatments given to students and their gender.

Hypothesis: The hypotheses formulated for the study were tested at 0.05 level of significance using Analysis of Covariance (ANCOVA).

HO_1. There is no significant difference between the effects of student-centered and teacher- centered

method of instruction on students' academic achievement in Technical Drawing class in Technical Colleges.

HO_2. There is no significant difference in the academic achievement of male and female students in Technical Drawing when student-centered method of instruction is used.

HO_3. There is no interaction effects of treatment and gender on students' achievement in Technical Drawing.

Table 3: Summary of Analysis of Covariance (ANCOVA) for Test of Significance of:
1. Effects of Treatments (student-centered and teacher-centered methods of instruction) on Students' Achievement in Technical Drawing.
2. Effects of gender on Students' Achievement in Technical Drawing.
3. Effects of Interaction of Treatment and Gender on Students' Achievement in Technical Drawing.

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1978.214	4	494.554	137.405	.000
Intercept	1963.532	1	1963.532	531.653	.000
Pretest	18.344	1	18.344	6.960	.034
Treatment	1364.645	1	1364.645	450.544*	.000
Gender	298.841	1	298.841	76.763*	.000
Treatment * Gender	7.311	1	7.311	1.761	.234
Error	350.313	99	3.539		
Total	145377.000	104			
Corrected Total	2328.527	103			

***Significant at sig of F< .05**

As can be seen in table 3, F-calculated values for effects of the treatment (student-centered and teacher-centered), gender (male and female) and interaction effect of the treatment and gender on achievement of students in Technical Drawing were statistically presented. Results from the table showed that there was a significant effect of treatment on students' achievement in Technical Drawing which is evident in F-calculated value of 450.544 at of 0.000 which is less than 0.5 that is $\rho < .05$. The implication is that the achievement scores in Technical Drawing for the treatment groups (student-centered and teacher centered) was statistically significant. With this result, the null-hypothesis (HO_1) was rejected at 0.05 level of significance meaning that there was a significant effect of treatment on students' achievement in Technical Drawing. The table also revealed that there was a significant effect of gender on students' achievement in Technical Drawing with F-calculated value of 76.763 and F-value at 0.000 which is less than 0.05 meaning $\rho<0.05$. By this result, the null-hypothesis (HO_2) which stated that there is no significant difference in the academic achievement of male and female students in Technical Drawing was rejected at 0.05 level of significance. However, the interaction

effect of treatment and gender has F-calculated value of 1.761 with significant of F at 0.234 which is higher than 0.05 that is ρ>0.05. This implies that the null-hypothesis (HO_3) for the interaction effect of treatment and gender which stated that there is no interaction effects of treatment and gender on students' achievement in Technical Drawing will be accepted at 0.05 level of significance which means that there was no significant interaction effect of the treatment and their gender on achievement of students in Technical Drawing when any of the methods of instruction (student-centered or teacher-centered) is used (F=1.761 at significance of F=0.23 which means ρ>0.05 and HO_3 was accepted at 0.05 level of significance.

Discussion of Findings

The result emanated from the study indicated that student-centered method of instruction presents students with better academic achievement in Technical Drawing than when the teacher-centered method is used. This result justifies the call by the UNESCO that educational institutions need to embrace new technology such as appropriate computer technology as learning tools together with appropriate teaching method that will transform the present isolated teacher-centered and text bound classroom into rich students-centred interactive knowledge environment (UNESCO, 2002). This study also corroborated the study of Edwards, (2017) and Scarrow (2017) which revealed that Learner-centered teaching strategies increase student motivation and engagement significantly and statistically more than traditional or teacher-centered instruction. Among the benefits of student-centered learning identified by Nikolaos Tzenios (2022) is that it boosts students' engagement and leverages a learner's curiosity and develops it into a strong interest in a subject making them to take the lead, dig deeper, and engage in discussions and disputes, which leads to increased engagement. According to him, the approach moves the focus from the traditional approach of cramming learning material to showing students real-life content applications. In LCT, there is more practical work than theory, which keeps the students interested and challenges them to seek more knowledge. The study also revealed that there was an effect of gender on the achievement of students in Technical Drawing when any of the instructional methods is used as males had better achievement than females in either of the methods of instruction which negates the study of Avila and Malquisto (2019) on Gender Disparity Competence in Drafting Technology among Government Secondary Learning Institutions where females had better achievement than their male counterparts. However, the studies of Jimoh (2019) and Opara, Banjoko, Ayoola and Opara (2019) agreed with the present study that male students always achieve better in engineering or architectural drawing than female students. This points to the fact that males and female learners have diverse views about technology and

take diverse concern of its undertakings and uses (Kalka, 2010). No significant interaction effect of the treatment and gender on the students' achievement in Technical Drawing was observed in the study which means that better academic achievement of student-centered group not rely on level of gender which the study of Jimoh (2019) on comparative effects of 2D and 3D methods of graphics in AutoCAD on interest of national diploma students in engineering graphics in Southwest Nigeria where there was also no significant interaction effect.

Conclusion

The study compared the effectiveness of student-centered and teacher-centered methods of instruction on students' academic achievement in Technical Drawing and the results of the findings provided that Student-Centered method of instruction yielded better results than the teacher-Centered while male students' performance was better than their female counterparts in Technical Drawing regardless of the method employed. There was no interaction effect between the method of instruction and students' gender on academic achievement in Technical Drawing. The study concluded that the two methods of instructions considered in this study have advantages and disadvantages yet student-centered method was found to be better for students' academic achievement in Technical Drawing than the teacher-centered method of instruction.

Recommendations

This study revealed non availability or inadequate relevant instructional and learning materials for Technical Drawing in Oyo State Technical Colleges which has been influencing teaching and learning of Technical Drawing as a subject. Teachers have not been able to diversify their teaching methods simply because of the non-availability or inadequate relevant teaching materials. This has been making teachers to hold on to the traditional teacher-centered method of instruction. Student-centered method which has however been found effective could not be adopted for the sake of the indigent students who may not be able to cope with the expenses involved. According to Tzenios (2022) Learner-centered teaching is demanding in nature for the instructors and the expenses involved is on the high side for the students. This has been greatly influencing the use of teacher-centered as the only method of instruction for teaching Technical Drawing in Oyo State Technical Colleges.

Government should therefore be endeavor to provide enough funds for the procurement of adequate and relevant teaching materials while the available infrastructural facilities should be upgraded to support diversification of teaching method appropriately. In the same vein, Government should make loan facility available for the indigent students to purchase necessary tools and equipment that will help them in student-centered learning.

Although, student-centered method of instruction was found to be more effective for the teaching of Technical Drawing, teachers should consider adopting the use of mix method of instruction involving combination of student-centered and teacher-centered as this will lead to a more effective and well-rounded education.

According to Altun (2023) most good teachers use a mix of both methodologies, the balance of which depends on the context, the subject and the students. Combining teacher-centered and student-centered education can lead to a more effective and well-rounded education When the two methods of instruction are well structured and combined, the learners are likely to have better academic achievement in Technical Drawing and the learning environment will be more productive with improved skill development by the learners.

Since male and female students have equal opportunity in the labour market, the learning process should provide equal opportunity for both gender along diverse processes and skills development. Female students should be encouraged not to approach Technical Drawing with phobia because they possess equal potentials as their male counterparts in acquisition of necessary skill for Technical Drawing while vocational institutions are equally expected to train, nurture and develop students' potential regardless of their sexes. Government, Institutions and teachers need to motivate students irrespective of their sexes to offer any course regardless of the associated challenges (Oladeji, Sangotayo, and Adebiyi, 2011).

There should be regular training and retraining for the teachers in Technical College to put them on the track of developments in teaching pedagogy and the use of modern technology that will enhance their job. In the same way, Opara, Banjoko, Ayoola and Opara (2019) suggested regular workshops, seminars and conferences for teachers who teach Design and Drawing subjects to improve their knowledge and skills on the use of modern drawing equipment like Autodesk Revit and AutoCAD. Government and institutions should therefore make adequate provision for training and retraining of teachers of Technical Drawing in Technical Colleges in the pedagogy of teaching so as to enhance academic achievement of the students.

Implication of the findings for Theory and Practice

The study supports the Student-Centered Learning theory which emphasizes the importance of active learning, student autonomy, and teacher facilitation. According to Jacobs and Renandya (2016), Student-Centered Learning shifts the focus of instruction from teachers to students and prepares students to be lifelong learners. The study also justifies UNESCO's call for educational institutions to adopt student-centered approaches and integrate

technology to create interactive learning environments (UNESCO, 2002).

Practically, the study suggests that educators should adopt student-centered instructional methods, such as project-based learning, problem-based learning, and flipped classrooms, to improve student academic achievement while professional development of the teachers should be centered on trainings that will improve their skills in technology integration into teaching and usage of Student-Centered method of Instruction. The design of curriculum for Technical Drawing should also incorporate student-centered learning principles and technology-enhanced learning experiences that will create engaging and interactive learning environments. If educators, policymakers, and researchers can work together, there will be more effective and inclusive learning environments which will promote student engagement, motivation and better academic achievement.

Limitations of the Study

One of the limitations to this study was the fact that it was conducted in Technical Colleges in Oyo State, Nigeria and the results may not be representative of technical colleges in other States of Nigeria or other countries. Also, sample size used in this study may be insufficient to make generalization for a larger population. Although, the Instrument used for the study was developed by the researchers and validated by experts and the coefficient of the reliability was found to be high enough yet validity and reliability might not be fully established. Effectiveness of the teachers involved in the implementation of the teaching methods may influence result of the study. Future study may delve into other methods of Instruction that may be more effective for teaching Technical Drawing than either Student-Centered or Teacher-Centered.

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