

Research Article

Enhancing Academic Performance and Retention of General Woodwork Students' using Adaptive Instructional Strategy in Technical Colleges in Edo State, Nigeria

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Abstract: This study examined the effectiveness of adaptive instructional delivery approach on students' performance in general woodwork adopting non-equivalent control group quasi-experimental research design. Four research questions and four hypotheses guided the study. A total of 79 vocational II woodwork students' in 2016/2017 academic session drawn from four co-educational technical colleges in Edo State made up the sample for the study. The instrument for data collection was a 30-item General Woodwork Achievement Test (GWAT), administered as pre-test, post-test and delayed post-test respectively. Three experts validated the instruments. Its reliability of .89 was determined using Kuder Richardson 21 formulae. Mean was used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at .05 level of significance. The results indicated among others that adaptive instructional approach had a significant effect on students' performance and retention in General Woodwork trade. The study recommended that General Woodwork teachers should employ the use of adaptive teaching approach in teaching General Woodwork to enhance students' performance and retention. The major educational implication of the findings was that students will do better in General Woodwork if taught with adaptive teaching strategy.

Keywords: Adaptive Teaching Strategy, Academic Performance, Retention, Technical Colleges.

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INTRODUCTION

General Woodwork is one of the skill-oriented trade subjects offered in technical colleges in Nigeria. It is a geared towards equipping its recipients with profitable skills for self-reliance or for paid employment. It deals with the possession of skills, knowledge and attitude in constructing woodwork joints in framing items, objects and structures, using diverse types of woodworking machines to perform different practical task. It is a trade that enables students to acquire the requisite knowledge and skills to live effectively in and contribute to the society. In contemporary Nigeria, greater emphasis is on skill acquisition and development for entrepreneurship and self-reliance. General woodwork trade is aimed at exposing students with the knowledge and skill for the production and set for the site; give and impart skills to students who shall be able to make: prepare timber to a given specification using hand tool, identify convention of representation using on working drawing, use portable electric tools, use woodworking machines, construct woodwork joints, apply a range of types of adhesives, make objects using different types of fittings

and asteners and apply finishes to on-going jobs (National Business and Technical Examinations Board (NABTEB) [1]. Acquisition of saleable construction skills in woodwork trade is essential in order to equip individuals for paid or self-employment and sustainable development [2]. Yet academic performances of students in their final year examinations have not been very encouraging.

Academic performance is a measure of learner's level of knowledge, skills or performance [3]. It is the extent of accomplishment or failure of goal in a particular content that the student has earlier been exposed to. In the context of this study, performance is the successful accomplishment of goals and how students are able to demonstrate their intellectual abilities in woodwork concepts through testing over sometime. Poor performance in woodwork can be attributed to many factors among which is the poor instructional delivery approaches. Researches [4-7] have shown that the fall in standard of achievement is incontrovertibly attributed to poor instructional delivery approach adopted by teachers in schools. The resultant

effect is poor achievement and poor retention level of students' in examinations. The National Business and Technical Examinations Board (NABTEB) Chief Examiner's report (2009-2013) noted that the persistent poor achievement of students in technical subjects General Woodwork inclusive leaves one in doubt about the effectiveness of instructional delivery approaches employed by the teachers for teaching General Woodwork. Therefore, woodwork concepts need to be presented to the learners in a manner that touches their sub-consciousness which can trigger quick recalling of the concept being taught or learnt. Researchers are unanimous in their submissions that the prevalent lecture-based method of teaching technical subjects in schools in Nigeria, which does not equip learners with necessary skills, beliefs, motivation, interest and knowledge to approach General Woodwork and other technical subjects problems and learning tasks in an efficient and successful way should be de-emphasized and that alternative classroom practices that can facilitate the process leading to effective learning of General Woodwork be sought.

This led to a shift to a constructivist instructional strategy that will emphasize an active role of the students which will enable them to create their own understanding by interacting with their learning environment. Several constructivist strategies have been seen as an intervention plan for enhancing students' academic performance; among which are two-programmed instructional strategies, mastery learning approach, think-pair-share, peer tutoring, reciprocal peer tutoring, concept mapping, instructional scaffolding, exchange board substitution strategy, etc yet learners' academic performance and retention remain low or poor. It appears that some other factors needed to be addressed alongside the instructional innovations. This compelled the researcher to extend her search to considering the effect of adaptive teaching strategy that can remediate and compensate the students' poor academic performance and retention in General Woodwork by providing them with instruction that can match their individual strength.

Adaptive teaching strategy is one that applies various strategies to different sets of students so the natural diversities prevailing in the classroom does not prevent any learner from achieving success [8]. The natural diversity could be in form of prior performance, aptitude or learning style, learning disability, psychological make-up and family background. A learning style is the characteristics, strengths and preferences in the way people receive and process information [8]. It is a truism that every individual has its personal way or set of tactics when learning. If the instructional style used closely matches the learner chosen style of obtaining knowledge, learning turns out to be easier and extra natural, learning outcomes increase and learning period is reduced. Conversely, learning will be difficult and forceful thus reducing

students' academic performance and retention. In this sense, it is essential to deploy resources in order to support the course of learning in a manner that it does not only go well with the features of a few, but adapts to the features of every learner.

On the other hand, when the necessary learning resources are applied and learners' performance does not improve it becomes learning disability. The U.S. Department of Education in Woolfolk [10] described learning disabilities as a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, speak, read, write, spell, or to perform General Woodwork tasks. The term includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. It does not affect people who have learning issues that are principally the consequence of visual, or of hearing, or of motor disabilities, or of psychological make-up and family background like mental retardation, emotional disturbances, environmental, cultural, or financial disadvantages.

Adaptive teaching is an instructional strategy that applies different instructional strategies to different groups of learners so they all can achieve success. It requires the understanding of students' learning strengths and experiences with regard to specific lesson content and the alternative instructional strategies that can boost their retention and maximize their strongest receptive modalities towards high academic performance. In applying adaptive teaching, teachers tend to use various instructional strategies to different groups of students in the classroom in order to meet their learning differences. Adaptive teaching works to achieve success with all students, regardless of their individual differences. Thus, it was discovered that different instructional strategies when matched to the individual strength or weakness of learners can significantly improve their performance [11].

Adaptive teaching approaches are remediation and compensation [8]. Remediation approach provides the student with the requisite knowledge, skills or behaviour needed to benefit from the planned instruction [12]. For instance, a teacher might attempt to lower the anxiety of highly anxious student with a learner-centred discussion before the planned presentation or instruction. This approach is useful to the extent that the desired prerequisite information, skills or behaviour can be taught within a reasonable period of time [13]. When this is not possible or represents an inefficient use of classroom time, the compensatory approach to adaptive teaching can be taken.

Applying compensatory approach, teachers choose an instructional technique to balance for the deficiency of information, dexterity or aptitude known to be present among students by varying the lesson presentation to thwart a weakness and encourage strength. This is accomplished by using alternative modalities such as supplementing the content with additional learning resources (instructional games and simulations); picture versus words; and activities (group discussions or experience-oriented activities). The teacher will achieve this by modifying the instructional techniques to focus on known strengths of the learners. Hence, it is observed that when the teaching style used closely matches the learner preferred style of acquiring knowledge, learning becomes easier and more natural and results improve [9].

Besides, if for instance a learner is more verbal than visual and everything is written on the board without auditory resources, the learner will experience difficulties in attaining the pedagogical goals in the requested time. In this sense, it is crucial to set up resources to sustain the process of learning in a manner that it does not only suits the features of a few, but that it adjust to the features of each learner. Given that learning objectives and study materials are standardized for an entire class, the only adaptation has to do with the pace at which students complete the lesson. This can be achieved by close observation of the learners using their classroom performance or more reliably through the use of checklist. With regard to the sufficiency of learning, high achievers may be inclined to obtain more shore up than they require and low achievers excessively little. The teacher will then modify and plan instruction in a manner that will suit the individual learning differences that exist among learners irrespective of their gender.

The influence of students' gender in their academic performance in General Woodwork has been a concern to educators and researchers for long. Yet no consistent result had emerged. In Nigeria, bias is still prevalent; it has persisted even within the General Woodwork classroom. To this end, Oludipe [14] asserted that the prevalent effects of gender bias and stereotypes in Nigeria affects certain vocation and disciplines whereby certain vocations are considered for males and some for females. There is a stereotyping bias that science and technical disciplines are a males' enterprise while catering, typing and some other disciplines are females. This gender stereotyping of subjects is of great concern in the academic field and resulted to a controversial issues and conflicting reports among educators and scholars. While some scholars and educators [15, 14, 16, 2] reported that there exists no significant difference in the academic performance of students as a result of their gender; other scholars [17] reported that there is difference in the performance of male and female students in school subjects. Thus, this study sought to examine whether adaptive teaching will

enhance students' performance and retention in General woodwork among technical college students' in Edo State. This study intends to make its contribution in the educational debate and to add to existing literature on the influence of gender on teaching methods.

Purpose of the Study

The purpose of the study was to find out the effect of adaptive teaching strategy on students' performance and retention in General Woodwork. Specifically, this study sought to determine the:

1. Effect of adaptive teaching strategy on the mean performance scores of students' taught General Woodwork and those not taught with it;
2. Effect of adaptive teaching strategy on the mean retention scores of students' taught General Woodwork and those not taught with it;
3. Influence of adaptive teaching strategy on male and female students' mean performance scores of students' taught General Woodwork and those not taught with it; and
4. Influence of adaptive teaching strategy on the mean retention scores of students' taught General Woodwork and those not taught with it.

Theoretical Significance of the Study

Social constructivism views each learner as a unique individual with unique needs and backgrounds [18]. The learner is also seen as complex and multi-dimensional. Social constructivism not only acknowledges the uniqueness and complexity of the learner, but actually encourages, utilizes and rewards it as an integral part of the learning process [19]. Furthermore, it is argued that the responsibility if learning should reside increasingly with the learner [20]. Social constructivism thus laid emphasis on the significance of the student being enthusiastically involved in the process of learning, contrasting earlier educational perspectives where the task rested among teachers to instruct and where students are passive and receptive. Glaserfeld [20] emphasized that the learners construct their own understanding and that they do not simply mirror and reflect what they read. Learners look for the absence of full or complete information. Summing the core principles of constructivism, which emphasizes learning, promotes learner independence and individual participation in learning, seems to students as serving of major roles and as mediators exercising resolve and purpose, encourages learner natural curiosity, beliefs, attitude and motivation. In addition, within the constructivist theory, framework is accorded importance, as it makes circumstances and events significant and germane and offers students with the prospect to create innovative knowledge from real-life experience.

Constructivists share the idea that knowledge must be applicable. The emphasis of adaptive teaching strategy is not different from the idea and emphasis of the constructivists in the teaching and learning situation.

Adaptive teaching strategy is based on the principles of social constructivism learning theory, that emphasizes learning and not teaching, encourages learner autonomy and personal involvement in learning, looks to learner as incumbents of significant roles and as agents exercising will and purpose, fosters learners' natural curiosity, beliefs, attitude and motivation [22]. This makes the Constructivist theory relevant to the present study in general woodwork because it is a trade that can be applied, or practiced by individual learner or group. Students will integrate and work together as a team and participate actively which will improve their academic performance and retention in general woodwork.

METHODS

Design of the Study

The design of this study is a quasi-experimental design; specifically, the pre-test, post-test non-equivalent control group design since intact classes was used. The use of intact classes was to avoid threat of selection bias among the students and to avoid re-arranging and re-grouping which could disrupt the normal lessons. The pre-test was used to partial out initial differences in the two groups and also to control selection bias which is a threat to internal validity.

Population, Sample and Sampling Technique

The population for this study comprises all 79 the General Woodwork students as at 2016/2017 academic session in vocational II in technical colleges in Edo State, Nigeria. Edo State consists of six co-educational technical colleges. Since the population was few and manageable, the entire population was used for the study. The researcher randomly grouped the six schools into two groups using simple balloting technique. Three intact classes were each assigned to the experimental group and control group. That is, three classes were assigned to experimental group (taught with adaptive teaching strategy) and the other three classes were assigned to control group (taught with lecture-based methods). A total of 79 students were used for the study.

Instrument for Data Collection

The instruments used for data collection was General Woodwork Performance Test (GWPT) and General Woodwork Retention Test (GWRT) developed by the researcher. Specifically, the items were drawn from the content of vocational I and II General Woodwork curriculum for technical colleges by National Board for Technical Education (NBTE) [22]. The GWPT was used for both pre-test and post-test while the GWRT was used as delayed post-test. The items in the GWPT used for pre-test were reshuffled for use as post-test. GWPT is a 30-items instrument, made up of multiple choice objective questions with three options labelled A, B, C of which only one of the option is correct, and scored 1 mark each with a total of 30 marks. GWPT items tested students' knowledge, comprehension, and application that were set on safety

practice in the workshop: hand tools safety, machine safety, safety devices and appliances, and first aid; timber: types, conversion, seasoning, defects in timber, timber preservation and timber products; tools and machines: types of maintenance, maintenance of hand tools and machines; design and construction: timber preparation, woodwork joints, wood finishes and finishing, wood abrasives, wood adhesives, wood fitting, non-wood materials, veneering, wood bending, project design, drawing, and construction and application of two real-life based on the General Woodwork NBTE [22] curriculum. The test was designed to measure students' cognitive performance in the topics listed above. A total of 14 lesson plans were developed based on the topics listed above. Each treatment group has a different and corresponding lesson plans.

Instrument Validity and Reliability

The instruments were validated by two Technical teacher education lecturers and one lecturer in Measurement and Evaluation and the corrections suggested reflected in the final instrument used for the study. The reliability index of .88 was established for the instrument using Kuder Richardson's formula 21 (K_{R-21}).

Experimental Procedure

Before the treatment, the research subjects were given a pre-test which was administered by the regular general woodwork teachers in the technical colleges who have undergone training. The scripts were marked by the researcher. The pre-test was used to: (i) determine the students' initial knowledge of the topics they will learn later; (ii) determine the comparability of the two groups (experimental and control) with respect to their performance in the pre-test.

The treatment for the study was teaching of the selected topics to vocational II students' using the two methods (adaptive instructional strategy and lecture-based method). The experimental groups were taught using adaptive teaching strategy while the control group was taught using the lecture method. Teaching lasted for six weeks. The experimental groups were subjected to adaptive teaching strategy. The objectives of the lesson were spelt out for each topic. The teacher introduced each topic and used the adaptive teaching strategy to explaining all the concepts. The teacher got the students involved in the process.

The lecture method was used in teaching the control group. The teachers verbalized the relevant concepts during the lesson and as well initiated and encouraged group discussion on the course of the learning. The students watched, listened, discussed within the group and took down relevant notes. The teaching of both experimental and control groups were done during the normal periods using prepared lessons notes.

At the end of the treatment, a post GWPT was administered to the same subjects. The scores for both experimental and control group were recorded accordingly. Each item in the test was scored one mark. The maximum mark was 30 while minimum mark was 0. The retention test was administered to the students two weeks after the experiment.

METHOD OF DATA ANALYSIS

The research questions were answered using Mean and standard deviation. This is because Mean is the most reliable measure of central tendency in a

normal distribution which will be used to describe the Mean performance scores of students. The hypotheses were tested at .05 level of significance using Analysis of Covariance (ANCOVA). ANCOVA was used in order to take care of the error of initial difference in the ability levels among the research subjects. The pre-test scores were used as covariates for performance.

FINDINGS AND DISCUSSION

Research Question 1: What is the effect of adaptive teaching strategy on the mean performance scores of students’ taught General Woodwork and those not taught with it?

Table-1: Mean and Standard Deviation of Students’ Performance in General Woodwork

Group	N	Pre-test		Post-test		Gain
		\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	
Experimental	39	8.18	3.08	15.05	5.05	6.87
Control	40	7.87	3.08	12.31	3.91	4.44

The results in Table 1 reveals that students in the experimental group taught General Woodwork using adaptive teaching strategy had gain score of 6.87 while students in the control group taught using lecture-based method had gain score of 4.44. The results indicates that students taught General Woodwork using adaptive teaching strategy performed

better than their counterparts taught using lecture-based method.

Research Question 2: What is the effect of adaptive teaching strategy on the mean retention scores of students’ taught General Woodwork and those not taught with it?

Table-2: Mean and Standard Deviation of Students’ Retention in General Woodwork

Group	N	Post-test		Retention		Gain
		\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	
Experimental	39	15.05	5.05	18.90	4.59	-0.03
Control	40	12.31	3.91	12.28	4.47	4.44

The results in Table 2 reveals that students in the experimental group taught General Woodwork using adaptive teaching strategy had post-test mean retention score of 18.90 while the post-test mean retention score of students in the control group taught using lecture-based method was 12.28. The results indicates that students taught General Woodwork using adaptive teaching strategy had higher retention score

than their counterparts taught using lecture-based method.

Research Question 3: What is the influence of adaptive teaching strategy on male and female students’ mean performance scores of students’ taught General Woodwork and those not taught with it?

Table-3: Mean and Standard Deviation of Gender and Students’ Performance in General Woodwork

Group	N	Pre-test		Post-test		Gain
		\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	
Male	15	7.36	2.74	15.68	4.94	8.32
Female	64	8.33	3.19	12.78	4.33	4.45

The results in Table 3 reveals the post-test mean performance score of 15.68 male students with a mean gain of 8.32; while the female students had post-test mean performance score of 12.78 with a mean gain of 4.45. It is concluded that male students had higher mean performance score than their female counterparts in General Woodwork trade.

Research Question 4: What is the influence of adaptive teaching strategy on the mean retention scores of students’ taught General Woodwork and those not taught with it?

Table-4: Mean and Standard Deviation of Gender and Students' Retention in General Woodwork

Group	N	Post-test		Retention		Gain
		\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	
Male	15	15.68	4.94	17.96	5.83	2.28
Female	64	12.78	4.33	14.61	5.25	1.83

The results in Table 4 reveals that male students in the experimental group taught General Woodwork using adaptive teaching strategy had mean retention score of 17.96 while the female students had mean retention score of 14.61. The result shows that the male students had higher mean retention score than their female counterparts in General Woodwork.

Hypothesis 1: There is no significant difference in the mean performance scores of students

taught General Woodwork using adaptive teaching strategy and those taught using lecture-based method.

Hypothesis 3: There is no significant difference in the mean performance scores of male and female students taught General Woodwork using adaptive teaching strategy and those taught using lecture-based method.

Table-5: ANCOVA on Students' Mean Performance scores in General Woodwork

Sources of Variations	Sum of Squares	DF	Mean Square	F cal-value	Sig.	
Corrected Model	375.943 ^a	4	93.98	65.157	.001	
Intercept	1990.635	1	1990.635	109.216	.000	
Pre-test	10.142	1	10.142	.0556	.458	
Methods	183.166	1	183.166	10.049	.002	
Gender	39.514	1	39.514		2.168	.145
Method*Gender	115.349	1	115.349	6.329	.014	
Error	1348.766	74	18.227			
Total	16544.000	79				
Corrected Total	1724.709	78				

Table 5 shows that there is a significant mean effect of teaching methods on students' academic performance in General Woodwork $F(1, 79) = 10.049$, $p < .002$. Therefore, the null hypothesis was rejected, indicating that there was a significant difference between the mean achievement scores of students taught General Woodwork using adaptive teaching strategy and those taught using lecture-based method. The mean performance score for students taught using adaptive teaching strategy was 15.05, while the mean score for lecture-based method was 12.31. The difference was in favour of students taught using adaptive teaching strategy. Therefore, adaptive teaching strategy was superior to lecture-based method in General Woodwork instruction.

Table 5 also revealed no significant mean effect of gender on students' academic performance in

General Woodwork when taught using adaptive teaching method $F(1, 79) = 2.168$, $p > .145$. Therefore, the null hypothesis was retained, indicating that there was no significant difference between the mean achievement scores of male and female students taught General Woodwork using adaptive teaching strategy and lecture-based method.

Hypothesis 2: There is no significant difference in the mean retention scores of students taught General Woodwork using adaptive teaching strategy and those taught using lecture-based method.

Hypothesis 4: There is no significant difference in the mean retention scores of male and female students taught General Woodwork using adaptive teaching strategy and those taught using lecture-based method.

Table-6: ANCOVA on Students' Mean Retention scores in General Woodwork

Sources of Variations	Sum of Squares	DF	Mean Square	F cal-value	Sig.	
Corrected Model	973.395 ^a	3	324.465	16.228	.000	
Intercept	15218.113	1	15218.113	763.937	.000	
Methods	750.165	1	750.165	37.658	.000	
Gender	30.479	1	30.479		1.530	.220
Method*Gender	39.644	1	39.644	1.990	.162	
Error	1494.048	75	19.921			
Total	21868.000	79				
Corrected Total	2467.443	78				

Results in Table 6 showed a significant mean effect of teaching methods on students'

Retention in General Woodwork $F(1, 79) = 37.658, p < .000$. Therefore, the null hypothesis was rejected, indicating that there was a significant difference between the mean retention scores of students taught General Woodwork using adaptive teaching strategy and those taught using lecture-based method. The mean retention score for students taught using adaptive teaching strategy was 18.98, while the mean score for lecture-based method was 12.28. The difference was in favour of students taught using adaptive teaching strategy. Therefore, adaptive teaching strategy was superior to lecture-based method in General Woodwork instruction.

Table 6 also revealed no significant mean influence of gender on students' retention in General Woodwork when taught using adaptive teaching method $F(1, 79) = 1.530, p > .220$. Therefore, the null hypothesis was retained, indicating that there was no significant difference between the mean retention scores of male and female students taught General Woodwork using adaptive teaching strategy and lecture-based method.

DISCUSSION

The findings of this study revealed that adaptive teaching strategy had a more positive effect on the students in the experimental group in that they obtained a higher mean performance score than their counterparts in the control group who were taught using the lecture-based method. The high mean score by the experimental group indicated that the objective of the instructional method was realized and a good mastery of the General Woodwork was accomplished and this enabled the students in the experimental group to perform better. Students exposed to adaptive teaching strategy performed better because various techniques that use to their different natural diversities prevailing in the classroom were addressed during the experiments. The teacher utilized the techniques involved in the strategy such as the remediation and compensation by introducing student-centred discussion before the planned instruction or presentation to lower the anxiety of highly anxious students. This is done to bring to bay the desired pre-requisite information, skill, or behaviour to the knowledge of the students [13]. Teachers also choose sets of instructional methods to compensate for the lack of information, skills or ability known to exist among students, such as supplementing the content with additional learning resources (institutional games and simulations); (picture versus words); and activities (group discussions or experience-oriented activities) which caused the students to critically reflect and examine the materials presented to them during lesson. This is in line with the assertion of Rose [23] who stated that if the teaching style employed closely matches the student preferred style of acquiring knowledge, learning will be easier, more natural, and performance will improve. Conversely, learning will be difficult. Also, the findings of the hypothesis 1 revealed

that a significant change in mean performance scores was found to exist among the General Woodwork students taught with adaptive teaching strategy and lecture-based method with those taught with adaptive teaching having higher mean gain.

The findings of the study revealed that the adaptive instructional delivery approach enabled students to better retain what was learnt over a period of time than the lecture-based method. The finding is in agreement with the earlier findings from similar experimental studies such as Onyegebu [24] and Chianson [25] who reported that students subjected to the use of innovative instructional delivery approaches were able to retain the concepts been taught.

The findings of the study also revealed that male students taught using adaptive instructional delivery approach, achieved higher scores and retained better than female students at all levels. This could be due to the fact that some female students believe that general woodwork trade is too difficult and not important for their future. Also, the male students are already inclined to general woodwork and see it as a necessity, therefore paid serious attention to lessons. The findings of this study corroborates the views of Abdu-Raheem [26] and Atovigba [27] who reported that gender had significant effect on students' academic performance in favour of males. Barbican [28] asserted that irrespective of the method used in teaching concepts, boys usually achieved significantly better than girls to support the findings of this study.

The finding of this study is in contradiction with the findings of some researchers who had conducted similar experimental studies earlier using innovative instructional strategies. Ibe and Nwosu [29] reported that girls achieved more than boys in science subjects, and that female learners show some superiority over male learners. Larbi and Okyere [30]; Nwoke and Akukwe [6] posited that when girls and boys are instructed through extensive use of manipulative, girls benefit most, which enable them to perform at almost equal level as their male counterparts. Asaf and Zahoo [31] reported that girls performed better than boys in their study. Ogundola [32] posited that gender had effects on students' achievement in technical drawing in favour of girls. Nnamani, Akabogu, Uloh-Bethel and Ede [33] stated that gender had effect on students' achievement in favour of the girls. Also, the findings of this study is in disagreement with that of Oludipe [14]; Oviawe, Ezeji and Uwameiye [7]; Ndinika and Ubani [34] found no significant difference in the Mean scores of male and female students.

IMPLICATION AND RECOMMENDATIONS

This study aligned to the theories of learning by Bruner [18], Piaget [35] and Dewey [36] who stressed the use constructivism instructional methods in

the classroom which emphasize an active role of the learners that will enable them to construct their own understanding from a base of prior knowledge through interaction with their environment rather than lecture-based method which assumes that knowledge is simply given or transferred by the teachers in front of the classroom to students seated at their desks. This study thus incorporated the activity that will allow students to actively participate in the learning activity. The findings of this study have some implications for teachers, students, policy makers, and researchers. Efforts aimed at improving students' academic performance and retention in General Woodwork in technical colleges should be broadened to address all fundamental factors that contribute to students' performance and retention. Teachers should be using activity-based learner-centred constructivism instructional models such as adaptive teaching for more effective teaching which in turn will lead to excellent academic performance and retention in General Woodwork. Policy makers are expected to use the information provided by this study as a basis for taking decision in the best instructional methods like adaptive teaching strategy to be adopted in Nigerian technical college General Woodwork curriculum as opposed to using the lecture-based method. This is so, since the adaptive teaching strategy is aimed at making General Woodwork learning interesting by meeting the natural diversities that exist among students.

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