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EFFECT OF PERSONAL LEARNING NETWORK INSTRUCTIONAL APPROACH ON METALWORK CRAFT PRACTICE STUDENTS' ACHIEVEMENT IN RIVERS STATE TECHNICAL COLLEGES

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Abstract:

The study determined the effect of personal learning network instructional approach on students' academic achievements in metalwork craft practice in technical colleges in Rivers State, Nigeria. Four (4) research Questions guided the study and Four (4) hypotheses were tested at .05 level of significance for the study. The study employed quasi-experimental research design. Specifically, non-randomized control group design involving two groups – pretest, posttest treated groups design were used for the study. The population for the study was 31 National Technical Certificate class two (NTC II) fabrication and welding craft practice students from four Technical Colleges in Rivers State for the 2020/2021 session. Out of the four Technical Colleges, two Technical Colleges were selected. The study was a census as the entire population was studied. These students in their intact classes were assigned to twenty (20) for experimental group (Personal Learning Network Instructional approach) and eleven (11) for control group (Demonstration Instructional approach). Metalwork Achievement Test were developed, validated and used for data collection. The instrument was trial tested using NTC II students from Government Technical College, Sagbama in Bayelsa State for determining its reliability. Reliability index of 0.88, 0.87, 0.89 and 0.89; were obtained for the four (4) clusters with the overall reliability of coefficient of 0.88 for Metalwork Achievement Test using Pearson Product Moment Correlation coefficient. Research Questions were answered using means and standard deviation while hypotheses were tested using Analysis of covariance (ANCOVA) at .05 level of significance. The computation was done through the help of Statistical Packages for Social Sciences Version 20 (SPSS 20). Findings of the study revealed that Personal Learning Network Instructional Approach has significant

effect on students' Achievement in Metalwork Craft Practice. Findings indicated that there was significant difference between the mean achievement scores of students taught using Personal Learning Network Instructional Approach and those taught using the Demonstration Instructional Approach in the four (4) metalwork operations (cutting, joining, forming, and casting operations). Based on the findings of the study, the following recommendations are made: teaching / learning of cutting operations via the personal learning network instructional approach; National Board for Technical Education (NBTE) should consider review of curriculum for metalwork craft with a view to incorporating personal learning network instructional approach into teaching/learning of joining operations; Seminars, workshops and in-service programs should be organized by all examination boards (NABTEB and NBTE) to enlighten technical teachers and improve their knowledge and skills on the use of the personal learning network instructional approach for improving students' performance in forming operations; There should be well trained personnel on ground to handle such innovations with personal learning network instructional approach as to make training and retraining of staff imperative in casting operations.

Keywords: Technical colleges, Metalwork Craft Practice, Personal Learning Network Instructional Approach and Students' Achievement

INTRODUCTION

1.1 Background of the Study

Technical colleges are post-primary schools saddled with the responsibility of producing craftsmen and master-craftsmen as low level manpower. Atsumbe et al (2012) sees technical colleges as institutions where students are trained to acquire relevant knowledge and skills in different occupations for employment in the real world. That is why the Federal Government of Nigeria (FGN, 2013) stated in her policy document that technical colleges form part of technical and vocational education designed to produce craftsmen at the secondary school level and master craftsmen at the advanced craft level. Referring to the National Policy on Education (NPE) 6th edition, technical colleges admit junior secondary school leavers who wish to learn trade and are ready to be given full vocational course of three years duration. At the end of the approved period of study, students take various examinations, particularly, the National Technical Certificate Examination (NTCE) and the Senior School Certificate Examination (SSCE) which certifies them as craftsmen (Okoro cited in Fabiyi, 2016). Technical colleges train craftsmen in Blocklaying and Concreting Works, Plumbing, Carpentry and Joinery, Painting and Decorating, Electrical Installation and Maintenance Work, Radio and Television Repairs, Motor Vehicle Mechanics Works, Mechanical engineering craft practices, Fitting and Fabrication and Welding and metalwork craft among others (Atsumbe et al, 2012).

Metalwork Craft is offered under mechanical engineering craft Practice and Fabrication and welding engineering craft practice at the technical colleges. According to Wordu et al (2022), mechanical engineering and Fabrication and welding engineering crafts practice are offered at two levels, leading to the award of National Technical Certificate (NTC) and Advance National Technical Certificate (ANTC) for craftsmen and master craftsmen respectively. Metalwork craft is the process of forming and shaping metals to create useful tools, objects, equipment parts, and structures. Metalwork craft is practice that involves the process of shaping and reshaping metals to create useful objects, parts, assemblies, and large scale structures. According to Hesse (2007), metalwork craft covers a wide and diverse range of processes, skills, and tools for producing objects on every scale: from huge ships, buildings, and bridges down to precise engine parts and delicate jewelry. Metalworking projects generally fall under the categories of forming, cutting, and joining, and may involve techniques such as cutting, joining, forming and casting.

Cutting removes material from metal using milling, routing, turning, and technologies like CNC (computer numerical control) machines. Plasma cutters are gas-powered torches powered by argon and hydrogen gas that will remove material and make holes in metal. Cutting is often used in metalworking fabrication shops, automotive repair, and construction (Frank, 2015).

Joining is the process of combining several pieces of metal with heat through welding or soldering. Welding is a fabrication process that utilizes a welding machine to join ferrous and non-ferrous metals and works well for larger projects. Soldering is a joining process used to fuse different types of precious metals together by melting solder and works well for small projects. New technology continues to develop as metalworking advances (Messler, 2014).

Forming is the process of re-shaping and fabricating metal objects without adding or removing any material. This process is possible through a combination of heat and pressure. Both forging and bending are essential methods for forming metal. When forging metal, you will heat it in the forge, then hammer and bend it into your desired shape. To make a bend or curve in the metal, heat it in the forge, then hold it over the anvil horn and strike it with a hammer to make your desired curve. The English wheel is a tool that allows metalworkers to easily form and shape cold materials, such as aluminum or steel (Lange, 2005).

Casting is a metalworking process that can be traced back to around 4000 BCE, and it is still used for making sculptures, tools, and jewelry. Metal smiths have been pouring molten metals into cavities shaped in stone, plaster,

sand, and even bone since we learned to melt metals. Metal casting is cost and time effective, and it gives you the ability to make multiples of the same piece. The common methods for casting metal are lost wax casting and sand casting. Lost wax casting involves carving or shaping your piece in wax, creating a plaster mold around it, then burning out the wax. Sand casting uses sand as the mold material. Sand is combined with a bonding agent, such as clay, and is gated. Then, molten metal is flowed into the mold to create a solid object (John, 2015).

In lieu of optimal achievement of students in the above discussed areas of metalwork craft practice, a technology-enhanced instructional approach should be used. The use of information and communication technologies as mediating devices supporting student learning that can include elements of assessment, tutoring, and instruction. It involves a wide set of applications and processes, such as web-based learning, computer-based learning, virtual classrooms and learning environments, and digital collaboration (Okorieocha, 2010). According to Tsiga and Bala (2011)student created content, collaborative learning, active learning, mobile learning, competency based learning, social learning, flipped teaching and learning and personal learning networks are the examples of technology-enhanced instructional approaches.

Personal Learning Network (PLN) according to Moreillon (2016) is an informal learning network that consists of the people a learner interacts with and derives knowledge from in a personal learning environment. In a PLN, a person makes a connection with another person with the specific intent that some type of learning will occur because of that connection (Trust, 2012). Personal learning networks share a close association with the concept of personal learning environments. It is a manifestation of a learner's informal learning processes via the Web (Martindale & Dowdy, 2010).

PLN's consist of formal and informal networks of individuals with similar goals and interests who interact using digital tools to share information, learn from each other, solve problems and collaborate (Ferguson, 2010; Nelson, 2012; Perez, 2012; Trust, 2012). They provide a vehicle for lifelong learning for both personal and professional development by enabling individuals to remain relevant in a world of rapidly changing information. While PLN's can encompass both digital and face to face connections (Perez, 2012) the focus of this discussion will be on digital learning networks and why they are significant to learning in a digital age.

In addition, PLN's provide far greater resources and information than one can muster alone or in a small group (Ross et al, 2013). A PLN is a community of individuals around the world who are learning together (Ferguson, 2010). The key point here is the idea of "learning together". According to Delaney and Redman (2014), within a networked environment there is less emphasis on singular sources of expertise and instead, a focus on dialogue and constructing knowledge as a group comes into play. This is facilitated by the speed with which conversations take place in a digital environment where people can connect across the globe in minutes and hours instead of weeks, months or years (Delaney & Redman 2014).

On the other hand, demonstration instructional approach is a teaching approach used to communicate an idea with the aid of visuals such as flip charts, posters, power point, among others (Igweh, 2012). A demonstration instructional approach is the process of teaching someone how to make or do something in a step-by-step process. As you show how, you "tell" what you are doing. A demonstration always has a finished product. The key to a good demonstration is for the audience to be able to go home and do what you have taught them how to do (Akinbobola, 2015). To Azubuike and Mumuni (2018), demonstration instructional approach is a teaching-learning process carried out in a very systematic manner. Demonstration often occurs when students have a difficult time connecting theories to actual practice or when students are unable to understand the application of theories.

The demonstration instructional approach is a great way to call for active participation from the students (Jaksa, 2019). A lot of time teachers can ask the students to participate while presenting to the class. This keeps them interested throughout rather than getting bored as compared to lectures where they have to sit quietly for hours and listen. It is a practical way of teaching where a complex or difficult topic can be easily explained with the help of charts, and many other props (Woodbum & Oboum, in Motshoane, 2016). Despite that an effective demonstration promotes good observation skills, stimulate thought, arouse curiosity, present aspects of complex concepts on a concrete level, and, most important, be the basis for class discussion; using the PLN as one of the technology-enhanced instructional approach in learning fabrication and welding may have an optimistic effect in students' learning outcome by means of engaging students in the learning tasks which may improve their achievement and consequently sustain their interest.

Students' achievement connotes performance as symbolized by a score or mark on an achievement test. According to Olaoye and Adu (2015) academic achievement of a student is the learning outcomes of students which include the knowledge, skills and ideas acquired and retained through his course of study within and outside the classroom situations. It is quantified by a measure of the student's academic standing in relation to those of other students of his age (Oludipe, 2012). Students' achievement is dependent upon several factors among which are the instructional approaches used while carrying out the instruction (Akinbobola, 2015). This implies that students learn best when they are actively involved during the instructional process using the right instructional approach. Hence, the studies on the effect of personal learning network instructional approach on metalwork craft practice students' achievement in Rivers State technical colleges.

1.2 Statement of the Problem

Currently, the digital natives are being taught by immigrants who are, in effect, not of the same language. This makes it imperative for technical teachers to appropriately restructure the classroom learning environment in a way to

incorporate technology-enhanced instructional approaches. This demands that teachers in technical colleges would adopt instructional approaches that are active, authentic, constructive and collaborative similar to the digital natives that could improve the academic achievement and interest of students in fabrication and welding craft in technical colleges.

There is urgent need to bridge the existing gap in knowledge because there is still poor academic performance of students in metalwork craft practice in technical colleges (Nwaodo, 2016). The technological growth and globalization have resulted in a big gap between instructional approaches at schools and ways students are getting information outside school through contact with computers and mobile phones. This prompted the researcher's curiosity to investigate the effect of personal learning network on students' achievement and interest in fabrication and welding in technical colleges in Rivers State in order to bridge the gap.

1.3 Aim and Objectives of the Study

The aim of this study was to determine the effect of personal learning network instructional approach on metalwork craft practice students' achievement in Rivers State technical colleges, Nigeria. Specifically, the objectives of the study determined:

1. the effect of personal learning network on students' achievement in cutting operations in technical colleges in Rivers State.
2. the effect of personal learning network on students' achievement in joining operations in technical colleges in Rivers State.
3. the effect of personal learning network on students' achievement in forming operations in technical colleges in Rivers State.
4. the effect of personal learning network students' achievement in casting operations in technical colleges in Rivers State.

1.4 Research Questions

1. What is the effect of personal learning network on students' achievement in cutting sheet operations in technical colleges in Rivers State?
2. What is the effect of personal learning network on students' achievement in joining operations in technical colleges in Rivers State?
3. What is the effect of personal learning network on students' achievement in forming operations in in technical colleges in Rivers State?
4. What is the effect of personal learning network students' achievement in castingoperations in technical colleges in Rivers State?

1.5 Hypotheses

The following null hypotheses were postulated and tested at .05 level of significance:

1. There is no significant difference between the mean achievement scores of students taught cutting operations using personal learning network and those taught using demonstration instructional approach in technical colleges in Rivers State.
2. There is no significant difference between the mean achievement scores of students taught joining operations using personal learning network and those taught using demonstration instructional approach in technical colleges in Rivers State.
3. There is no significant difference between the mean achievement scores of students taught forming operations using personal learning network and those taught using demonstration instructional approach in technical colleges in Rivers State.
4. There is no significant difference between the mean achievement scores of students taught casting operations using personal learning network and those taught using demonstration instructional approach in technical colleges in Rivers State.

2. REVIEW OF RELATED LITERATURE

Nwala (2022) conducted a study on effect of personal learning network on students' academic achievement and interest in fabrication and welding in technical colleges in Rivers State, Nigeria. The study revealed that students taught Fabrication and Welding Craft Practice (Findings of the study revealed that students taught using Instructional software Package performed better than those taught with conventional strategy) using Personal Learning Network Instructional Approach performed better than those taught with Demonstration Instructional Approach. Findings also indicated that there was significant difference between the mean achievement scores of students taught using Personal Learning Network Instructional Approach and those taught using the Demonstration Instructional Approach in the seven (7) fabrication and welding operations (sheet metal forming, soldering and brazing, iron and steel manufacture and assembly, cold metal work and hot metal works, gas welding and arc welding operations).

Mosimege and Winnaar (2021) conducted a study on teachers' instructional strategies and their impact on learner performance in grade 9 mathematics: Findings from TIMSS 2015 in South Africa. The results indicate that the two instructional strategies of problem solving with direct teacher guidance and teacher-teacher interaction were found to be significantly associated with learner performance across the four content domains of algebra, numbers, geometry and data and chance.

Fair (2018) investigated a framework for the analysis of personal learning networks. The study focused on research undertaken to map and analyzes Personal Learning Networks (PLNs). Drawing from Education, Web Science, Digital Sociology and Network Science, a Framework was developed which conceptualizes PLNs as egocentric interaction networks involving a mode, purpose and endpoint. Analysis indicates that regardless of any contextual factors, individuals interact nearly three quarters of the time via digital devices, and just a quarter of the time face-to-face or non-digitally. One third of those interactions are with smartphones, most often for the purpose of gathering information from web searches. Individuals also interact more frequently with non-humans than they do with humans. Ivanova et al (2012) examined analysis of personal learning networks in support of teachers' presence optimization of teachers 'efficacy and productivity. The received data shows very different PLN structures consisting of preferred and favorite social networking sites, online authoring tools, search engines, software for communication and collaboration, socially-oriented learning management systems. Most often used and very popular among teachers are the social networks Facebook and Twitter that are studied in detail in the form of friends number, reasons for adding/excluding someone from friends' list, frequency and directions for usage, influence on personal efficacy, impact on teaching practice. All gathered data and performed analysis result in a created model for social teachers' presence optimization. Nafees et al (2012) studied effects of instructional strategies on academic achievement in a high school general science class in Rawalpindi, Pakistan. The study used one class for problem-based instructional strategy (Experimental Group) and the other classes for lecture-based instructional strategy (Control Group) were taken from the school. General Science students were compared regarding their academic achievement in a three month term by giving them problem-based instructional treatment. The problem-based group reported a significantly higher level of academic achievement than the traditional lecture based group. Statistically, there were significant differences between the two groups regarding their academic achievement.

3. MATERIALS AND METHODS

3.1 Design of the Study

The study employed quasi-experimental research design. Quasi-experimental design was considered suitable for this study because intact classes were assigned to the two different treatments: Personal Learning Network Approach and Demonstration Instructional Approach..

3.2 Population for the Study

The population for this study comprised all 31 NTC II (Voc. II) students studying metalwork craft in all the Technical colleges in Rivers State. The population of students available in each of the Technical College was provided by the office of the Vice Principal (Administration) of each of the schools for 2020/2022 academic session.

3.3 Sample and Sampling Technique

The sample of the study was the entire population of 31 NTC II (Voc II) students, hence there was no sampling as the entire population was studied and therefore referred as census. The choice of census is due to the relatively small size of the population.

3.4 Instrument for Data Collection

The instruments used for data collection in this study are MetalWork Achievement Test (MAT). The instrument was used to test the students' achievement in Metalwork Craft (cutting, joining, forming and casting Operations)

3.5 Validity of the Instrument

To ensure content validity of the Fabrication and Welding Achievement Test (WFAT) a test blue print (Table of Specification) was developed for the test given due consideration to the emphasis placed on each objective question and major topics in the mechanical engineering craft practice as designated in the National Board for Technical Education (NBTE) syllabus for technical college. In the face validity exercise, the instrument was given to three experts in the Mechanical engineering craft practice; each of the validates were served with a copy of each of the instrument for validation. Based on the experts' corrections and suggestions, preliminary screening and revision of the instruments were made by the researchers.

3.6 Reliability of the Instrument

A test-retest method was used to determine the reliability of various sections of the instrument before commencing the pre-test. This was done by administering the instrument Metalwork Achievement Test (MAT) to the students of Government Technical College, Sagbama in Bayelsa State which was not part of the study.

3.7 Method of Data Analysis

The data collected from the administration of pretest and posttest were analyzed using descriptive (Mean and standard deviation) and inferential statistics (Analysis of Covariance, ANCOVA) to answer the research questions and test the hypotheses respectively. The pretest-posttest mean gain of each of the treatment groups were computed to determine the effects of the Personal learning network on metalwork craft practice students' achievement in Rivers State technical colleges.

4. RESULTS

Research Question 1: What is the effect of personal learning network on students' achievement in cutting operations in technical colleges in Rivers State?

Table 1

Mean and Standard Deviation Achievement Scores of Students Taught with Personal Learning Network on Students' Academic Achievement in Cutting in Rivers State

Groups	N	Pretest $\bar{X}_1$	SD_1	Posttest $\bar{X}_2$	SD_2	Mean Difference $(\bar{X})$	Mean Gain $(\bar{X})$	Remarks
Experimental	20	14.10	2.78	32.5	2.88	18.40	3.30	Better Performance
Control	11	12.50	2.66	27.6	2.77	15.10		

The data presented in Table 1 shows the pre-test and post-test mean score of students' Achievement in cutting Operations for both the experiment and control groups. Result showed that the students in the experiment group had a pre-test mean score of 14.1p with a standard deviation of 2.88 and a post-test mean score of 32.50 with a SD of 2.88 while the control group had a pre-test mean score 12.50 with a standard deviation of 2.77 and a post-test mean score of 27.6 and SD of 2.77. The difference between the pre-test and post-test mean for the experiment group was 18.4, and the difference between the pre-test and post-test mean score for the control group was 15.10, with a mean gain being a positive of 3.30, This showed that the mean score for the experiment group was higher than the mean score for the control group, indicating that those taught with the personal learning network approach scored higher. The closeness of the standard deviation shows the homogeneity of the respondents in their achievement test.

Research Question 2: What is the effect of personal learning network on students' achievement in joining operations in technical colleges in Rivers State?

Table 2

Mean and Standard Deviation Achievement Scores of Students Taught with Personal Learning Network on Students' Academic Achievement in Joining Operations in Rivers State

Groups	N	Pretest $\bar{X}_1$	SD_1	Posttest $\bar{X}_2$	SD_2	Mean Difference $(\bar{X})$	Mean Gain $(\bar{X})$	Remarks
Experimental	20	14.10	1.78	31.20	2.08	17.10	3.40	Better Performance
Control	11	11.50	2.16	25.20	2.77	13.70		

Table 2, showed the pre-test and post-test mean score of students' Achievement in Joining Operations for both experiment and control groups. Result showed that the students in the experiment group had a pre-test mean score of 14.10 with a standard deviation of 1.78 and a post-test mean score of 31.20 with a SD of 2.08 while the control group had a pre-test mean score 11.50 with a standard deviation of 2.16 and a post-test mean score of 25.20 and SD of 2.77. The difference between the pre-test and post-test mean for the experiment group was 17.10, and the difference between the mean score for the control group was 13.70, with a mean gain of positive 3.40. This showed that the mean score for the experiment group was higher than the control group, indicating that those taught with personal learning network approach performed better. Moreso, the gap of the standard deviation shows the disparity of the respondents in their achievement test.

Research Question 3: What is the effect of personal learning network on students' achievement in forming operations in technical colleges in Rivers State?

Table 3

Mean and Standard Deviation Achievement Scores of Students Taught with Personal Learning Network on Students' Academic Achievement in Forming Operations in Rivers State

Groups	N	Pretest $\bar{X}_1$	SD_1	Posttest $\bar{X}_2$	SD_2	Mean Difference $(\bar{X})$	Mean Gain $(\bar{X})$	Remarks
Experimental	20	25.10	2.16	32.20	2.18	7.10	5.00	Better Performance
Control	11	22.10	2.15	24.20	2.17	2.10		

Table 3 showed the pre-test and post-test mean score of students' Achievement in forming operations for both experiment and control groups. Result showed that the students in the experiment group had a pre-test mean score of 25.10 with a standard deviation of 2.16 and a post-test mean score of 32.20 with a SD of 2.18., while the control group had a pre-test mean score 22.10 with a standard deviation of 2.15 and a post-test mean score of 32.20 and SD of 2.18. The difference between the pre-test and post-test mean for the experiment group was 7.10, and the difference between post-test and pre-test mean scores for the control group was 2.10, with a mean score gain of positive 5.00. This showed that the mean score for the experiment group was higher than the control group, indicating that those taught with personal learning network approach performed better. Moreso, the closeness of the standard deviation shows the homogeneity of the respondents in their achievement test.

Research Question 4: What is the effect of personal learning network students' achievement in casting operations in technical colleges in Rivers State?

Table 4

Mean and Standard Deviation Achievement Scores of Students Taught with Personal Learning Network on Students' Academic Achievement in Casting Operations in Rivers State

Groups	N	Pretest $\bar{X}_1$	SD_1	Posttest $\bar{X}_2$	SD_2	Mean Difference $(\bar{X})$	Mean Gain $(\bar{X})$	Remarks
Experimental	20	16.10	2.26	35.10	2.28	19.00	2.00	Better Performance
Control	11	15.20	2.11	32.20	2.07	17.00		

Table 4. showed the pre-test and post-test mean score of students' Achievement in Casting Operations for both experiment and control groups. Result showed that the students in the experiment group had a pre-test mean score of 16.10 with a standard deviation of 2.26 and a post-test mean score of 35.10 with a SD of 2.28. while the control group had a pre-test mean score 15.20 with a standard deviation of 2.11 and a post-test mean score of 32.20 and SD of 2.07. The difference between the pre-test and post-test mean score for the experiment group was 19.00, and the difference between pre-test and post-test mean score for the control group was 17.00, with a mean gain of positive 2. This showed that the mean score for the experiment group was higher than the control group, indicating that those taught with personal learning network approach performed better. The closeness of the standard deviation shows the homogeneity of the respondents in their responses.

Hypothesis 1: There is no significant difference between the mean achievement scores of students taught cutting operations using personal learning network and those taught using demonstration instructional approach in technical colleges in Rivers State.

Table 5

Summary of Analysis of Covariance (ANCOVA) or Tests of Between- Subjects Effects on Students' Achievement in Cutting Operations

Source	Type III Sum of Squares	df		F	Sig.
Corrected Model	12816.093[a]	2	6408.047	726.696	.000
Intercept	23048.968	1	23048.968	2613.838	.000
posttest	3460.761	1	3460.761	392.463	.000
Group	5000.578	1	5000.578	567.084*	.000
Error	846.533	18	8.818		
Total	462776.000	20			
Corrected Total	13662.626	20			

a. R Squared = .938 (Adjusted R Squared = .937) *Significant at sig of F < .05

The data presented in Table 5 show the F calculated value or the effect of instructions on academic achievement of students taught cutting operations using personal learning network instructional approach. The F calculated value for the group is 567.084 at 5000.578 mean square with significant value of 0.000 which is rejected at .05 level of significance. This implies that there is significant difference between the achievement mean scores of students taught cutting operations using personal learning network approach.

Hypothesis 2: There is no significant difference between the mean achievement scores of students taught joining operations using personal learning network and those taught using demonstration instructional approach in technical colleges in Rivers State.

Table 6

Summary of Analysis of Covariance (ANCOVA) or Tests of Between-Subjects Effects on Students' Achievement in Joining Operations

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12835.191[a]	2	3208.798	364.532	.000
Intercept	22899.582	1	22899.582	2601.484	.000
posttest	3279.744	1	3279.744	372.592	.000
Group	4223.152	1	4233.152	479.767*	.000
Error	827.436	18	8.803		
Total	462776.000	20			
Corrected Total	13662.626	20			

a. R Squared = .938 (Adjusted R Squared = .937) *Significant at sig of F < .05

The data presented in Table 6 show the F calculated value or the effect of instructions on academic achievement of students taught joining operations using personal learning network instructional approach. The F calculated value for the group is 479.767 at 4223.152 mean square with significant value of 0.000 which is less than P (.05). the null

hypothesis is rejected at .05 level of significance. This implies that there is significant difference between the achievement scores of students taught joining operations using personal learning network instructional approach.

Hypothesis 3 There is no significant difference between the mean achievement scores of students taught forming operations using personal learning network and those taught using demonstration instructional approach in technical colleges in Rivers State.

Table 7

Summary of Analysis of Covariance (ANCOVA) or Tests of Between-Subjects Effects on Students' Achievement in Forming Operations

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2408.780[a]	2	802.927	18.572	.000
Intercept	286771.477	1	286771.477	6633.089	.000
posttest	3460.761	1	3460.761	392.463	.000
Group	1831.784	1	1831.784	42.370*	.000
Error	4107.180	18	43.233		
Total	389556.000	20			
Corrected Total	6515.960	20			

a. R Squared = .938 (Adjusted R Squared = .937) *Significant at sig of F < .05

The data presented in Table 7 show the F calculated value or the effect of instructions on academic achievement of students taught forming operations using personal learning network instructional approach. The F calculated value for the group is 42.370 at 1831.784 mean square with significant value of 0.000 which is less than P (.05). the null hypothesis is rejected at .05 level of significance. This implies that there is significant difference between the achievement scores of students taught forming operations using personal learning network instructional approach.

Hypothesis 4: There is no significant difference between the mean achievement scores of students taught casting operations using personal learning network and those taught using demonstration instructional approach in technical colleges in Rivers State.

Table 8

Summary of Analysis of Covariance (ANCOVA) or Tests of Between-Subjects Effects on Students' Achievement in Casting Operations

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2307.915[a]	2	1153.957	58.365	.000
Intercept	17854.476	1	17854.476	903.050	.000
Posttest	106.689	1	106.689	5.396	.000
Group	833.851	1	833.851	42.175*	.000
Error	1898.045	18	19.771		
Total	774386.000	20			
Corrected Total	4205.960	20			

a. R Squared = .938 (Adjusted R Squared = .937) *Significant at sig of F < .05

The data presented in Table 8 show the F calculated value or the effect of instructions on academic achievement of students taught casting operations using personal learning network instructional approach. The F calculated value for the group is 42.175 at 833.851 mean square with significant value of 0.000 which is less than P (.05). the null hypothesis is rejected at .05 level of significance. This implies that there is significant difference between the achievement scores of students taught casting operations using personal learning network instructional approach

5. DISCUSSION

The data presented in Table provided answer to research question 1, finding revealed that students taught forming of cutting operations with the personal learning network instructional approach had a higher mean achievement score than those taught with demonstration instructional approach in the achievement test. At the same time, Analysis of covariance was used to test the first hypothesis, Table 5, at the calculated F-value (567.084), Significance of F (.000) and confidence level of .05. There was statistically significant difference between the achievement mean scores of students taught cutting operations using personal learning network instructional approach and those taught using demonstration instructional approach in the achievement test. This confirmed that the mean difference was statistically significant. The implication of this finding proved that personal learning network instructional approach is more effective than demonstration instructional approach in enhancing students' achievement in studying fabrication and welding craft with reference to cutting operations in technical college in Rivers State. The findings of this study are consistent with other previous findings which show that the use of varieties of teaching methods is a must for teachers if learning is to be effective and efficient, and hence there is need for a good teacher to be multi-talented in other to be conversant with the use of various teaching methods in the teaching and learning process (Dorgu, 2015)

The data presented in Table 2 provided answer to research question 2; finding revealed that students taught joining operations with the personal learning network instructional approach had a higher mean achievement score than those taught with demonstration instructional approach in the achievement test. At the same time, Analysis of covariance was used to test the first hypothesis, Table 6, at the calculated F-value (479.767), Significance of F (.000) and confidence level of .05. There was statistically significant difference between the achievement mean scores of students taught joining operations using personal learning network instructional approach and those taught using demonstration instructional approach in the achievement test. This confirmed that the mean difference was statistically significant. The implication of this finding proved that personal learning network instructional approach is more effective than demonstration instructional approach in enhancing students' achievement in studying fabrication and welding craft with reference to joining operations in technical college in Rivers State. This finding is consistent with that of Ndudi (2011) which revealed that students taught Basic Electricity with CAI (which is one of the technology-enhanced instructional approach) performed better than students taught using conventional teaching method.

The data presented in Table 3 provided answer to research question 3, finding revealed that students taught forming operations with the personal learning network instructional approach had a higher mean achievement score than those taught with demonstration instructional approach in the achievement test. At the same time, Analysis of covariance was used to test the first hypothesis, Table 7, at the calculated F-value (42.370), Significance of F (.000) and confidence level of .05. There was statistically significant difference between the achievement mean scores of students taught forming operations using personal learning network instructional approach and those taught using demonstration instructional approach in the achievement test. This confirmed that the mean difference was statistically significant. The implication of this finding proved that personal learning network instructional approach is more effective than demonstration instructional approach in enhancing students' achievement in studying fabrication and welding craft with reference to forming operations in technical college in Rivers State. The findings of this study are in consistent with the findings of Charagu (2015) which indicated a significant improvement in Chemistry performance for students from the experimental group who were exposed to computer assisted learning than those students from control group, who were not exposed to computer assisted learning. The finding of the present study are also in agreement with Kareem (2015) study that investigated the effects of introduction of CAI in Biology compared to the conventional method of teaching on senior secondary school students' achievement and the results revealed that CAI improved students' academic achievement in Biology. In addition, the findings of this study concurs with Olakanmi, Gambari, Gdodi and Abalaka (2016) findings which revealed that students who were taught chemistry with computer assisted instruction had higher extrinsic and intrinsic motivation as well as achievement than those in conventional teaching methods. Generally, several research findings concurs that the use of Computer aided Instruction (CAI) raises students' achievement more than traditional methods of instruction (Olga, 2008; Serin, 2011; Ahiatrogah et al, 2013; Jesse et al, 2014).

The data presented in Table 4 provided answer to research question 4, finding revealed that students taught casting operations with the personal learning network instructional approach had a higher mean achievement score than those taught with demonstration instructional approach in the achievement test. At the same time, Analysis of covariance was used to test the first hypothesis, Table 8, at the calculated F-value (42.175), Significance of F (.000) and confidence level of .05. There was statistically significant difference between the achievement mean scores of students taught casting operations using personal learning network instructional approach and those taught using demonstration instructional approach in the achievement test. This confirmed that the mean difference was statistically significant. The implication of this finding proved that personal learning network instructional approach is more effective than demonstration instructional approach in enhancing students' achievement in studying fabrication and welding craft with reference casting operations in technical college in Rivers State. The findings of this study are in consistent with the findings of Rojewskin (2002) who noted that a shift from teacher-centred instruction to learner-centred instruction is needed to enable students acquire the new 21st century knowledge and skills.

6. CONCLUSION

From the findings, the researchers made the following conclusions:-

1 Students taught cutting operations with the personal learning network approach performed better in the achievement test.
2 Students taught joining operations with the personal learning network approach performed better in the achievement test.
3 Students taught forming operations with personal learning network approach performed better in the achievement test.
4 Students taught casting operations with personal learning network approach performed better in the achievement test.
5 There was a positive effect attributable to male students on the interest mean scores when taught cutting operations using personal learning network instructional approach.
6 There was a positive effect attributable to male students on the interest mean scores when taught joining operations using personal learning network instructional approach.

7 There was a positive effect attributable to male students on the interest mean scores when taught forming operations using personal learning network instructional approach.
8 There was a positive effect attributable to male students on the interest mean scores when taught casting operations using personal learning network instructional approach.

7. RECOMMENDATIONS

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

1. The study recommends the teaching/learning of cutting operations via the personal learning network instructional approach.
2. National Board for Technical Education (NBTE) should consider review of curriculum for metalwork craft with a view to incorporating personal learning network instructional approach into teaching/learning of joining operations.
3. Seminars, workshops and in-service programs should be organized by all examination boards (NABTEB and NBTE) to enlighten technical teachers and improve their knowledge and skills on the use of the personal learning network instructional approach for improving students' performance in forming operations.
4. There should be well trained personnel on ground to handle such innovations like with personal learning network instructional approach as to make training and retraining of staff imperative in casting operations.

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