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Effect of Intelligence Tutor Learning Software on Students' Academic Achievement Brick/Block Laying and Concreting Programme in Technical Colleges in Delta State

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ABSTRACT

The study focused on the effect of intelligence tutor learning software on students' academic achievement in brick/block laying and concreting programmes in Technical Colleges in Delta State. Specifically, three objectives, research questions, and hypotheses guided the study. Quasi-experimental research design was used for this study. The population for the study comprised 160 NTC II brick block laying and concreting students in the six Technical Colleges in Delta State selected for the study. A purposive random sampling technique was used to select the two schools in Delta State. The instrument, lesson plans, and the Table of Specification/Test Blue Print were subjected to face and content validation by two experts. The instrument yielded a reliability index of .87. The instrument for data collection was brick block laying and concreting (BBLCT) which has five parts according to the topics outlined and was used for data collection. The finding of the study shows that the mean score for the experimental group is higher than the control group, indicating that those taught construction management with the intelligence tutor learning technique performed better than those who were taught using the lecture method in technical colleges in Delta State. The finding of the study shows that there is a significant difference between the mean scores of students taught building drawing and design using intelligent tutor technique and those who were taught with lecture method in Technical Colleges in Delta State.

Based on the findings of the researcher, the following recommendations were made: The use of the intelligence tutor learning software should be encouraged as this would help students to study at their own pace in Technical Colleges in Delta State. Philanthropists and stakeholders in technical colleges should create good content of intelligence learning software for students in brick/block laying and concreting programmes in Technical Colleges in Delta State. This could train the students on the current skills required in the industry.

KEYWORDS

intelligence tutor learning software; brick/block laying and concreting programme; technical colleges

INTRODUCTION

The important role of technical vocational education and training (TVET) with regard to individual occupational preparation in addition to national development is well recognized worldwide today. According to the Federal Republic Nigeria on National Policy on Education (FRN, 2014), TVET is defined as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practice skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. TVET is considered essential because a country cannot achieve economic and social development without a skilled, productive labor force that can meet the changing requirements of its environment.

In the Nigerian educational system, technical colleges offer technical and vocational education programmes for the purpose of producing middle-level skilled manpower required for the nation's economic and technological development (the Federal Republic of Nigeria FRN, 2014). The National Technical Certificate (NTC) is awarded by the National Business and Technical Examinations Board (NABTEB) to students who have completed their post-primary education at technical colleges (NABTEB, 2004). Brick/Block laying and Concreting (B/BC) is one of the trades at the National Technical Certificate (NTC) level and its curriculum primarily is aimed at equipping an individual with skill in the application of the right or appropriate blocks, tools, and concrete as applicable in the construction industry.

Brick/Block laying and concreting like other courses are carried out in the classroom and workshop learning and training environments and each complements the other. Workshop environment in a college setting is the introduction of industry in a learning situation, designed to equip students for work in their chosen occupation as demanded by the labour market (N.B.T.E; 2001) Brick/Block laying and concreting at the Technical college level is designed to provide the trainee with the essential knowledge and skill that will enable him to perform competently in all aspects of Brick-work in the construction industry. On completion of the programme, the trainee should be able to manipulate various tools and equipment in the brick/block laying and concreting trade. Manipulative skills are required in brick/ block laying and concreting. Skills are those aspects of technical and vocational education that involve hands-on the-job experience by the students.

Block laying and concreting are offered at both intermediate and advanced levels in technical colleges. The curriculum of intermediate block laying and concreting in addition to what may be termed general education subjects such as Mathematics, English Language, Physics, Chemistry, Social studies, etc has the core trade subjects to include: Introduction to Building Construction, Concreting, Block laying, Bricklaying, Land Surveying, Quantity Surveying, Technical Drawing, Building Drawing, and Construction Management.

In building construction, building drawings contain details of index plans, detailed floor and roof plans, elevations, and cross-sections of walls which plays an important role as a working drawing; because it is almost impossible to construct a building without sufficient knowledge of building drawing (cseek.com).

The aim of building drawing/design according to the National Board for Technical Education (NBTE, 2001) is to produce a platform for the trainee with the essential knowledge and skills that will enable him to perform proficiently in all aspects of brick/block laying and concreting work in the construction industry. In extension, the goal of concrete is designed to provide the trainee with the building knowledge of the properties and application of concrete as well as the skill in the production of sound concrete structures before carrying out floor and ceiling finishing

Block/bricklaying is the act of building a wall by placing blocks/bricks on each other usually with cement between the surfaces of the bricks the building methods for bricks or blocks are the same. Joints between bricks should never be in line with the joints in the course below. Good bonding between courses ensures that the forces applied to the wall are effectively distributed. The structure then remains stable and strong and functions as one unit. Unbounded or insufficient bonding results in vertical joints with the accompanying risk of failure. The basic laying procedure for block and brick walls is the same for all types of block and brick and is identical to the procedure for block foundation walls

Flooring is the general term for a permanent covering of a floor, or for the work of installing such a floor covering. Floor covering is a term to generically describe any finish material applied over a floor structure to provide a walking surface. Both terms are used interchangeably but floor covering refers more to lose-laid materials. Materials almost always classified as flooring include carpet, laminate, tile, and vinyl. A wall is a structure that defines an area, carries a load, or provides shelter or security. There are many kinds of walls: Defensive walls in fortifications, Walls in buildings that form a fundamental part of the superstructure or separate interior sections, sometimes for fire safety, Retaining walls, which hold back dirt, stone, water, or noise sound, Walls that protect from oceans (seawalls) or rivers (levees), Permanent, solid fences, Border barriers between countries, Brick wall, Precast Wall, Stonewall, Glass wall (only when most of the wall, in smaller amounts it is called a window) and Doors are mobile walls on hinges which open to form a gateway (Tantawi, 2015).

A ceiling is an overhead interior surface that covers the upper limits of a room. It is not generally considered a structural element, but a finished surface concealing the underside of the roof structure or the floor of a story. Ceilings can be decorated to taste, and there are many fine examples of frescoes and artwork on ceilings especially in religious buildings.

The aim of concreting according to Ameh et al (2010) is to provide the trainee with the basic knowledge of the properties and application of concrete as well as the skill in the production of sound concrete structures, State the functions and methods of care of common concreting tools and equipment, State the properties of aggregates in relation to their use

in concrete production, Know the properties and application of different types of cement, Understand the use and application of stones in construction, Relate the properties of concrete to its application as a construction material, Understand the use and application of earth soil and laterite in construction, Understand the principles and methods of proportioning, mixing and testing concrete and be able to carry out the operations.

Concrete is a common building material used in a number of structures, such as floors, walls, columns, lintels, beams, and roofs. It can be cast in any desired shape and fashion and is therefore applicable for most building purposes. Concrete does not rot, rust, or decay and is resistant to wind, water, rodents, and insects. Concrete consists of cement, sand, and coarse aggregate mixed with water. The aggregate is a mixture of stones of various sizes. When water is added, a chemical process takes place primarily with cement, causing the mix to harden. While concrete performs well under compression, it does not tolerate tension well. To improve its strength, steel bars are added to the concrete in places where tensile stress is expected to occur - such as in beams and slabs. Consequently, the load-bearing capacity of this composite material, called Reinforced Cement Concrete, (RCC), is significantly better compared to when concrete or steel members are used in isolation. With reinforcement steel firmly embedded into the concrete, it can be used to build strong load-bearing structures such as columns, beams, and slabs. Concrete is cast in molds referred to as formwork or shuttering. Usually, the formwork used for walls, columns, beams, and slabs is assembled by joining wooden boards edge on edge. The advantage of using wood is that it can easily be used to create any required shape. Plywood, laminated boards, and metal are also commonly used for formwork.

However, the objective of brick/block laying and concreting works according to the National Board for Technical Education NBTE (2003) is to give training and impart the necessary skills leading to the production of craftsmen, technicians, and other skilled personnel who will be enterprising and self-reliant. This goal can however be achieved only when brick/block laying and concreting works are appropriately taught to learners. This can be possible by making teaching teaching-learning process student-centered as against being teachers-centered and by also viewing students as problem solvers rather than direction followers. Davidson (2014) observed that many teaching methods/techniques do not use students to their full capacity, and for this reason, teachers should use appropriate teaching techniques that are student-centered (intelligent tutor) as against teacher-centered.

An intelligence tutoring (IT) is a computer system that aims to provide immediate and customized instruction or feedback to learners, usually without requiring intervention from a human teacher. IT has the common goal of enabling learning in a meaningful and effective manner by using a variety of computing technologies. There are many examples of IT being used in both formal education and professional settings in which they have demonstrated their capabilities and limitations (Dimelu 2014). There is a close relationship between intelligence tutoring, cognitive learning theories, and design; and there is ongoing research to improve the effectiveness of IT. And IT typically aims to replicate the demonstrated benefits of one-to-one, personalized tutoring, in contexts where students would otherwise have access to one-to-many instruction from a single teacher (e.g., classroom lectures), or no teacher at all (e.g., online homework). IT is often designed with the goal of providing access to high-quality education to each and every student.

Intelligence tutor learning techniques (ITLT) are learning techniques that help learners master knowledge and skills. ITLT works with only one user because users differ in many dimensions and the goal is to be sensitive to the differences of individual users. Some basic activities of ITLT incorporate active learning of the user, interactivity, adaptability, and feedback. The main goal of ITLT is to make these technologies adaptable to users, based on their individual characteristics and needs (Onwuchekwa 2013). Thus, the ITLT offers individual tutoring benefits automatically and autonomously, making each user progress at their own pace. Also applying the concept of adaptive learning to ITLT is a powerful learning tool. Learning skills are vital to achieving success, whether at school or at work, and are becoming increasingly important for social communication which is an improvement on traditional teaching techniques such as lecture teaching methods.

In the lecture method, the teacher presents the learning concepts to the students. Teachers learn different concepts beforehand and explain the concepts in a classroom. The teacher will be actively involved in the lecture method and the students will be passively listening to the lectures. In order to make the lectures more engaging and captivating, teachers use different strategies. These strategies enhance the outcomes of the lecture method and improve the learning retention rate of the students.

The lecture method of teaching is one of the oldest methods of teaching in which the teacher focuses on the theory of syllabus. The lecture method of teaching has been used for a long time and it is still used during the preparation of various competitive exams and practical exams because, in the end, the lecture method helps in memorizing things much faster and in an efficient way. The definition of lecture method may differ from person to person but the meaning of it remains the same in the end.

The lecture method is sometimes referred to as direct instruction, deductive teaching, or expository teaching, and is typified by the lecture-type presentation (Afolabi 2019). In these techniques of teaching, the teacher controls what is to be taught and how students are presented with the information that they are to learn. While in modern teaching techniques such as the use of intelligent tutors have been spread all over the world, which is useful and easy for teachers. Modern teaching techniques educate children well and make them understand clearly (Okeke,2016). In this era, there is an increased usage of the Internet in educational applications; this could mean that students and teachers will increasingly make use of technology within open and flexible learning systems. Technology plays an important role in enhancing and developing our learning system. Intended outcomes, as well as unintended results of using Modern Teaching Techniques for teacher professional development, need to be explored. Certain skills and capabilities of using different Modern Teaching Technologies are necessary for students to enhance their learning process.

Educational learning facilities are the entire scope of human, physical, and social infrastructure provided in the school for the purpose of the teaching/learning process. Odu, (2012) describes learning facilities as physical resources that the school administrators and his reference group harness, allocate, utilize, and maintain for the purpose of effective school administration that will facilitate the teaching/learning process in social studies. Learning facilities are those materials that enhance teaching/learning processes. They further stated that learning facilities refer to buildings as well as items such as machines, laboratory equipment, chalkboard, and learners' tools. They are those things that enable a skillful teacher to achieve a level of instructional objectives that far exceeds what is possible when they are not provided (Fournier, Nkambou, & Mephu 2010). Therefore, the planning and designing v of educational facilities for schools, colleges, and universities possess a greater influence on the. performance outcome of social studies students. This is certainly true because deferred maintenance of the learning facilities whether human resources (e.g. teachers), social or physical facilities, and inadequate provision of these facilities can create a deteriorating environment such as dilapidated buildings, peeling paint, crumbling plaster, broken furniture, and nonfunctioning learning facilities. This, of course, affects students learning achievement.

Achievement in trade subjects is symbolized by the score or grade on performance tests. According to Oyenuga (2019), achievement measures an individual's knowledge or skills in the given areas or subjects. Samuel and Kissi (2013) pointed out that students' achievement is dependent on several factors, including the instructional methods and learning environment. Arroyo says that continuous poor academic achievement most often reduces students' interest and can lead to poor knowledge retention in electrical installation and maintenance work. The National Board for Technical Education chief examiner's report for 2015, 2016, and 2017 shows an average percentage of failure (F9) as follows; Engineering at 47 percent, Construction trade at 58 percent, and Electrical trade at 69 percent. A close examination of this result shows that electrical trade has the highest rate of failure. Considering this poor achievement of students in electrical installation and maintenance work, one is bound to be worried. Teaching and learning in electrical installation and maintenance work may be enhanced by the adoption of teaching techniques rooted in the teacher's self-concept and self-belief and in tune increase academic achievement. Academic achievement has been described as a view of how well an individual has done his or her affective, cognitive, and psychomotor tasks (Okafor, 2016). Students' achievement in brick/block laying and concreting according to Chijioke and Tambari (2017) is the learning outcomes which include the knowledge, skills, and ideas acquired and retained through the course of studies within and outside the classroom situation. According to Faga (2011) noted that students' cognitive achievement is quantified by a measure of the student's technical abilities and those of other students of his or her age. Matar et al., (2018) described achievement as an active drive or motivates an individual for action. The question now becomes to what extent would student's performance be sustained when taught electrical installation and maintenance works using intelligent tutor learning techniques? Would students prefer being taught brick/block laying and concreting with intelligent tutor learning techniques? This gap in knowledge underscores the need to develop and validate an intelligent tutor learning software technique for students in brick/block laying and concreting programmes in Technical Colleges in Rivers State.

STATEMENT OF THE PROBLEM

If there is any field of human endeavors where technology changes rapidly, is the brick block laying and concreting works. Brick/block laying and concreting operations in the technical college curriculum involve the skills required in accomplishing given tasks in Mixing Mortars by hand, Moulding of Blocks, Laying Blocks, Rendering Walls, Wall Tiling, Pointing Top Walls, and Laying Curved Walls (Arches). It also involves the Workability Test on Concrete Slump Test), Placing of Concrete, Application of Admixture to Concrete, Compaction, Curing of Concrete, and Fixing of Concrete Joint Materials.

However, in Nigeria, Olaitan, (2016) opined that vocational technical training is classroom oriented. This assertion is supported by Tukur, Tahir, and Saidu (2018) that vocational training in Nigeria lacks practical orientations. Ezeani and Urama (2014) attributed the poor vocational technical training (including block laying and craft).

Technical college graduates have prospects of either being employed in the industries or setting up their own workshops and becoming self-employed. Better still, technical college graduates should have the opportunity to further their education in higher institutions.

Contrary to achieving the above goal, the majority of students have been completing brick/block laying and concreting programmes with very poor academic performance and inadequate skills which is incapable of earning them a living. In this regard, the employers of labor responded by non-demand of the graduates of technical colleges. This decline in students' performance has been associated with a number of factors, among which is the strategy employed in imparting knowledge to the learners (Akpan and Williams, 2014). The National Technical and Business Examination Board (NABTEB) (2018) chief examiner's report observed that the poor performance of the students in National Technical Certificate (NTC) examinations in recent years is partly due to the teaching techniques employed by the teachers. National Business and Technical Examination Board (NABTEB) (2004) chief examiners report revealed that candidates' performance in Brick/Block laying and concreting practical examinations was too low. This is affirmed by the preliminary study carried out by the researcher in Niger state. Similarly, NABTEB (2020) marking scheme on rating skills in Brick/Blocklaying and concreting practical examination clearly shows that some tasks are not included in the scheme which could affect student performance. Moreover, it has been discovered that the persistent poor academic performance of students in brick/block laying and concreting works and other technical subjects is a result of the inappropriate teaching techniques adopted by the teachers (Hamza, 2010).

This unsatisfactory situation could lead to a breakdown in the economy, industrial, technological, and educational growth of a nation since the main goal of technical education is to achieve self-reliance. The foregoing therefore underscores the need to explore other teaching approaches that would enhance and facilitate understanding and acquisition of knowledge of what is been taught in brick/block laying and concreting works.

PURPOSE OF THE STUDY

The general purpose of the study was to examine the effect of intelligent tutor learning software for teaching brick/block laying and concreting programmes in Technical Colleges in Delta State. Specifically, the study determined the following:

(1) Effect of intelligence tutor learning software on students' academic achievement in construction management in technical colleges in Delta State?
(2) Effect of intelligence tutor learning software on students' academic achievement in building drawing and design in technical colleges in Delta State?
(3) Effect of intelligence tutor learning software on students' academic achievement in bricklaying in technical colleges in Delta State?

RESEARCH QUESTIONS

The following research questions guided the study:

(1) What is the effect of intelligence tutor learning software on students' academic achievement in construction management in technical colleges in Delta State?
(2) What is the effect of intelligence tutor learning software on students' academic achievement in building drawing and design in technical colleges in Delta State?
(3) What is the effect of intelligence tutor learning software on students' academic achievement in bricklaying technical colleges in Delta State?

Hypotheses

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

HO_1 There is no significant difference between the mean scores of students taught construction management with intelligence tutor learning software and those taught with lecture methods in Technical Colleges in Delta State.

HO_2 There is no significant difference between the mean scores of students taught building drawing and design with intelligence tutor learning software and those taught with lecture method in Technical Colleges in Delta State.

HO_3 There is no significant difference between the mean scores of students taught bricklaying with intelligence tutor learning software and those taught with lecture method in Technical Colleges in Delta State.

METHODOLOGY

The design of this study is a quasi-experimental pre-test and post-test design with experimental and equivalent groups. A quasi-experimental research design involves the exposure of the experimental group to treatment but lacks the randomization of the research subjects into groups (Wodi, 2005).

The population for the study comprised 160 NTC II brick block laying and concreting students in the six Technical Colleges in Delta State selected for the study. The colleges were Technical College Sapele, Agbor, Kwale, Isselu-Uku, Ofagbe and Ogor. A purposive random sampling technique was used to select students in six colleges into control and experimental groups. Furthermore, the intact classes used indicated that the entire NTC II brick block laying and concreting students were used. The control group was taught with the lecture method while the experimental group was taught with intelligence tutor learning software.

The instrument, lesson plans, and the Table of Specification/Test Blue Print were subjected to face and content validation by two experts from the Department of Technical Education, Delta State University, Abraka. The researcher finally developed the modified instrument by integrating the comments, observations, suggestions, corrections, and advice that were given by the experts.

The instrument yielded a reliability index of .87. Data were collected through the use of pre-tests and post-tests for each topic in each week. The test was administered to the students by the Teachers in both groups. The test results were the data that the teachers submitted to the researcher for analysis. The instrument for data collection was brick block laying and concreting (BBLCT) which has five parts according to the topics outlined and was used for data collection. The test consists of 40 objective questions based on brick block laying and concreting curriculum content for NTC ll students. Each item has four alternative options. Every correct answer has one point while an incorrect answer has 0 points. The data for the research questions of this study were analyzed using mean and standard deviation. The hypotheses were tested at .05 level of significance using analysis of covariance (ANCOVA). The statistical package for social sciences (SPSS) was used for all data analysis in this study. With the calculated f-ratio being greater than the table or critical f-ratio, the null hypotheses were rejected. The values of the calculated f-ratio being less than the table f-ratio value, the null hypotheses were accepted. The value of f-ratio at .05 level of significance and above was accepted while the value of f-ratio less than .05 level of significance was rejected.

RESULTS

Research Question 1: What is the effect of intelligence tutor learning on students' academic achievement in construction management in technical colleges in Delta State?

TABLE 1: Mean showing the Effect of Intelligence Tutor Learning Technique on Students' Academic Achievement Construction Management.

Group	School	N	Pre-test		Post-test		Mean Gain	Mean Diff
			$\bar{x}$	SD	$\bar{x}$	SD		
Experimental Group	GTC Ahoada	54	18.413	6.8503	48.522	18.5220	30.109	21.894
Control Group	GTC PH	66	17.969	6.7296	26.184	16.6401	8.215	

Source: Field Survey, (2022).

Table 2 shows the pre-test and post-test mean scores of students' performances in construction management for both experimental and control groups. The result shows that the students in the experimental group had a pre-test mean score of 18.41 with a standard deviation of 6.85 and a post-test mean score of 48.52 with an SD of 18.52. The difference between the pre-test and post-test mean for the experimental group was 30.10, while the control group had a pre-test mean score of 17.96 with a standard deviation of 6.72 and a post-test mean score of 26.18 and SD of 16.64. This shows that the mean score for the experimental group is higher than the control group, indicating that those taught with the intelligence tutor learning technique performed better in construction management than those taught with the lecture method in technical colleges in Rivers State.

Research Question 2: What is the effect of intelligence tutor learning software on students' academic achievement in building drawing and design in technical colleges in Delta State?

TABLE 2: Mean Showing the Effect of Intelligence Tutor Learning Technique on Students' Academic Achievement in Building Drawing and Design.

Group	School	N	Pre-test		Post-test		Mean Gain	Mean Diff
			$\bar{x}$	SD	$\bar{x}$	SD		
Experimental Group	GTC Ahoada	54	18.435	6.5168	50.185	17.8707	31.75	29.842
Control Group	GTC PH	66	18.439	6.6396	20.347	12.5559	1.908	

Source: Field Survey, (2022).

Table 2 shows the pre-test and post-test mean scores of students' performances in building drawing and design for both experimental and control groups. The result shows that the students in the experimental group had a pre-test mean score of 18.43 with a standard deviation of 6.51 and a post-test mean score of 50.18 with a SD of 17.87. The difference between the pre-test and post-test mean for the experimental group was 31.75, while the control group had a pre-test mean score of 18.43 with a standard deviation of 6.63 and a post-test mean score of 20.34 and SD of 12.55. This shows that the mean score for the experimental group is higher than the control group, indicating that those taught with the intelligence tutor learning software performed better in building drawing and design than those taught with lecture methods in technical colleges in Rivers State.

Research Question 3: What is the effect of intelligence tutor learning software on students' academic achievement in bricklaying technical colleges in Delta State?

Table 3: Mean Showing the Effect of Intelligence Tutor Learning Technique on Students' Academic Achievement in Bricklaying Rivers State Technical Colleges.

Group	School	N	Pre-test		Post-test		Mean Gain	Mean Diff
			$\bar{x}$	SD	$\bar{x}$	SD		
Experimental Group	GTC Ahoada	54	19.163	6.9016	51.076	17.2959	31.913	29.842
Control Group	GTC PH	66	20.806	7.0194	26.143	15.9535	5.337	

Source: Field Survey, (2022).

Table 3 shows the pre-test and post-test mean scores of students' performances in bricklaying for both experimental and control groups. The result shows that the students in the experimental group had a pre-test mean score of 19.16 with a standard deviation of 6.90 and a post-test mean score of 51.07 with a SD of 17.29. The difference between the pre-test and post-test mean for the experimental group was 31.91, while the control group had a pre-test mean score of 20.80 with a standard deviation of 7.01 and a post-test mean score of 26.14 and SD of 15.95. This shows that the mean score for the experimental group is higher than the control group, indicating that those taught with the intelligence tutor learning software performed better in bricklaying than those taught with lecture methods in technical colleges in Rivers State.

Hypotheses

HO_1: There is no significant difference between the mean scores of students taught construction management with intelligence tutor learning software and those taught with lecture methods in Technical Colleges in Delta State.

TABLE 4: ANCOVA Analysis on Effect of Intelligence Tutor Learning Technique on Students' Academic Achievement in Construction Management.

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	13432.415[a]	2	6716.208	27.969	.000
Intercept	14287.929	1	14287.929	59.500	.000
PRETEST	13173.013	1	13173.013	54.857	.000
EFFECT	152.047	1	152.047	.633	.027
Error	44904.637	116	383.7949		
Total	483706.000	120			
Corrected Total	58337.053	119			

a. R Squared = .230 (Adjusted R Squared = .222)

The analysis of covariance of students' performance scores presented in Table 4 showed that f-calculated for teaching methods in the two groups is 0.633 at 0.027 significant level. Since the p-value (0.027) is less than 0.05 level of significance (P (0.027) <0.05), it therefore implies that the null hypothesis is rejected. Thus, there is no significant difference in the mean scores of students taught construction management using intelligence tutor learning software and lecture teaching methods in technical colleges Delta State.

HO_2: There is no significant difference between the mean scores of students taught building drawing and design with intelligence tutor learning software and those taught with lecture method in Technical Colleges in Delta State.

TABLE 5: ANCOVA Analysis on Effect of Intelligence Tutor Learning Technique on Students' Academic Achievement in Building and Design**.**

Tests of Between-Subjects Effects

Dependent Variable: Post-test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6446.395[a]	2	3223.198	15.448	.000
Intercept	22934.156	1	22934.156	109.915	.000
PRETTEST	5335.779	1	5335.779	25.572	.000
INTEREST	1112.101	1	1112.101	5.330	.022
Error	39018.283	116	336.365		
Total	477579.000	120			
Corrected Total	45464.679	119			

a. R Squared = .142 (Adjusted R Squared = .133)

The analysis of covariance analysis of students' performance scores presented in Table 5 showed that the f-calculated for teaching methods in the two groups is 5.33 at 0.022 significant level. Since the p-value (0.022) is less than 0.05 level of significance (P (0.022) <0.05), the null hypothesis is therefore rejected. Thus, there is a significant difference in the mean scores of students taught building drawing and design using intelligence tutor learning technique and lecture teaching method in technical colleges in Delta State.

HO_3: There is no significant difference between the mean scores of students taught bricklaying with intelligence tutor learning software and those taught with lecture method in Technical Colleges in Delta State.

TABLE 6: ANCOVA on Effect of Intelligence Tutor Learning Technique on Students' Academic Achievement in Bricklaying.

Tests of between-subjects Effects

Dependent Variable: Post-test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	16343.638[a]	2	8171.819	41.614	.000
Intercept	10599.142	1	10599.142	53.975	.000
PRETTEST	15188.794	1	15188.794	77.347	.000
EFFECT	2328.704	1	2328.704	11.859	.001
Error	36721.673	116	316.566		
Total	500575.000	120			
Corrected Total	53065.311	119			

a. R Squared = .308 (Adjusted R Squared = .301)

The analysis of covariance of students' performance scores presented in Table 6 showed that the f-calculated for teaching methods in the two groups is 11.85 at 0.001 significant level. Since the p-value (0.001) is less than 0.05 level of significance (P (0.001) <0.05), the null hypothesis is therefore rejected. Thus, this implies that there is a significant difference in the mean scores of students taught bricklaying using intelligence tutor learning software and lecture teaching methods in technical colleges in Delta State.

DISCUSSION OF FINDINGS

Firstly, the finding of the study shows that the mean score for the experimental group is higher than the control group, indicating that those taught construction management with the intelligence tutor learning performed better than those who were taught using the lecture method in technical colleges in Delta State. The analysis of covariance showed that the difference in the performance of the experimental and control groups in construction management is significant. Therefore, the null hypothesis was rejected. The finding is in line with Dania, Kehinde, and Bala (2017) who carried out a study on the Differential Efficacy of an Intelligent Tutoring System for University Students: A Case Study with Learning Disabilities. They found that Results show that as a consequence of the training, the students who were taught using the intelligent tutor technique applied more self-regulation strategies than those taught with conventional mean (lecture), not only as a response to a system prompt but also self-initiated. Also Supporting this, Dania et al (2017)'s results show that when students with learning difficulties have tools that facilitate applying self-regulated learning strategies, they do so even more than students without learning difficulties.

Secondly, the finding of the study shows that there is a significant difference between the mean scores of students taught building drawing and design using intelligence tutor software and those who were taught with lecture methods in Technical Colleges in Delta State. The finding agrees with Brandenburg, Govindan, Sarkis, and Seuring (2014) who developed and validated the electric machine winding intelligent tutor (EMWIT) and found that all the features of the tutor were rated high by the electrical teachers and lecturers in enabling the user to acquire mastery on the winding of an electric motor. They also found that intelligent tutor teaching technique helps in the development of students' cognitive, psychomotor, and affective domains of knowledge. Geral (2013) viewed computer-aided teaching technique as a means that teachers design situations so that pupils are caused to employ procedures research scientists used to recognize problems, ask questions, apply investigational procedures, and provide consistent descriptions, predictions, and explanations that are compatible with the shared experience of the Building Technology world.

Thirdly, the finding of the study shows that there is a significant difference between the mean scores of students taught bricklaying using intelligence tutor learning software and those taught with lecture methods in technical colleges in Delta State. The finding is in accordance with Beamon (2008) who carried out a study on Intelligent Tutoring Systems and Learning Outcomes: A Meta-Analysis.

The result revealed that the use of ITS was associated with greater achievement in comparison with teacher-led, large-group instruction, non-ITS computer-based instruction, and textbooks or workbooks. An aspect of the result is contrary to the findings of the present study, which stated that there was no significant difference between learning from Intelligent Tutor Software and learning from individualized human tutoring or small-group instruction. Also, in line with this finding, Gilchrist (2013) asserted that organizing learning using experimental teaching techniques would enable teachers and students to integrate knowledge across disciplines through the cultivation of disciplined habits of mind. Gilchrist (2013) was certainly ahead of his time, and traces of his extensions exist today in our need to reaffirm a place for inquiry within our learning system. Beamon (2008) claimed that ITS are relatively effective tool for learning is consistent with the analysis of potential publication bias.

CONCLUSION

Based on the research carried out, on the effect of intelligent tutor learning technique on student academic achievement in brick/block laying and concreting programme in technical colleges in Delta State, it was concluded that teaching brick/block laying and concreting programme using intelligence tutor learning technique has a significant effect on the academic achievement of student compared to the conventional method of teaching. Also, it is expected that building teachers in Technical colleges may now be able to use the objective, comprehensive, and systematic instrument to effectively assess students' performance in practical works as stated in the NBTE curriculum. In so doing, the teachers will be able to show proof of the scores and grades that they award.

RECOMMENDATIONS

Based on the findings of the researcher, the following recommendations were made:

(1) The use of the intelligence tutor learning software should be encouraged as this would help students to study at their own pace in Technical Colleges in Delta State.

(2) Philanthropists and stakeholders in technical colleges should create good content of intelligence learning software for students in brick/block laying and concreting programmes in Technical Colleges in Delta State. This could train the students on the current skills required in the industry

(3) Delta State Government should provide adequate provision of facilities for intelligence tutor learning software for students in brick/block laying and concreting programmes in Technical Colleges

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