

Evaluating Task and Project Instructional Impact on Woodwork Students' Skill Acquisition in Technical College in South-South, Nigeria

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Abstract

The study assessed the impact task and project instruction on woodwork students' skill acquisition in Technical College in South-South Nigeria. Two research questions and two hypotheses were formulated for the study. This research employed a quasi-experimental design, involving a pre-test and post-test control group. The population of the study was 102 General woodwork students as at 2020/21 academic session in public Technical Colleges in the study area. Purposive sampling technique was used to select all the 102 General Woodwork (GW) students from six Technical Colleges, with 48 and 54 students designated as experimental groups and control groups respectively. The instrument for data collection was Machine Woodwork Skills Acquisition Evaluation Checklist (MWSAEC) developed by the researcher. The instruments were validated by three technical teacher education lecturers and one lecturer in Measurement and Evaluation and the corrections suggested reflected in the final instrument used for the study. The reliability index of .87 was established for the instrument using Kuder Richardson's formula 21 (KR-21). Mean and analysis of covariance (ANCOVA) was used for testing the null hypothesis at 0.05 level of significance. The result of the study among others revealed that there is a significant difference in the impact of task instructional sheet and project instruction utilization on skills acquisition of student in machine wood boring and shaping. Thus, this paper recommended among others that wood work teachers in Technical Colleges should use task instruction sheet approach to teach machine wood boring and shaping as this approach is more effective in enhancing students' manipulative skills compared to the project instruction method.

Keywords: Task and Project Instruction, Skills Acquisition, Technical College Students, woodwork, South-South Nigeria

Introduction

Technical education plays a pivotal role in equipping students with the practical skills and knowledge necessary to excel in the rapidly evolving global workforce. Technical education according to Aina, Ogundele and Olanipekun (2013) is an aspect of education which leads to the acquisition of practical, basic scientific knowledge, which involves special manipulative skills, creative minds and attitude relating to occupations in various sectors of the economic and social life. In Nigeria, as in many parts of the world, technical colleges serve as vital institutions that bridge the gap between theoretical learning and practical application. The trades offered in technical colleges as stated by Federal Republic of Nigeria (FRN, 2013) include building trades; computer craft practices; painting; electrical engineering trades; woodwork trades; printing trades, textile trades, hospitality trades and mechanical trades. Technical college is a post primary institution where students are given full vocational training that will enable them acquire relevant knowledge, skills and attitude for paid or self-employment in various occupations in the world of work.

National Board for Technical Education (NBTE), accredits the programmes in the Technical Colleges while the National Business and Technical Education Board (NABTEB) conducts the final national examination and awards certificates (NBTE, 2001). Trainees who successfully complete all the courses/modules specified in the curriculum table and passed the national examinations in the trade are awarded National Technical Certificate (NTC) at craft level and Advanced National Technical Certificate (ANTC) at advanced craft level. The major goal of the programme in the technical colleges is to produce competent craftsmen and master craftsmen for industrial and technological development in Nigeria. Woodwork technology being one of the vocational subjects studied in technical colleges in Nigeria (NBTE, 2007) is to produce skilled craftsmen for self or paid employment in the world of work. The skill areas for employment in woodwork include machine Operations, Furniture Making, Upholstery Design and Construction, Carpentry and Joinery. All these areas of woodwork technology are changing rapidly and as such it demands that practitioners should have flexible skills that can easily adapt to changes.

Technical education in Nigeria has been undergoing notable transformations over the years. The expansion of technical colleges and vocational training institutions reflects the recognition of the pivotal role that practical skills play in national development. The rapid changes in technology have necessitated the need to equip technical college students with workplace basic and thinking skills which will make them flexible and adaptable to the present and envisaged future changes (Zhang et al., 2020) Technology, the world over is dynamic and work organizations are getting increasingly flexible, process-based and multitasking. Oluka and Onyebuanyi (2017) noted that the place of skill acquisition cannot be over emphasized in quest for the rapid development in education, technology and other sectors of the economy. Skill acquisition for relevance in ones' society is the core objective and thus formed the bedrock for different trade offered in technical colleges as the place of skill acquisition cannot be underrated. Practical skill is a manual dexterity through repetitive performance of an operation. Skill according to Onyebuanyi and Mbah (2018) is an individual's conscious and intentional practical knowledge display acquired through experience, training and application on the job.

The acquisition of technical skills is a multifaceted process that encompasses a wide array of competencies. These competencies span from fundamental abilities like machine operation and precision work to more advanced skills such as problem-solving, creativity, and adaptability.

According to Okebukola (2010) specific acts are adopted by teachers to inject varieties in their teaching, stimulate and maintain the learners' academic achievement, interest and retention in the lesson all in a bid to sustain the student's interest. Okebukola maintained that instructional techniques are subsumed in teaching methods as ancillaries to ensure the effectiveness of the teaching methods. The traditional instructional methods used for so many years in the teaching of Woodwork technology seem today inadequate for equipping students with skills such as creative skills, higher order thinking skills and problem-solving skills needed by the students to thrive as craftsmen in the 21st century Woodwork workplace. This is because the teaching methods are executed by teacher centred activities; hence most students are not always given enough opportunity to participate actively in the teaching/learning process (Orji, 2015; Orji & Ogbuanya, 2018).

Essential to this transformation is the need for pedagogical methods that align with the evolving demands of technical education. Task instruction sheets, which provide structured, step-by-step guidance for completing specific technical tasks, have become a common instructional tool in technical colleges (Hidayat et al. 2018). They offer a systematic approach to skill development and are often used to introduce students to various technical processes. On the other hand, Bender (2012) stated that project-based instruction emphasizes learning through hands-on projects or assignments. According to Johnson and Ulseth (2014), Fioravanti, et al., (2018) this approach encourages students to apply their knowledge and skills to solve real-world problems or create tangible products. Projects can be open-ended, allowing students to exercise creativity and problem-solving abilities. Both instructional methods have their merits and potential drawbacks. Task instruction sheets offer structured guidance, making it easier for students to grasp fundamental techniques. However, they may limit students' creativity and problem-solving abilities. Project-based instruction, on the other hand, fosters independent thinking and application of skills but may require students to navigate complex challenges without a structured path (Ravitz, 2012).

According to Udofia, et al., (2012) and Muhammad (2016), graduates of Technical Colleges in the South-South region of Nigeria, lack adequate skills for employment in their area of trades thus hindering the economic development in the zone. Teachers in the South-South region had, over the years been using teacher-dominated demonstration (drills), and sometimes project method devoid of proper content selection, analysis and sequencing of learning task, to teach skilled trades (Muhammad, 2016). These traditional methods and the way they are presented do not lay much emphasis on the students' self-assessment, problem-solving and effective thinking abilities. Perhaps, the observed anomalies in these traditional methods could constitute a problem for students' acquisition of manipulative skills thus hindering sustainable economic development of the region. To this end, the study assessed the impact task and project instruction on woodwork students' Skill acquisition in Technical College in South-South Nigeria.

Problem Statement

Technical College is a post primary educational institution established for enrollment of students specifically into practical/skill-oriented programme. The objective which is to produce competent human resources that could be relevant to themselves and the nation at large has not been met. Some Technical Colleges lack the necessary facilities, tools, instructional materials and equipment for practical skill enhancement while in some other schools, most facilities dilapidate

as a result of lack of finance and competent human resources needed for maintenance practices (Bakare & Orji 2019; Orji & Ogbuanya 2018; Orji & Ogbuanya, 2020). Studies have also shown that the best way to improve students' practical skills outcome and engagement is by designing a learning environment and engaging teaching methods that encourage active learning strategies, promote collaboration, and provide prompt feedback to improve students' achievement and learning in schools (Orji, 2015; Orji & Ogbuanya, 2018; Zhang et al 2021). These have contributed to poor skill acquisition by the woodwork students which invariably results to unemployment after graduation. Consequently, most of the graduates of technical colleges are found roaming the streets and involving in unacceptable social activities like robbery, drug addiction, smoking and others. To this end, the study sought to find out ways through which skills could be enhanced for sustainable job security of technical college graduates by evaluating task and project instructional delivery approach on woodwork students' skill acquisition in Technical College in South-South, Nigeria.

Objectives of the Study

The main objective of this study was to determine the impact of task and project instruction on skill acquisition among woodwork Students in Technical College in South-South Nigeria. Specifically, the study was designed to determine:

1. Woodwork students' acquisition of machine wood shaping skill, when exposed to task and project instruction techniques in South-South Nigeria.
2. Woodwork students' acquisition of machine wood boring skill, when exposed to task and project instruction techniques in South-South Nigeria.

Research Questions

Two research questions guided the study

1. What is the difference in woodwork students' acquisition of machine wood shaping skill, when exposed to task and project instruction techniques in South-South Nigeria?
2. What difference exists in woodwork students' acquisition of machine wood boring skill, when exposed to task and project instruction techniques in South-South Nigeria?

Research Hypotheses

Two research hypotheses were tested at .05 level of significance as follows:

- H₀₁ There is no significant difference in woodwork students' acquisition of wood machine shaping skill when exposed to task and project instruction techniques in South-South Nigeria.
- H₀₂ There is no significant difference in woodwork students' acquisition of wood machine boring skill when exposed to task and project instruction techniques in South-South Nigeria.

Area of Study

The study was conducted in the South-South geopolitical zone of Nigeria. The region consists of six states, namely, Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers States.

These six states have 24 public Technical Colleges out of which Government Technical College, Abak, Akwa Ibom State; St. Patrick Technical College, Ugep, Cross River State; Government Technical College, Issale Uku, Delta State; Government Technical College, Afuse, Edo State; Government Technical College, Ahoada, Rivers State and Government Technical College, Ewet, Akwa Ibom State, have required equipment to offer woodworking as a course of study.

Design of the Study

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

Population of the Study

The population of the study was 102 General woodwork students as at 2020/21 academic session in Senior Technical II and III in public Technical Colleges in the study area.

Sample and Sampling Technique

Purposive sampling technique was used to select all the 102 general woodwork students from six Technical Colleges in the study area. Since the population was few and manageable, the entire population was used for the study. The researchers randomly grouped the students and six schools into two groups using simple balloting technique. Three Technical Colleges were assigned to experimental group (taught with Task Sheet strategy) and the other three classes were assigned to control group (taught with project-based methods). A total of 48 and 54 students respectively were used for the study. The reason for the selection of participants in a purposive sampling is based on their knowledge or experiences in providing the information that needs to be known for a study (Tongco, 2007). Furthermore, the criteria used in selecting participants for the qualitative part is based on experience.

Instrument Validity and Reliability

The instruments were validated by three technical teacher education lecturers and one lecturer in Measurement and Evaluation and the corrections suggested reflected in the final instrument used for the study. The reliability index of .87 was established for the instrument using Kuder Richardson's formula 21 (KR-21).

Method of Data Collection

Machine Woodwork Skills Acquisition Evaluation Checklist (MWSAEC) was developed by the researcher for the study. This is an evaluation checklist of operation in machine woodworking derived from the general woodwork syllabus of technical Colleges in Nigeria. The main task of the two groups was the construction of a functional penholder and skills evaluated were as in the objective of the study. Lesson plan for each objective of the study was developed for the two groups. The Evaluation Checklist was structured based on a 4-point rating scale of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2), and Strongly Disagree (SD = 1).

Method of Data Analysis

The research questions were answered using Mean and standard deviation. This is because Mean is the most reliable measure of central tendency in a normal distribution which will be used to describe the Mean performance scores of students. The hypotheses were tested at .05 level of significance using Analysis of Covariance (ANCOVA). ANCOVA was used in order to take care of the error of initial difference in the ability levels among the research subjects. The decision was made on the condition that: When the calculated F was greater than the critical F at 0.05 alpha level, the null hypothesis was rejected but if the calculated F was less than the critical F, the null hypothesis was upheld.

Results

The results in line with the research questions and corresponding null hypotheses that guided the study are presented below.

Research Question 1: What is the difference in woodwork students' acquisition of machine wood shaping skill, when exposed to task and project instruction techniques in South-South Nigeria?

Table 1: Mean analysis of the difference in woodwork students' acquisition of machine wood shaping skill, when exposed to task and project instruction techniques in South-South Nigeria

Group	N	Mean			
		Pretest	Posttest	Mean Gain	Posttest Difference
		\bar{X}	\bar{X}	\bar{X}	\bar{X}
Experimental (Task Instruction Sheets)	48	9.25	13.29	4.04	
Control (Project Instruction)	54	9.59	11.93	2.34	1.53
Total	102	9.42	12.61	6.38	

The data on table 1 shows that the experimental group has Mean scores of 13.29 in the pretest and posttest; while the corresponding figures for control group are 9.59 and 11.93, respectively. This shows that the experimental group has a lower Mean scores in the pretest and higher mean score compared to the control group in both tests. Thus, the difference in the Mean scores of students taught using task instruction sheet and those taught using the project instruction in both pretest and posttest are 1.33 and -0.34 respectively. This therefore means that the use of task instruction sheets in teaching machine wood boring enhances student's skill acquisition more than the project instruction technique in South-South Nigeria.

Research Question 2: What difference exists in woodwork students’ acquisition of machine wood boring skill, when exposed to task and project instruction techniques in South-South Nigeria?

Table 2: Mean Analysis of the difference woodwork students’ acquisition of machine wood boring skill, when exposed to task and project instruction techniques in South-South Nigeria

Group	N	Mean			
		Pretest	Posttest	Mean Gain	Posttest Difference
		\bar{X}	\bar{X}	\bar{X}	\bar{X}
Experimental (Task Instruction Sheets)	48	10.45	14.40	3.95	
Control (Project Instruction)	54	10.29	12.87	2.5	1.53
Total	102	10.37	13.64	6.45	

The data on table 2 shows that the experimental group has Mean scores of 10.45 and 14.40 in the pretest and posttest; while the corresponding figures for control group are 10.29 and 12.87, respectively. This shows that the experimental group has a higher Mean scores than the control group in both tests. Thus, the difference in the Mean scores of students taught using task instruction sheet and those taught using the project instruction technique in both pretest and posttest are 1.53 and 0.16 respectively. This therefore means that the use of task instruction sheets in teaching machine wood shaping skill enhances students’ skill acquisition more than the project instruction technique in South-South Nigeria.

Hypotheses (H0₁): There is no significant difference in woodwork students’ acquisition of wood machine shaping skill when exposed to task and project instruction techniques in South-South Nigeria.

Table 3: One-Way Analysis of Covariance (ANCOVA) of difference in students’ acquisition of wood machine shaping skill when exposed to task and project instruction techniques in South-South Nigeria

Source of Variation	Sum of Squares	df	Mean Square	F-cal	F-crit
Pretest (Covariates)	319,760	1	319.760	117.184	
Main Effect	117.438	2	58.719	31.618	
Treatment	117.438	2	58.719	31.618	4.88
Between Group	17730.145	3	5710.048	3074.682	
Within Group	183.855	99	1.857		
Total	621.083	102	6.08		

- P <.05 alpha level

Table 3 shows that the calculated F (32.618) is greater than the critical F (4.88) at df 2, 99 and .05 level of significance. Therefore, the null hypothesis is that there is no significant difference between the effects of task instruction sheets and project instruction technique in skill acquisition of students in Machine wood shaping is rejected. This implies that there is a significant difference in students' acquisition of wood machine shaping skills when exposed to the two models of instruction under investigation with the instruction sheet model being effective in South-South Nigeria.

Hypotheses (H₀₂) There is no significant difference in woodwork students' acquisition of wood machine boring skill when exposed to task and project instruction techniques in South-South Nigeria

Table 4: One-Way Analysis of Covariance (ANCOVA) of difference in students' acquisition of wood machine boring skill when exposed to task and project instruction techniques in South-South Nigeria

Source of Variation	Sum of Squares	df	Mean Square	F-cal	F-cri
Pretest (Covariates)	389.505	1	383.505	188.026	
Main Effect	149.968	2	74.984	36.763	
Treatment	149.968	2	74.984	36.763	
					4.88
Between Group	19249.076	3	6416.359	3145.839	
Within Group	201.924	99	2.040		
Total	621.083	102	7.268		

- P < .05 alpha level

Table 4 shows that the calculated F (36.763) is greater than the critical F (4.88) at df 2, 99 and .05 level of significance. Therefore, the null hypothesis is that there is no significant difference between the effects of task instruction sheets and project instruction technique in skill acquisition of students in Machine wood boring is rejected. This implies that there is a significant difference in students' acquisition of wood machine boring skills when exposed to two approaches of instruction under investigation with the task instruction sheet approach being more effective in South-South Nigeria.

Discussion of Findings

The result presented in table 1 shows that the experimental group has Mean scores of 13.29 in the pretest and posttest; while the corresponding figures for control group are 9.59 and 11.93, respectively. This shows that the experimental group has a lower Mean scores in the pretest and higher mean score compared to the control group in both tests. Thus, the difference in the Mean scores of students taught using task instruction sheet and those taught using the project instruction in both pretest and posttest are 1.33 and -0.34 respectively. This therefore means that the use of task instruction sheets in teaching machine wood boring enhances student's skill acquisition more than the project instruction technique in South-South Nigeria. This study supports the one of Oluka and Onyebuanyi (2017), who observed in his findings that instruction sheets clearly indicate to the students from the very beginning exactly how much work must be accomplished. In other words, it places more responsibility on the students for meeting the requirements which the teacher have

specified for the lesson. The study is in line with Hassan and Ogbuanya (2017) who asserted that the teaching and learning methods adopted in acquiring skills in Nigeria are conventional usually with lecture and demonstration method which do not give students adequate opportunities to actively involved in the learning process to acquire the necessary skills needed at the work place. Accordingly, Akor et al. (2018); Oloyede, Ajimotokan, and Faruk (2017) observed that lecture, demonstration, project work are the most predominant teaching methods in Nigerian tertiary institutions.

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Conclusion

Based on the findings, it is concluded that students taught with task instruction approach in the machine woodworking skills performed better than those taught with the project instruction indicate the fact that student's performance can be improved through the use of task instruction approach in South-South Nigeria. The study also revealed that improved performance is probably due to the fact that the learning principle in task instruction sheets is based on effective analysis and the careful sequencing of learning tasks, the individualization of instruction, proper preparation of instruction delivery employed by the teachers, effective utilization of tools in the learning process and the provision made for safe working in the task instruction sheets. It can also be concluded that the use of an enhanced instructional technique woodwork teachers in Technical Colleges, as observed in this study will produce better occupational students and by extension

better would be worker in the field because they are better equipped with high quality work-behaviour required in the world of work and for entrepreneurial exploits in South-South Nigeria. This in effect is apt to meet the national manpower aspirations of Nigeria in the years to come.

Recommendations

Based on the findings of this research study, the following recommendations were proffered:

1. Woodwork teachers in Technical College should use task instruction approach to teach machine wood sawing, planning, boring, shaping, turning, routing, sanding and finishing skills since it is found in the study apparently more efficient in the development of students' manipulative skills than the project instruction approach currently in use in Technical Colleges in the region.
2. Woodwork student should use task instruction sheets to improve their manipulative skills, problem-solving and creative thinking abilities.
3. Task instruction techniques should be incorporated into the curriculum of teacher preparation programmed in Nigeria.
4. Conferences, seminars and workshops should be organized for serving woodwork and other Vocational Education teachers in the Technical College in the South-South States and the Country at large to avail them of the knowledge and skills on the development and the use of task instruction sheet which by this research work, have been found to be effective in facilitating students' skills acquisition.
5. Technical Colleges and other Vocational Education students in the States should be encouraged to use task instruction in learning as found out in this study that it promotes self-learning through the steps guided approach.
6. Learning packages in task instruction should be produced in all technical subjects since it is found to encourage discovery, self-assessment and problem-solving abilities of students.

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