



Impact of Instructional Methods on Academic Achievement of Radio, Television and Electronics Works Students with Different Learning Styles in Technical College in Kano State, Nigeria

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ABSTRACT

The objective of this study was to investigate the impact of three instructional methods on the academic achievement of students studying Radio, Television, and Electronics Works (RTVEWS) with different learning styles. Three research questions were formulated, and three null hypotheses were proposed to guide the study, which were tested at a significance level of $p < 0.05$. Relevant literature was reviewed to support the study's findings. Two research designs were employed: a pre-test-post-test non-equivalent control group quasi-experimental design and a descriptive survey research design. The population of the study comprised all 83 NTC II RTVEWS students from three selected schools, determined through purposive sampling. The study utilized an Achievement test instrument (ARTVEWS) and a Structured Questionnaire (PLSEWSQ) for data collection, both of which underwent content and face validation. Reliability was established using Cronbach's Alpha and Pearson Product Moment Correlation. Hypotheses were tested using the Z-test at a significance level of 0.05. The collected data were analyzed using frequency count and mean value range, as well as grade points to address research question one. Mean and standard deviation were employed to address research questions one to three. ANOVA was used to test hypotheses one to three. The results indicated a significant difference between the mean scores of the pre-test and post-test in the ARTVEWS achievement test. Additionally, a significant difference was observed in the mean performance scores of students with different learning styles when taught using demonstration and problem-based methods. However, no significant difference was found in the mean achievement scores of students with different learning styles when taught using the project-based teaching method. In cases where significant differences were identified, Scheffes comparison test was conducted to determine the groups responsible for these differences. The findings of this study revealed the existence of different learning styles among RTVEWS students. Based on these findings, the researcher recommends that RTVEW teachers employ an integrated teaching approach that incorporates demonstration, problem-based, and project-based methods. By varying their teaching methods, teachers can accommodate students' preferred learning styles, thereby enhancing their performance, achievement, and retention. Furthermore, the researcher recommends that curriculum development and implementation agencies such as the NBTE and NCCE incorporate learning styles as an approach and strategy for teaching RTVEW, aiming to improve overall performance, achievement, and retention.

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INTRODUCTION

Technical colleges are formed in Nigeria to prepare and train students to gain

the necessary trade skills that will enable them to find work, become self-employed and hire others, or continue their study at tertiary level

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(Polytechnics, Colleges of Education and Universities). Umar and Ma'aji (2010) asserted that Technical Colleges are charged with the goals of providing trained personnel in applied sciences, technology and business particularly at craft and advanced craft levels; providing the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and giving training or imparting the necessary skills to individuals for self-reliance.

In an attempt to achieve the goals of Technical Colleges, several trade courses were introduced of which Electrical Engineering Trade is among. However, in order to attain to students needs and abilities, the trade was sub-divided into other basic trade among which are Electrical Installation & Maintenance Works and Radio Television and Electronics Works (RTVEW). Emphasizing the need for RTVEW, Ezugu (2004) asserted that students of RTVEW are expected to acquire skills that will lead them to carryout diagnosis of faults on television, radio and other domestic electronic products and to effectively repair and maintain them. In order to achieve the above stated curriculum objectives of RTVEW, teaching method adopted should be one that arouses the interest of the students so they can achieve their potential.

The action of imparting information or skills to another is commonly referred to as teaching. Teaching is also an act of sharing experiences or information with someone who is less experienced. Rajagopalan (2019) defined teaching as an art that emphasizes the teacher's inventive and artistic ability in establishing a good learning environment in the classroom. Teaching as a science, according to Rajagopalan, illuminates the logical, mechanical, or procedural stages that must be followed in order to achieve effective educational goals. Teachers are guided by certain principles of teaching and learning which have great implications on their jobs, some of the principles include the use of suitable teaching methods and effective teaching strategies. These methods are selected partly by the subject matter to be taught and partly by the nature of the learner. For a particular teaching method to be appropriate and efficient it has to have affiliation with the characteristic of the learner

and the type of learning it is supposed to bring about. The teaching methods to be employed in any teaching and learning activities must be such that it appeals to the student's interest, attention, and desire.

The demonstration teaching method as described by Daluba (2013) is a method of teaching that is based on the simple principle of learning skills by doing. Through the demonstration method of teaching used by a teacher, students learn physical or mental skills by actually performing those skills under the supervision of their teacher.

On the other hand, Project-Based teaching method has been viewed as a very important teaching/learning method that can be used to inculcate independent learning and lifelong learning skills required to operate in the information society. Pasha (2016) explains that project-based teaching is an active method of teaching in which students discover real-world challenges and concurrently developing co-curricular skills while working in small collaborative groups. Therefore, with project-based learning, students learn how to be initiative, be accountable and build a true attitude. Students learn to build their confidence, resolve problems, work in teams, and communicate concepts efficiently. Pasha added that project-based teaching method usually stops absenteeism and encourages prompt attendance of students, enhances cooperative learning skills, and improves students' achievement in schools. A substantial body of literature supports the view that PBTM substantially improves long-term retention, deep understanding and the ability to generalize scientific knowledge to subsequent learning experiences and new situations (Hetty & Wendy, 2011).

In the context of this study, the learning style variations provide opportunities for students to develop their acquaintance by probing for information and applying prior knowledge, demonstrating and producing feedback and solve the problem. Fardon (2013) defined learning style as a stable preference that is used by individuals to effectively organize process and develop their understanding of any learning challenge, task or situation. Learning style is an individual's mode of gaining knowledge. According to Awla (2014) learning style is the different ways

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and preference that help student acquire new skills and knowledge, and to remember things. Awla's definition of learning style fits this study and therefore will be adopted for this study. Human being is a complicated creature due to his nature and sense of reasoning. Hence, every individual has his own way of perceiving and processing information with a view to learning it, this is what is referred to as learning preferences or learning styles. Learning styles are inherent in individual learners and therefore can never be dismissed in the learning process. Knowing the learning styles of the learners helps the teacher in facilitating students' performance and achievement as it will improve understanding and skill acquisition. What is needed of a teacher is to identify the learning styles, be aware and prepare his teaching process accordingly.

According to Asikia (2010), teaching has great impact on the students' academic achievements. Studies have shown that there is a relationship between teaching method and students' academic achievement as for example, Griffin (2007) reported that teachers who used a specific style of evidence-based teaching and operate within a developmental learning paradigm had an increase effect on student learning outcome, thus, teaching method play an important role in producing good students' performance. Furthermore, several studies conducted on teaching method in many part of the world have demonstrated that teaching methods has impact students' academic performance and achievement. Some of which include USA (Haas, 2002), Nigeria (Asikia 2010), USA (Bategakee, 2012), and in Washinton, (Luntungan, 2012). These studies clearly indicate that instructional method used by the teacher has impact on students' performance and medium of instruction also has an impact on students' achievement (Senkoro, 2004).

Academic achievement is a measure of cognitive skill possessed by a student. Igbo and Ihejiene (2014) view academic achievement as the successful result of interaction between a teacher and a student. It is designed to measure an individual's level of skill accomplishment or knowledge in a specific area. Academic achievement is commonly measured through examinations or continuous assessments but there is no

general agreement on how it is best evaluated or which aspects are most important.

Statement of the Problem

The use of demonstration, problem-based and project-based teaching methods have been prevalent as the most used teaching methods in Technical Colleges and yet still students in Kano State of Nigeria fail RTVEW external examinations. Could the rate of failure be tribute to the students' learning styles? As the data available from NABTEB Chief Examiner's Report for 2014 - 2018, indicated that students of RTVEW failure rate increases from 50.61% in 2014 to 70.09% in 2018 which the year 2016 had the highest failure rate of 75.02%. Unfortunately, despite all efforts by the successive and present Government of Kano State, Nigeria to ensure qualitative education at the Technical Colleges that will bring about highly competent products both in academics and employability have been persistently made with high failure rate among graduates of RTVEW in the Technical Colleges in Northwest Nigeria. The thrust of the study is to determine the effects of three instructional methods on academic achievement of electronic work students with different learning styles in Technical Colleges of Kano State, Nigeria

Purpose of the Study

The main purpose of the study was to determine the effects of three instructional methods on the academic achievement of electronic work students with different learning styles in Technical Colleges of Kano State, Nigeria. Specifically, the study sought to:

1. Determine the mean score of RTVEW students with different learning styles in an achievement test when taught using demonstration teaching method.
2. Determine the mean score of RTVEW students with different learning styles in an achievement test when taught using problem-based teaching method.
3. Determine the mean score of RTVEW students with different learning styles in an achievement test when taught using project-based teaching method.

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Research Questions

The following research questions guided the study:

1. What are the mean score of RTVEW students with different learning styles in an achievement test when taught using demonstration teaching method?
2. What are the mean score of RTVEW students with different learning styles in an achievement test when taught using problem-based teaching method?
3. What are the mean score of RTVEW students with different learning styles in an achievement test when taught using project-based teaching method?

Hypotheses

The following null hypotheses tested at 0.05 level of significance:

1. There is no significant difference in the mean Achievement scores of students with different learning styles taught using demonstration teaching method in RTVEW.
2. There is no significant difference in the mean Achievement scores of students with different learning styles taught using problem-based teaching method in RTVEW.
3. There is no significant difference in the mean Achievement scores of students with different learning styles taught using project-based teaching method in RTVEW.

METHODOLOGY

The study adopted pre-test, post-test non-equivalent control group quasi-experimental research design. Ogbuonya and Owodunni (2015) stated that quasi-experimental research design investigates the possible cause and effect as well as relationship between two or more variables by the application of treatment which cannot be resolved by mere observation or description. The study was conducted in Kano State of Nigeria. Kano State is located in North Western part of Nigeria on latitude 11o 59'47" N and longitudes 80o 31'0" E of the Greenwich Meridian. The state borders Katsina State to

the north-west, Jigawa State to the north-east, Bauchi state to the south-east and Kaduna State to the south-west.

The population of this study comprised of the entire 83 RTVEW NTC II students of 2020/2021 academic year in the selected Technical Colleges from the study area. The distribution of the Technical Colleges was based on their status of accreditation by NBTE. Purposive sampling technique was used to select three technical colleges in Kano State for the study. The three technical colleges are Government Technical College Kano, Girls' Science and Technical College Mairo Tijjani and Government Technical College. The total sample size was 83 year II intact classes students.

The instrument that was used for data collection was developed by the researcher and was called "Achievement Test for Radio Television and Electronics Works (ATRTVEWS)". It was a 50-item multiple choice test. Each question item was followed by a four options lettered A-D. The test items were constructed using a table of specification. It was based on the selected topics to be used for treatment. The instruments were subjected to both content and face validation by three (3) validates in the Department of Electrical Technology Education, Modibbo Adama University, Yola. Furthermore, ATRTVEWS was trial tested on RTVEW NTC II students of Government Science and Technical College, Dutse, Jigawa State, which was not part of the study area. The achievement test was administered twice (test and retest) and Pearson Product Moment Correlation formula was used to establish the reliability which 0.86 reliability index was obtained. During the pre-test and post-test achievement test, an answer sheet was provided to record the answers which were retrieved by the research assistant for marking and further processes. Data collected for this study were analyzed as follows: mean statistics were used to answer all the research questions while; the null hypotheses were tested using Analysis of Variance (ANOVA) at 0.05 level of significance.

To answer the three research questions of the study, both pre-test and post-test mean scores of the three experimental groups were computed for mean difference.

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The higher mean score showed better achievements. The decision for testing the three null hypotheses of the study was that; when the calculated F-value was lower than the Table-value, the null hypothesis was rejected, conversely, the null hypothesis was accepted

RESULTS

Research Question 1: What are the mean score of Radio Television and Electronics Works trade students with different learning styles in an achievement test when taught using demonstration teaching method?

Table 1: Mean Achievement Scores of Students Taught Using Demonstration Teaching Method

Categories of Learners	N	Demonstration Method			
		\bar{x}	SD	Grade	Remark
Visual Learner	16	68.38	8.01	Credit	High
Audio Learners	14	65.29	10.87	Credit	High
Reading/Writing Learners	25	64.08	8.71	Credit	High
Kinesthetic Learners	28	80.61	8.13	Distinction	High

N = Number of Students, \bar{x} = Mean Scores of Students, S^2 = Standard Deviation

Table 1 showed the mean score of Radio Television and Electronics Works trade students with different learning styles in an achievement test when taught using demonstration teaching method. Table 1 showed that students who belong to the Visual Learners style had a mean achievement scores of 68.38 with a standard deviation of 8.01. The Audio learners had a mean achievement scores of 65.29 with a standard deviation of 10.87. The students who preferred Reading/Writing as their learning style had a mean achievement score of 64.08 and a standard deviation of 8.71; while kinesthetic

learners had a mean achievement scores of 80.61 with a standard deviation of 8.13 respectively. This result indicated that kinesthetic learners had a distinction grade in their mean achievement scores while Visual, Audio and Reading/Writing Learners had the 'Credit grade' in their mean achievement scores.

Research Question 2: What are the mean score of Radio Television and Electronics Works trade students with different learning styles in an achievement test when taught using problem-based teaching method?

Table 2: Mean Achievement Scores of Students Taught Using Problem-Based Teaching Method

Categories of Learners	N	Problem-based Method			
		\bar{x}	SD	Grade	Remark
Visual Learner	16	67.38	8.01	Credit	High
Audio Learners	14	62.29	10.87	Credit	High
Reading/Writing Learners	25	63.72	8.55	Credit	High
Kinesthetic Learners	28	78.61	8.13	Distinction	High

N = Number of Students, \bar{x} = Mean Scores of Students, S^2 = Standard Deviation

Table 2 showed the mean score of Radio Television and Electronics Works trade students with different learning styles in an achievement test when taught using project-based teaching method. Table 2 showed that students whose learning style is inclined to the Visual Learners style had a mean achievement scores of 67.38 with a standard deviation of 8.01. The Audio learners had a mean achievement scores of 62.29 with a standard deviation of 10.87. The students who preferred

Reading/Writing as their learning style had a mean achievement score of 63.72 and a standard deviation of 8.55; while kinesthetic learners had a mean achievement scores of 78.61 with a standard deviation of 8.13 respectively. This result indicated that kinesthetic learners had a distinction grade in their mean achievement scores while Visual, Audio and Reading/Writing Learners had the 'Credit grade' in their mean achievement scores.

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Research Question 3: What are the mean score of Radio Television and Electronics Works trade students with different learning

styles in an achievement test when taught using project-based teaching method?

Table 3: Mean Achievement Scores of Students Taught Using Project-Based Teaching Method

Categories of Learners	N	Project-based Method			Remark
		\bar{x}	SD	Grade	
Visual Learner	16	65.38	8.01	Credit	High
Audio Learners	14	63.29	10.87	Credit	High
Reading/Writing Learners	25	68.08	8.71	Credit	High
Kinesthetic Learners	28	82.61	8.13	Distinction	High

N = Number of Students, \bar{x} = Mean Scores of Students, S^2 = Standard Deviation

Table 3 showed the mean score of Radio Television and Electronics Works trade students with different learning styles in an achievement test when taught using project-based teaching method. Table 3 showed that students whose learning style is inclined to the Visual Learners style had a mean achievement scores of 65.38 with a standard deviation of 8.01. The Audio learners had a mean achievement scores of 63.29 with a standard deviation of 10.87. The students who preferred Reading/Writing as their learning style had a mean achievement score of 68.08 and a standard deviation of 8.71; while kinesthetic learners had a mean achievement scores of

82.61 with a standard deviation of 8.13 respectively. This result indicated that kinesthetic learners had the highest mean achievement score graded as "Distinction" in the mean achievement test while Visual, Audio and Reading/Writing Learners scored 'Credit' in their mean achievement test when taught using project-based teaching method.

Hypothesis 1: There is no significant difference in the mean achievement scores of students with different learning styles taught using demonstration teaching method in Radio Television and Electronics Works trade.

Table 4: ANOVA on the Achievement Scores of Students with Different Learning Styles Taught Using Demonstration Teaching Method

Source of Variation	SS	df	MS	F- Cal	P-value	F crit	Remark
Between Groups	4340.73	3	1446.91	18.73	0.00	2.72	Reject H_0 s
Within Groups	6103.13	79	77.26				
Total	10443.855	82					

SS = Sum of Squares, df = Degree of Freedom, MS = Mean of Squares, F -cal. = F - Calculated, F -crit. = F -Critical

Table 4a showed the result of mean performance scores of the groups as; F -value calculated was 18.73 and the F -critical value was 2.72 at degree of freedom (df) 3 and 78.

Therefore, there was a significant difference in the mean achievement scores; hence the null hypothesis was rejected.

Table 5: Scheffes comparison test for Hypotheses 1

Group	F_s	F - Crit
Visual vs Audio Learners (V vs A)	0.84	< 2.72
Visual vs Reading/writing Learners (V vs RW)	0.57	< 2.72
Visual vs kinesthetic Learners (V vs K)	5.60*	> 2.72
Audio vs Reading/writing Learners (A vs RW)	0.0803	< 2.72
Audio vs kinesthetic Learners (A vs K)	10.86*	> 2.72
Reading/writing vs kinesthetic Leaners (RW vs K)	12.78*	> 2.72

F -cal. = F - Calculated, F -crit. = F -Critical, F_s = Scheffes Pairwise Cal, F -Critical, * = Significance difference

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In order to determine the group that is responsible for the significant difference, Scheffes Pair wise comparison test was carried out and the calculation were done manually using the formula as posited by Ozoagulu (2021). The scheffe's pairwise comparison result indicates that pairing V & A, V vs RW and A vs RW recorded no significant difference. However, Pairing V vs K, A vs K and RW vs K indicated significant difference. From the foregoing, it can be deduced that the group responsible for the significant difference

is the kinesthetic group. This can be testified by the mean scores displayed on table 1. In the table 1, the mean score of kinesthetic group is 80.61 while in the remaining three groups their respective mean scores range from 64.08-68.38

Hypothesis 2: There is no significant difference in the mean Achievement scores of students with different learning styles taught using problem-based teaching method in Radio Television and Electronics Works trade.

Table 6: ANOVA on the Achievement Scores of Students with Different Learning Styles Taught Using Problem-Based Teaching Method

Source of Variation	SS	Df	MS	F-cal.	P-value	F-crit.	Remark
Between Groups	3951.19	3	1317.06	17.23	1.061E-08	2.72	Reject H ₀₆
Within Groups	6038.33	79	76.43				
Total	9989.52	82					

SS = Sum of Squares, df = Degree of Freedom, MS = Mean of Squares, F-cal. = F- Calculated, F-crit. = F-Critical

Table 16a showed the result of mean achievement scores of the groups as; F-value calculated was 17.23 and the F-critical value was 2.72 at degree of freedom (df) 3 and 78.

Therefore, there was a significant difference in the mean achievement scores; hence the null hypothesis was rejected.

Table 7: Scefes comparison test for Hypotheses six

Group	F _s	F- Crit
Visual vs Audio Learners (V vs A)	0.141	< 2.72
Visual vs Reading/writing Learners (V vs RW)	0.779	< 2.72
Visual vs kinesthetic Learners (V vs K)	13.04*	>2.72
Audio vs Reading/writing Learners (A vs RW)	0.89	< 2.72
Audio vs kinesthetic Learners (A vs K)	12.09*	> 2.72
Reading/writing vs kinesthetic Leaners (RW vs K)	12.03*	> 2.72

F-cal. = F- Calculated, F-crit. = F-Critical, F_s = Scheffes Pairwise, F-Cal, F-Critical, * = Significance difference

In order to determine the group that is responsible for the significant difference, Scefes Pair wise comparison test was carried out and the calculation were done manually using the formula as posited by Ozoagulu (1998). The scheffe's pairwise comparison result indicates that pairing V vs A, V vs RW and A vs RW recorded no significant difference. However, Pairing V vs K, A vs K and RW vs K indicated significant difference. From the foregoing, it can be deduced that the group responsible for the significant difference

is the kinesthetic group. This can be testified by the mean scores displayed on table 2. In the table 2, the mean score of kinesthetic group is 78.61 while in the remaining three groups their respective mean scores range from 63.72-67.38

Hypothesis 3: There is no significant difference in the mean Achievement scores of students with different learning styles taught using project-based teaching method in Radio Television and Electronics Works trade.



Table 8: ANOVA on the Achievement Scores of Students with Different Learning Styles Taught Using Project-Based Teaching Method

Source of Variation	SS	df	MS	F-cal	P-value	F-crit	Remark
Between Groups	5289.74	3	1763.25	22.82	9.698E-11	2.72	Reject H_{07}
Within Groups	6103.13	79	77.25				
Total	11392.87	82					

SS = Sum of Squares, df = Degree of Freedom, MS = Mean of Squares, F-cal. = F- Calculated, F-crit. = F-Critical

Table 3a showed the result of mean achievement scores of the groups as; F-value calculated was 22.82 and the F-critical value was 2.72 at degree of freedom (df) 3 and 78.

Therefore, there was a significant difference in the mean achievement scores; hence the null hypothesis was rejected.

Table 9: Scheffes comparison test for Hypotheses seven

Group	F _s	F- Crit
Visual vs Audio Learners (V vs A)	0.25	< 2.72
Visual vs Reading/writing Learners (V vs RW)	0.039	< 2.72
Visual vs kinesthetic Learners (V vs K)	3.85*	>2.72
Audio vs Reading/writing Learners (A vs RW)	7.244*	>2.72
Audio vs kinesthetic Learners (A vs K)	54.9*	> 2.72
Reading/writing vs kinesthetic Learners (RW vs K)	3.40*	>2.72

F-cal. = F- Calculated, F-crit. = F-Critical, F_s = Scheffes Pairwise, F-Cal, F-Critical, * = Significance difference

In order to determine the group that is responsible for the significant difference, Scheffes Pair wise comparison test was carried out using the formula as posited by Ozoagulu (2021) and the result is in table 3b, the calculations were done manually. The scheffe's pairwise comparison result indicates that pairing V & A, V & RW recorded no significant difference. However, Paring V vs A and V vs RW indicated no significant difference. This can be seen from table 7, in the table the mean values of Visual learners and Audio learners are 65.38 and 63.29 respectively. Pairing V vs K, A vs K, A vs RW and RW vs K indicated significant difference. From the foregoing, it can be deduced that the group responsible for the significant difference is the kinesthetic group. This can be testified by the mean scores displayed on Table 3. In the Table 3, the mean score of kinesthetic group and Reading/Writing are 82.61 and 68.08 respectively.

FINDINGS OF THE STUDY

Based on the results of the analyses presented, the following findings emerged:

1. Students with Kinesthetic learning style had a distinction grade in their mean

- achievement scores while Visual, Audio and Reading/Writing Learners had the 'Credit grade' in their mean achievement scores when taught Radio Television and Electronics Works trade using demonstration method of teaching
2. Students who are Kinesthetic learners had a distinction grade in their mean achievement scores while Visual, Audio and Reading/Writing Learners had the 'Credit grade' in their mean achievement scores when taught Radio Television and Electronics Works trade using problem-based method of teaching
3. Students who are Kinesthetic learners had the highest mean achievement score graded as "Distinction" in the mean achievement test while Visual, Audio and Reading/Writing Learners scored 'Credit' in their mean achievement test when taught using project-based teaching method
4. There is a significant difference in the mean achievement scores of students with different learning styles taught using demonstration teaching method in Radio Television and Electronics Works trade

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5. There is a significant difference in the mean Achievement scores of students with different learning styles taught using problem-based teaching method in Radio Television and Electronics Works trade
6. There is a significant difference in the mean Achievement scores of students with different learning styles taught using project-based teaching method in Radio Television and Electronics Works trade.

DISCUSSION OF FINDINGS

The findings of the study revealed that students with kinesthetic learning style had a distinction grade in their mean achievement scores while Visual, Audio and Reading/Writing Learners had 'Credit grade' in their mean achievement scores when taught Radio Television and Electronics Works trade using demonstration method of teaching. The finding is in agreement with Eze & Ezioma (2018) who reported that demonstration is useful mostly in imparting lessons that require practical knowledge. Eze and Ezioma further maintained that demonstration method in teaching lies in the fact that it bridges the gap between theory and practice, enables learners to become good observers and generate their interest. Students see immediate progress as a result of a correct effort and it enables the teacher to teach manipulative and operational skills. In line with the finding, Enoch, (2016) reported that students learning styles on their achievement in service station mechanics module of motor vehicle mechanics (MVM) at Technical Colleges improves as they were taught using demonstration method of teaching. The finding is in agreement with Gopalakrishnan and Palanivelu (2017), Ianovici and Weissblueth (2016) and Akkoyunlu and Yilmaz-soylu (2002) who retorted that students' academic performance will have a positive effect when appropriate teaching method that goes in line with the individual students' learning style and pace are used. Blumenfeld, Soloway, Marx, Krajcik, Guzdiel and Palincsar (2021) and Awla (2014) suggested that learning styles and their relation to teaching styles give significance impact on the students' academic performance. Students will have better performance, if their teachers' styles or the way they receive instruction matches their

learning style. The finding disagreed with Maria, Azizifara, and Gowhary (2015) who examined learning styles and their link with educational attainment among Iranian high school students. Maria, Azizifara, and Gowhary reported that students' academic performance may be due to many factors which learning styles and teaching methods may not necessarily make students have better academic performance. Dissenting the finding, Joy and Abdulhamid (2016) reported that teaching methods which complement learning styles and not considering other factors will make teaching and learning boring for the students and thereby affect their academic achievement.

The findings of the study revealed that students who are kinesthetic learners had a distinction grade in their mean achievement scores while Visual, Audio and Reading/Writing Learners had the 'Credit grade' in their mean achievement scores when taught Radio Television and Electronics Works trade using problem-based method of teaching. The finding is in agreement with Wood (2003) and Barrett (2010) who opined that problem-based teaching methods can be used to enhance content knowledge while simultaneously fostering the development of communication, problem-solving, critical thinking, collaboration, and self-directed learning skills. In tandem with the findings, Abante, Almendral, Manansala and Manibo (2014) reported that students' academic achievement tend to be improved when taught using problem-based teaching methods as they are made to think critically and proffer solution to the problem at hand. In contrast with the findings of the study, Joy and Abdulhamid (2016) who reported that problem-based teaching methods discourages students who may not have developed their critical thinking senses and as such may not perform effectively in achievement test.

The findings of the study revealed that students who are Kinesthetic learners had the highest mean achievement score graded as "Distinction" in the mean achievement test while Visual, Audio and Reading/Writing Learners scored 'Credit' in their mean achievement test when taught using project-based teaching method. The finding is in agreement with Hetty and Wendy (2011) who

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maintained that project-based learning is based on constructivist learning theory, which finds that learning is deeper and more meaningful when students are involved in constructing their knowledge. Students are given the opportunity to select a topic of their interests within the required content framework and then they are responsible for creating their project plan. In line with the finding, Palma, De and Miñán (2011) reported that project-based teaching methods improves students' academic achievement as it incorporates knowledge with practice; cultivates the capability to examine problems, categorize and obtain knowledge and skills required to deal with realistic situations. The finding is in agreement with Hetty and Wendy (2011), Barrett (2010), Pasha (2016) and Wood (2003) in their various submissions reported that effective teaching methods which complements students' learning styles enhances students' academic achievement. The increase in students' academic achievement may be due to constructivist approaches embedded in project-based teaching methods. In further support of the findings, Shola and Sutton (2002) reiterated that project-based teaching methods are student-centered and as such will promote students' academic achievement as the methods fit into the learning styles mostly preferred by students. In contrast with the finding, Rajshree (2013) in his submission reported that though students undertake project work and in the process learn new concepts, individual learning is neglected as students' execute the project in group and not individually. The achievement of individual students may not be as the whole tasks are left for students who have better knowledge.

The findings of the study in relation to hypotheses one revealed that there is a significant difference in the mean achievement scores of students with different learning styles taught using demonstration teaching method in Radio Television and Electronics Works trade. The Scefes comparison test calculated showed that the Visual & Audio, Visual & Reading/writing Learners and Audio & Reading/writing Learners means are lower than the other groups and the groups responsible for significance difference are Visual & kinesthetic Learners, Audio &

kinesthetic Learners and Reading/writing kinesthetic Learners. The finding is in agreement with Ameh and Dantani (2012) who reported that there was significant difference between the experimental and control groups taught using lecture and demonstration methods on the academic achievement of students in chemistry in Nasarawa Local Government Area of Kano State Nigeria. The finding is also in line with the report of Daluba (2013) who submitted that there was a significant difference between the pre-test and post-test mean achievement scores of students taught Agricultural Science using demonstration method of teaching. However, the finding is in contrast with Umar and Bala (2019) who carried out comparative performance of Electrical Installation and Maintenance Work students taught using Computer Aided Instruction and demonstration methods in Technical Colleges in North East Nigeria. Umar and Bala reported that there is a significant difference between the mean achievement scores of students in the experimental group taught Electrical Installation and Maintenance Work using Computer Aided Instruction and the control group taught using demonstration method.

The findings of the study in relation to hypotheses two revealed that there is a significant difference in the mean achievement scores of students with different learning styles taught using problem-based teaching method in Radio Television and Electronics Works trade. The Shceffes pairwise comparison test indicated that the mean rating of Visual & kinesthetic Learners, Audio & kinesthetic Learners and Reading/writing & kinesthetic Learners are responsible for the significance difference. It can be observed that the ratings by Visual & Audio Learners, Visual & Reading/writing Learners and Audio vs Reading/writing Learners are comparatively lower than the other groups. The finding is in agreement with Avsec and Kocijancic (2014) who recounted that students in the experimental group had better academic achievement than their counterpart in the control group when taught Hydraulic Turbine using problem-based teaching method and lecture method with the experimental group having a better achievement scores. In concord with the finding, Kirschner, Sweller

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and Clark (2006) reported that students are always curious and as such desire more of the unknown. But with the problem-based teaching method, the students are enable to dive into the unknown with the guidance of the teacher discover their potential.

The findings related to hypotheses three revealed that there is a significant difference in the mean Achievement scores of students with different learning styles taught using project-based teaching method in Radio Television and Electronics Works trade. The Shceffes pairwise test calculated indicated that the group responsible for the significant difference are Visual & kinesthetic Learners, Audio & Reading/writing Learners, Audio & kinesthetic Learners and Reading/writing & kinesthetic Learners. It can as well be observed that the ratings by other groups were comparatively lower. However the mean rating of the three groups as revealed by their respective achievements was rated higher above the decision level. The result of this hypothesis may not be unconnected with the selection process of the technical college students in the study area which is based on the task performance and ability to accomplish a task swiftly by prospective student, as posited by Hussain (2020). The finding is in agreement with Amador (2019) who reported that there was a significant difference in the mean academic achievement of students in the control and experimental groups taught soil science using project-based teaching method at the College level. In tandem with the finding, English and Kitsantas (2013) stated that students have to be supported even when in self-regulated learning in project-based learning. Teachers have to select the projects that will be meeting the immediate level of the learners in order to foster the learning achievement of the students.

CONCLUSION

The three teaching methods of demonstration, problem-based, and project-based were found to improve students' academic achievement in radio, television, and electronics works, according to the study's findings. However the experimental group taught utilizing the demonstration method and showed good proficiency. The same was done for problem- and project-based methodologies.

When taught Radio Television and Electronics Works trade using demonstration, problem-based, and project-based teaching methods, students who preferred kinesthetic learning style demonstrated better academic achievement, receiving "distinction grades" in their mean achievement scores as opposed to Visual, Audio, and Reading/Writing Learners receiving "Credit grades" in their mean achievement scores.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

1. It is established that students' academic achievement when taught using demonstration teaching method is tied to their preferred learning styles of Kinesthetic, Visual, Audio and Reading/Writing learning styles, as such Technical Colleges through the Ministry of Education should partner with donor agencies to provide adequate training to teachers of RTVEW in order to enable them identified and understand the learning needs of the learners based on their preferred learning styles in the Technical Colleges.
2. Technical College administrators should from periodically organize in-house symposia and invite resource persons to intimate the RTVEW teachers on the pros and cones of problem-based teaching methods as this will help teachers to keep abreast on the learning needs of the students especially with regard to their learning styles.
3. National Board for Technical Education (NBTE) should design a template that will be used for project-based teaching methods that will ensure adequate and effective use of the teaching method to promote students understanding and knowledge in RTVEW in Technical Colleges

REFERENCES

- Abante, M. R., Almendral B. C., Manansala J. E. & Mañibo J. (2014). Learning Styles and Factors Affecting the Learning of General Engineering Students. *International Journal of Academic Research in Progressive*

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URL:
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- Akkoyunlu, B. and Yilmaz-Soylu M. (2002). The effect of learning styles on achievement in different Learning environments. *Turkish Online Journal of Educational Technology*. <https://www.researchgate.net/publication/228421429>
- Amador, J. A. (2019). Active learning Approaches to learning Soil Science at College level. *Frontiers in environmental Science*, Lausanne. Doi: 10.3389/fenvs.201900111.
- Asukwo, A. E., Vincent, C., Daniel, P. M. and Michika, M. U. (2019). Development and Validation of Psychomotor Skills Assessment Guide for Repairs of Television Receivers in Electronics Work for Technical Colleges in Akwa Ibom State, Nigeria. *International Journal of Educational Benchmark*, 13(2), 10–27.
- Avsec, S D. Kocjancic, S., (2014). The Effect of the Use of an Inquiry Based Approach An Open learning Middle School Hydraulic Turbine Optimization Course, World Transactions on Engineering and Technology Education 12(3): 329-337.
- Awla, H. A. (2014). Learning Styles and their relation to teaching styles. *International journal of languages and linguistics*. 2(3) 241-245. doi:10.11648/j.lji.2014023.23.
- Awotua-Efebo, E. B. (2001). *Effective teaching: principles and practice*. Port-Harcourt: Paragraphics.
- Bachari, A., Abelwahed, E. & Adnani M. (2010). An Adaptive Learning Model Using Learner's Preference. *Conference Paper*. DOI: 10.13140/2.1.4482.0162 Retrieved from: <https://www.researchgate.net/publication/268279023>. On 22/09/2020.
- Barrett, T. (2010). The problem-based learning process as finding and being in flow. *Innovations in Education and Teaching International*, 47(2): 165–174.
- Barsch, J. (1996). Barsch learning style inventory (rev.ed.). *Academic Therapy Publications*: Novato, CA.
- Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M. & Palincsar, A.. (2021). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist*, 26 (3-4), 369-398.
- Daluba, N. E. (2013). Effect of Demonstration Method of Teaching on Students' Achievement in Agricultural Science. *World Journal of Education Vol. 3*, No. 6. www.sciedu.ca/wje.
- David, W. D., Johnson T. R. and Smith K. A. (2015). Cooperative learning: Improving University Instruction by Using Practice on Validated theory. *Journal on excellence in college teaching* 25(3 &4) 85-118.
- English, M. C. & Kitsantas, A. (2013). Supporting student self-regulated learning in prob-lem-and project based learning. *Interdisciplinary Journal of Problem-Based Learning*, 7(2), 6-15.
- Eze, T. & Ezioma, V. (2018). Effectiveness of demonstration method in entrepreneurship education in tertiary institutions in South -South Nigeria. *NAU Journal of Technology & Vocational Education* 3. 44-53.
- Ezugu, L.C. (2004), "An investigation of the status of intrinsic job satisfaction among Technical college Radio, Television and electronic works teacher in Nigeria," *Multidisciplinary Journal of Research Development* 4(2), 58-66.
- George, B. & Sarah E. (2013). Refreshing lecturing: A guide for lecturers. AMMEE Medical Education guide No. 22:10.13140/RG.2.1.4369.3200.
- Gopalakrishnan, K. & Palanivelu G. (2017). Effectiveness of Learning Styles and Academic Achievements among Secondary School Students in



- mathematics Subject. *International Journal of Science and Research (IJSR)* (Online): 2319-7064
- Griffin, Sr F. (2007). Methods of Coping with Work Force Role Conflict in Relation to Job Satisfaction of Cooperative Extension Home Economists. *Journal of Career Development International*, 21(3): 136 -144.
- Hetty, R. & Wendy C. (2011). Project-Based Learning and Pedagogy in Teacher Preparation: Staking Out the Theoretical Mid-Ground. *International Journal of Teaching and Learning in Higher Education*. University of Calgary. Volume 23, Number 1, 60-71. Available at: <http://www.isetl.org/ijtlhe/> ISSN 1812-9129.
- Hussain M. H. (2020). Selection and Assessment process of Students into Science and Technical Colleges. *Unpublished paper presented during inauguration ceremony of newly posted Science and Technical School Directors*. Kano State Science and Technical Schools Management Board
- Igbo, J. N. & Ihejiene, M. A. (2014). Gender differences, delinquent behaviours and academic achievement of secondary students in Nigeria. *International Journal of Latest Research in Science and Technology*, 3(4), 2278-2299.
- Joy, N. N. & Abdulhamid B. (2016). Preference of Learning Styles and its relationship with academic performance among junior secondary school students in Dutse local Government area, Jigawa State, Nigeria. *International Journal of Education and Practice*. 4(3), 127-133 DOI: 10.18488/journal.61/2016.4.3/61.3.127.133
- Luntungan, P. Y. (2012). Field Trips: A Guide for Planning and Conducting Educational Experiences. *Washington, DC: National Education Association*.
- Maria, R., Akbar A., Habib G. (2015). The study of learning styles and its relationship with Educational achievement among Iranian high school students. *Unpublished paper presented at International Conference on Teaching and Learning English as an Additional Language, Antalya – Turkey*.
- Ogbuanya, T. C. & Owodunni A. S. (2015). Effects of reflective enquiry Instructional Techniques on students' Academic Achievement and ability level in Electronic work trade in Technical colleges. *Journal of Education and Practice*. ISSN 2222-1735 Vol. 6 No. 7.
- Ozoagulu A. U. (2021). A Practical Guide to Writing Research Project Reports in ertiary Institutions. Enugu Obosi, Pacific Publishers.
- Palma, M., De Los Rios, I. and Miñán, E. (2011). Generic competences in engineering field: A comparative study between Latin America and European Union. *Procedia -Soc. Behav. Sci.*, 15, 576 585.
- Rajagopalan, I. (2019). Concept of Teaching. *Shanlax International Journal of Education*, 7(2), 5-8.
- Rajshree, S. V. (2013). Learning Style and Academic Achievement of Secondary School Students. *Voice of Research*, 1(4), 2277-7733.
- Safo, A. D., Ezenwa, V. I., and Wushishi, D. I. (2013). Effects of Computer Assisted Instructional Package on Junior Secondary School Students' Achievement and Retention in Geometry in Minna Niger State, Nigeria. *International Journal of Humanities and Social Science Invention*, 2(5): 69-74
- Senkoro, F. E. (2004). Research and Approaches to medium of Instruction in Tanzania Perspective Directions and Challenges. In Block-utne, Bigit. Cape Town Minds, South Africa.
- Shola, K. W. & Sutton, C. D. (2002). Generational differences: Revisiting generational work values for the new millennium. *Journal of Organizational Behaviour*, 23, 363–382.

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✉ muhamidrisk3026@gmail.com

Department of Education (Technical), Kano State Polytechnic, Kano.

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- Umar, A. A. & Bala, A. W. (2019). Comparative Performance of Electrical Installation and Maintenance Work Students Taught Using Computer Aided Instruction and Demonstration Methods in Technical Colleges in North East Nigeria. *International Journal of Innovative Scientific & Engineering Technologies Research* 7(2):19-27. www.seahipaj.org ISSN: 2360-896X
- Umar, I. Y. & Ma'aji, A. S., (2010). Repositioning the facilities in technical college workshops for efficiency: A case study of North Central Nigeria. *Journal of Stem Teacher Education*, 47(3): 63–85.
- Vasconcelos, C. (2012). Teaching Environmental Education through PBL: Evaluation of a teaching intervention program, *Research Science Education*, 42, 229–232
- Wells, S. H., Warelow, P. J., and Jackson, K. L. (2009). Problem based learning (PBL): A conundrum. *Contemporary Nurse*, 33(2): 191–201.
- Wenjiang, D. (2012). *Informatics and Management Science V. London: Springer. p. 267.*
- Westwood, P. (2008). *What teachers need to know about teaching methods.* Camberwell, Vic, ACER Press.