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Effect of Computer Assisted Instructions on Students' Achievement in Damp Proofing Course Skills in Polytechnics in Anambra State

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ABSTRACT

The aim of the study is to explore the effect of computer assisted instructions on students' acquisition of damp-proof course skills in Polytechnics in Anambra State. Specifically, the study determined the effect of computer assisted instructions on students' acquisition of damp-proof course skills in building construction in Polytechnics in Anambra State. One objective, one research question and one hypothesis guided the study. The design of this study is a quasi-experimental design. The population for the study comprised 160 Ordinary Diploma Level II Building Technology students in the two Polytechnic in Anambra State which include: Federal Polytechnic, Oko and Anambra State Polytechnic, Mgbakwu. 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 .76. The data for the research question of this study was analyzed using mean and standard deviation. The hypothesis was tested at .05 level of significance using analysis of covariance (ANCOVA). The findings of the study revealed that students taught damp proof course skills using computer-assisted instruction (experimental group) had a higher achievement mean score when compared with those taught with chart/board (control group). The following recommendations were made based on the findings of the study: Computer assisted instructions should be adopted by curriculum designers and teachers as one of the participatory methods of teaching and learning of building technology in the Polytechnics. Lecturers should be trained and retrained by the government on how to use computer assisted instructions in order to improve students' academic achievements.

KEYWORDS

Computer-assisted instructions; building technology skills; damp proof course; polytechnics

INTRODUCTION

Education is a process of training designed to give knowledge, develop skills and abilities that could lead to the development of mental alertness and the right attitude to life. This implies that if education is adequately inculcated in human-kind, individuals would meaningfully help themselves and positively contribute to the growth and welfare of their immediate community. In essence, education remains the single factor that guarantees both individual growth and community development. Thus, if an individual acquires skills and the right attitude, and realistically apply the skills and right attitude for the benefit of his society, it means that education has helped to change (transform) the individual for better and pragmatically too. Technical education is saddled with this type of education (Akinyele and Bolarinwa, 2018).

Technical and Vocational Education Training (TVET) has a long history as various definitions/description have been given to TVET (Booker 2012). Dewi and Sudira (2018) defined vocational education as a practical programme given to learners of specific occupational skills for entry-level jobs in a trade or vocation. Hussaini and Jumba (2018) opined that

TVET gives the learners proficiency in manual skills; the design of the program is in such a way to meet the specific needs of the individual and the society at large. According to Carmen (2013), technical education should offer post-secondary skills training which should meet the needs of markets or of citizens and to fulfill stakeholders' expectations. TVET has evolved over the years. In Nigeria, its operation began with training youths in traditional vocation such as weaving, pottery, mat making and wood carving by parents, family and relatives who were skilled in these vocations (McGrath, 2014). The system changed with the intervention of the colonial masters as formal vocational schools for interested learners of particular trades were set up. The National Board for Technical Education (NBTE) was established in 1985 by the Federal Government of Nigeria, saddled with the responsibility of quality assessment and program accreditations at polytechnics, professional institutions, technical colleges, and training centres to set guidelines and standards for admissions to the different programs in each institution. In 1992, the National Business and Technical Examinations Board (NABTEB) was established and charged with the conduct of technical and business examinations, initially conducted by the Royal Society of Arts (RSA), City and Guilds of London Institute (CGLI), and the West African Examinations Council (WAEC) (Nwogu & Nwanoruo, 2011).

The basic goal of TVET is to provide employability and workplace skills to prepare trainees for occupations above skilled craft but below the scientific, engineering or technical professionals (Odu, 2011). TVET therefore provides basic skills for trainees, prepare trainees for basic technical occupational requirements and also prepare graduates for continuing education. It is expected that TVET graduates will add to the economic and industrial growth of the nations through the technical knowledge and vocational skills necessary for agricultural, commercial and economic development gained from the training received through TVET. In Nigeria, the institutions responsible for these training include technical colleges, colleges of education, universities and polytechnics.

The polytechnic education in Nigeria as in other parts of the world is established with a view to imparting relevant and necessary work skills in prospective students. Every course of study in Nigeria polytechnics has potential for entrepreneurship. Polytechnic education in Nigeria as in other parts of the world was established for training; equipping and deploying students who are productive, purposeful, strategic, enterprising and self-reliant enough to add value to the society with or without a white-collar job after graduation (Mogaji, 2019). Polytechnics offer vocational and technical education as enshrined in the National Policy on Education with the objectives to give training and impart the necessary skills for the production of skilled personnel who shall be enterprising and self-reliant (NBTE, 2006). Therefore, every course of study in Nigerian polytechnics has potential for entrepreneurship and employability. It is, however, regrettable that most Nigerian polytechnic graduates lack entrepreneurial and employability skills which could make them to be self-reliant after graduation (Amaniampong, 2014). Among the courses offered in Polytechnics includes building technology.

The Nigerian polytechnics programme in building technology develops middle level technical manpower mostly for the construction industry. As a consequence, with such a critical responsibility in the construction sector of the economy, the building technology curricula ought to mirror the requirements of the construction industry (Ojimba, 2012). The learner is therefore, the central figure in the curriculum implementation process and implementation takes place as the learner acquires the planned or intended experiences, knowledge, skills, ideas and attitudes that are aimed at enabling the same learner function effectively in a society. The curriculum of a subject with practical content is generally organized into an average of 67% for the theoretical classes and 33% for workshop (Samphina Academy 2020). The Higher National Diploma course in Building Technology is designed to develop diplomats for an active role in the building industry with emphasis on building production (NBTE, 2001).

On completion of all prescribed courses, the diplomat is expected to be able to: Supervise and manage efficiently the construction of buildings of all sizes from setting out to completion. understand and interpret all kinds of project drawings - architectural, structural, services to be able to implement them on site, design and prepare working structural drawings for medium size building structures, prepare realistic estimates in terms of cost, materials and labour for all building works including maintenance works, appreciate and determine quality of materials to be used for construction through appropriate tests in line with relevant codes of practice, carry out surveys of various kinds on existing buildings and prepare a schedule of dilapidation and repairs, finally, prepare a cost effective post-tender report for all sizes of buildings contracts for competitive building (NBTE, 2001).

The curriculum of the Building Technology programme in an attempt to give it a broad base has been designed to cover four components as stated in (NBTE, 2001): 1. General Studies - meant to give the students general knowledge of himself and the society. This includes courses in Art and Humanities that account for not more than 15% of the total contact hours of the programme. 2. Foundation Courses - meant to give students background knowledge that is applied in professional courses in the programme to aid easy understanding. Courses will include Mathematics, Principles of Architecture and Management, Law among others they will not account for more than 15% of the total works covered in the syllabus. 3. Professional Courses - that give the student the theory and practical skills needed to practice.

These include: Estimating, Price Analysis, Construction Technology and Structures etc. 4. Construction Technology and Structures include skills such as masonry wall construction, staircases, concreting, roofs, fenestration, floors, ceilings and damp proofing skills.

Damp proofing skills are skills a damp proofer acquires to be able to successfully lay the damp proof course and membrane in order to protect walls and other properties against moisture penetration (Richardson & Starling Damp Specialist 2022). There are different types of damp proof course namely; the damp proof course injection (involves a cream of liquid being injected into the wall in order to act as a water repelling layer), mortar injection damp proof course (use of a chemical enhanced mortar is caulked into the holes drilled in the wall – this used where the construction of the wall may be of random rubble and are more prone to having voids within the structure) and electro osmotic damp proof course (this is used when chemical injection is not needed, this is made of copper and titanium wiring, used to install a small electric charge into the wall which reverses the polarity of the capillarity in the wall and pulls the rising damp below the level of the new damp course. In addition to the skill to carry out these damp proofing functions, the damp proofer must be able to identify the cause of damp problem which are as follows; defective roof coverings or rain water gutters or down pipes, defective external render or masonry, condensation issues, defective cavity wall insulation, inadequate window and door pointing, defective damp proof course, plumbing leaks, defective drains and external flooding. Then, in order to keep your damp proofing membrane highly effective, always be sure to seal all penetration prior to using a liquid damp proofing membrane, both damp proofing and water proofing require same care in preparing the surfaces, the preparations according to Polyguard (2021), requires that the surfaces be cleaned, dried and the material must be applied in the correct temperature range for that product. The different methods are, roll-on, spray-on, sheeting, flashing, rods and combination of materials.

Several types of materials are used for damp proofing course, they are graded into three according to Gopal (2016), and the groupings are: 1. Flexible materials: this involves materials like bitumen felts (which may be hessian based or fiber/glass fiber-based), plastic sheeting (polythene sheets) and so on, 2. Semi-rigid materials like mastics, asphalt, or combination of materials or layers, 3. Rigid materials: materials like first-class bricks, stones, slate, cement concrete and so on. Gopal went further to opine that an effective damp roof material must possess the following properties as, it must be impervious, it should be strong and durable and should be capable of withstanding both dead and live loads without damage, it should be dimensionally stable, and it should be free from deliquescent salts like sulfates, chlorides and nitrates. Furthermore, he listed the pattern of laying damp proof course/membrane as DPC above ground level, DPC materials for floors, and roofs. DPC materials for situations where differential thermal movements occur, DPC material for cavity walls. General principles to be observed in carrying out damp proof course are enumerated as;

(1) The DPC should cover the full thickness of the walls, excluding rendering.
(2) The mortar bed upon which the DPC is to be laid should be made level, even and free from projections as uneven base is likely to cause damage to DPC.
(3) When horizontal DPC is to be continued up a vertical face, a cement concrete fillet 75mm in radius should be provided at the junction before the treatment.
(4) Each DPC should be placed in correct relation to other DPC to ensure a complete and continuous barrier to the passage of water from floors, walls or roof.
(5) The acquisition of this skill may not be effective and functional without the use of computer assisted instructional method.

The term 'computer-assisted instruction' or 'computer-aided instruction' (CAI) refers to the use of computer software to deliver instruction. Initially, CAI was used to describe systems that consist of discrete hardware and software, which were targeted to different teaching methodologies, and focused upon a curriculum core; reading, language arts, and mathematics (Atta, 2015). The current use of CAI embraces a range of instructional solutions, ranging from courseware applications to web-based learning systems (Al-Bataineh and Brooks, 2003). Computer-based training, computer-assisted learning, web-based instruction, and web-based training are some of the terminologies that are used interchangeably with CAI. While the various types of CIA include: drill and practice which fit the behaviourist model with repeated practice on lower level cognitive skills (Fuchs and Woessmann, 2004). Although learning by repetition is frowned at, drill and practice methods help students' master skills, concepts, and principles (Hakksrinen, 2001).

The tutorial activity includes the presentation of multimedia information, such as text, audio, video, and audio-visual. Such information is presented in a unit by unit format that is followed by questions. The students' responses to questions are then analysed by a computer software and appropriate feedback is given. The application of typical elements of game playing which encourages point scoring, competition with others, rules of play and so on, is referred to Gamification. Gamification according to Julius 2018 and Laborde 2002 is the use of game design elements characteristic for games (rather than play or playfulness) in non-game contexts, thus, gamification endeavours to tap into the motivational power of games and apply it to real-world situations and problems. Game mode or gamification creates a contest between two or more individuals or an individual versus a computer robot. Some of the common game

design principles are those of visible status, social engagement, goals and challenges, customisation, access to unlock content, freedom of choice, freedom to fail, and rapid feedback (Mahmood & Bokhari, 2012).

STATEMENT OF THE PROBLEM

The mission of the polytechnic education in Nigeria is teaching, research and public service for the production of quality graduates, innovative information and improvement in technology and the educational objectives are conceived in the effort by individual institutions to produce proficient higher and lower technicians that will occupy the middle level manpower cadre. Building technology programme offered in Nigerian polytechnics are accredited by the National Board for Technical Education (NBTE), leading to the award of National Diploma (ND) and Higher National Diploma (HND) certificates in Building technology. The National Diploma programme in Building Technology is aimed at producing technicians that are capable of performing basic functions in Building Technology practice both in private and public sector. Instead of being gainfully employed as was the purpose of the study, graduates of polytechnic are found everywhere loitering about for a white-collar jobs and some of them are seen trying to convert to educational sector by converting their HND degrees to B.Sc. and B.Ed. This means that they cannot be gainfully employed by the industries and cannot also be self-employed. The researcher, wondering what could be the reason for this lack of employment after graduation from a vocational and technical inclined institution like the polytechnic, tried gathering data on the performance of the students of building technology department in the two polytechnics, the results gathered from semester results of students from2019 to 2021, showed there was gross poor performance of the students. To confirm this, the researcher saw reports from the NBTE (2021) which revealed that the poor achievement of students from the Polytechnics could be as a result of the teaching techniques and methods adopted by the Lecturers. The question now is: would computer assisted instructions enhance students' achievement in Building Technology? To proffer answer to the above question gave rise to the study; effect of computer assisted instructions on students' achievement in building technology skills in Polytechnics in Anambra State.

AIM AND OBJECTIVES OF THE STUDY

The aim of the study is to explore the effect of computer assisted instructions on students' achievement building technology skills in Polytechnics in Anam State. Specifically, the study determined the effect of computer assisted instructions on students' achievement in damp proof course skills.

Research Question

One research question guided the study

(1) What is the effect of computer assisted instructions on students' achievement in damp proof course skills in Polytechnics in Anambra State?

Hypotheses

One null hypothesis was formulated and tested at .05 level of significance

(1) There is no significant difference between the mean scores of students taught damp proof course skills using computer assisted instructions and those taught using chart/board instruction in Polytechnics in Anambra State.

METHODOLOGY

The design of this study is a quasi-experimental design with experimental and non-equivalent groups. The intact classes were maintained in order not to truncate the school's time table for lessons, and the two classes were assigned to experimental and control groups. The population for the study is comprised of 160 Ordinary Diploma Level II Building Technology students in the two Polytechnic in Anambra State; which are Federal Polytechnic, Oko and Anambra State Polytechnic, Mgbakwu The census type of sampling and purposive sampling technique was used as all the 160 students who offer building technology were sampled due to the manageable size of the population.

The instrument, lesson plans and the Table of specification/Test Blue Print were subjected to face and content validity by two experts who were selected from technical department, building technology option in Federal Polytechnic, Oko. The instrument used for data collection is the Achievement Test on Damp Proofing Skills in Building Technology (ATDPSBT). The researcher also prepared two lesson plans (one for the experimental with the use of computer aided instruction and another for the control group to be taught with the chart) to guide the development of the test item. The researcher employed the help of the course lecturer in administering the instrument in an intact class to avoid bias, all 160 instruments were administered and retrieved without loss. The test scores of the instrument were obtained from the pre-test and post-test and computed using Kuder Richardson formula 20 (KR-20) which yielded a reliability index of .76, showing that the instrument was reliable. The test consists of 40 objective questions based on Polytechnic building technology curriculum content for OND ll students on damp proofing skills. Each item has four alternative options. Every correct answer has one point while an incorrect answer has 0 point.

The data derived for the research question of this study were analyzed using mean and standard deviation. The hypothesis was 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 hypothesis was rejected otherwise accept.

RESULTS AND ANALYSIS

Research Question 1: What is the effect of computer assisted instructions on students' achievement in damp proof course skills amongst building technology students in Polytechnics in Anambra State?

Table 1: Pretest and posttest mean score on the effect of computer assisted instructions on acquisition of damp proofing course skills amongst building technology students in polytechnics.

Groups	N	Pretest		Posttest		Mean difference	Mean gain
		Mean	SD	Mean	SD		
Experimental group	65	15 .35	10.72	58.62	7.32	43.27	15.91
Control group	95	15 .70	10.01	43.06	7.42	27.36	

The table above shows the that the pretest mean score of the experimental group is 15.35 with a standard deviation of 10.72 while the calculated pretest means and standard deviation scores for the control group are 15.70 and 10.01. This means that the two groups are in the same achievement baseline before treatment. However, after the instructional treatment, the mean and standard deviation values for experimental group are 58.62 and 7.3; while that of the control group are 43.06 with a standard deviation of 7.42. The experimental group taught damp proof course skills using computer assisted instructions had mean gain score of 15.5 against the conventional group. This means computer assisted instructions is superior over chart/board instruction in students' academic achievement in damp proofing skills.

H_{01} There is no significant difference between the mean scores of students taught damp proof course skills using computer assisted instructions and those taught using chart/board instruction in Polytechnics in Anambra State.

Table 2: Analyses of covariance (ANCOVA) of students' achievement in damp proofing skills.

Tests of Between-Subjects Effects.

Dependent Variable: posttest

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	17153.424[a]	2	8576.712	157.545	.000
Intercept	226659.014	1	226659.014	4163.476	.000
Prestest	3.441	1	3.441	.063	.802
Method	17153.278	1	17153.278	315.087	.000
Error	15460.917	158	54.440		
Total	800675.000	160			
Corrected Total	32614.341	159			

a. R Squared = .526 (Adjusted R Squared = .523)

As shown in Table 2 above, the calculated value of F (315.087) with associated probability value (P= 0.000). The associated probability value was less than .05 level of significance (P<0.05) set by the researcher; therefore the null hypothesis was rejected in favour of the alternative hypothesis that states that there is a significant difference between the mean scores of students taught damp proof course skills using computer assisted instructions and those taught using chart/board instruction in Polytechnics in Anambra State.

DISCUSSION OF FINDINGS

The findings of the study revealed that the experimental group had a higher achievement mean score when compared with the control group. The group taught damp proofing course skills using computer assisted instructions had mean gain score against the chart/board instruction group.

This means computer assisted instructions is superior over chart/board instruction in students' academic achievement in damp proof skills. This is in consonance with the findings of Adoke (2015) who also discovered simulation method is more effective than the lecture method in their subject area.

CONCLUSION

Based on the findings of this study, it was concluded that the computer assisted instructions is more effective in teaching damp proof course skills when compared to the chart/board.

RECOMMENDATIONS

The following recommendations are made based on the findings of the study

i. Computer assisted instructions should be adopted by curriculum designers and teachers as one of the participatory methods of teaching and learning of building technology in the Polytechnics.
ii. Lecturers should be trained and retrained by the government on how to use computer assisted instructions in order to improve students' academic achievement
iii. State and Federal governments should fund seminars and workshops on the use of computer assisted instructions.

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