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# TABLE OF CONTENTS

From the Editor’s Desk ........................................................................................................ 5

Comparative Effects of Computer Tutorial and Computer Simulation on Achievement and Retention of Motor Vehicle Mechanics Work Students ............................................................... 6

The Level of Reflective Practice of the Faculty Members A Field Study in Sharjah University .................. 20

Impact of Organisational Culture and Leadership on Employee Engagement in Libyan Banking Sector ...... 34

Investigation into the Problem of Insurgency and Primary School Education in Nigeria; Imo State Perspective .. 46

Fostering Vocal Instruction and Personalized Coaching Using Voice Authoring Components in Virtual rooms .52

Assessment of The Basic Teachers’ Competency in Implementing the New Basic Science and Technology (BST) Curriculum ........................................................................................................ 67

ICT preparedness and competence among Teacher Trainee Students between Botswana and Nigeria: Implications for global curriculum practices ................................................................. 80

Students’ Entry Qualification, UTME Scores and Academic Performance in Colleges of Education in Lagos State, Nigeria ........................................................................................................ 91

Incorporating Principles of Good Teaching Practice and Mobile Technologies to Enhance the Learning Experience of Students - a South African Perspective ....................................................... 102

Opinions towards CBCS Syllabus of Gujarat University ................................................................. 116

Parental Attitude towards the Inclusion of Sexuality Education in School Curriculum in Rivers State, NIGERIA. 127

The Economic Analysis of Tourism before and after conflict: A Case study of District Swat .................. 137

The Taliban and Girls Education in Swat. (A case study of district Swat) ....................................... 147

Submission Guide .............................................................................................................. 171

Review Process ................................................................................................................. 173
Dear Colleagues:

Welcome to the second issue of the Global Journal of Education. This Journal was created and designed by the Department of Education, University of Riverside. This issue contains professional papers as they relate to global issues in education. Several papers in this issue of the Journal were presented at the University of Riverside Education Conferences held in 2015. You will find that these papers are informative and very helpful to further understand global education issues. We are proud of the contributions made by our authors. All of them are well known both nationally and internationally in their field of expertise.

Dr. Sakariayah A Adebayo, & J. A. Jimoh, discuss the comparative effects of computer tutorial and computer simulation on achievement and retention of motor vehicle mechanics work students.

Dr. Ahmed Hussein AlSagheer explains the level of reflective practice of the faculty members in a field study in Sharjah University.

Dr. Mohammed Eseleni, Patrick Mclaughlin, Ahmed Al Ashaab, & Hamad Rashid present a case study on the impact of organisational culture and leadership on employee engagement in Libyan Banking Sector

Dr. Ike Eucharia discusses the importance of the investigation into the problem of Insurgency and Primary School Education in Nigeria; Ima State Perspective.

Dr. Martha Mendez provides an analysis of fostering vocal instruction and personalized coaching using voice authoring components in virtual rooms

Dr., Elizabeth. D. Offor provides a systematic assessment of the basic teachers’ competency in implementing the new basic Science and Technology (BST) Curriculum.

Dr., Edna N. Ogwu, Justina U. Eze, , Omobola Adedoyin, &, Francis J Ogwu discuss in detail a study on the ICT preparedness and competence among Teacher Trainee Students between Botswana and Nigeria: implications for global curriculum practices.

Dr. Peleyeju J. Olusegun, & Sheyin, O. Adejoke present a study on students’ entry qualification, UTME Scores and Academic Performance in colleges of education in Lagos State, Nigeria.

Dr. Marita Oosthuizen, & Johan Jurrius present a study on incorporating principles of good teaching practice and mobile technologies to enhance the learning experience of students from a South African Perspective

Dr. G.S Patel presents a study on opinions towards CBCS Syllabus of Gujarat University.

Dr. Chineolo J. Ugwu explores the parental attitude towards the inclusion of sexuality education in school curriculum in Rivers State, Nigeria.

Dr., Shahwali Ullah presents an economic analysis of tourism before and after conflict: a case study of District Swat. In addition to his previous analysis presented, Dr. Shahwali also presents an investigation on the Taliban and girls’ education in SWAT; a case study of district Swat.

I would like to extend my sincere thanks to our authors for their contribution towards a successful publication of this high quality journal.

Raj K. Singh, Ph.D.
Editor-in-Chief
COMPARATIVE EFFECTS OF COMPUTER TUTORIAL AND COMPUTER SIMULATION ON ACHIEVEMENT AND RETENTION OF MOTOR VEHICLE MECHANICS WORK STUDENTS

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Abstract

This study investigated comparative effects of computer tutorial and computer simulation on achievement and retention of motor vehicle mechanics work students. The study was a pretest, posttest, non-equivalent control group quasi-experiment which involved groups of students in their intact classes randomly assigned to two treatment groups. One group assigned to computer simulation and the other assigned to computer tutorial. Two research questions and three hypotheses, tested at 0.05 level of significance guided the study. The sample size was 136 students from which 71 students constituted the treatment group taught using computer simulation, and 65 students constituted the treatment group taught with computer tutorial. The instrument used for data collection was Automechanics Achievement test. The data collected were analyzed using Mean, to answer the two research questions while t-test and ANCOVA were used to test the three hypotheses. The study found students taught motor vehicle mechanics work using with computer simulation had a higher mean achievement score, than those taught with computer tutorial. The mean difference was found significant. The study also found a significant difference between retention mean scores of students taught motor vehicle mechanics work with computer simulation technique and those taught with computer tutorial technique in favour of computer simulation group. These results showed that computer simulation is a more viable teaching method than the computer tutorial for teaching motor vehicle mechanics work to technical colleges’ students. It is therefore recommended among others that technical teachers should place emphasis on the use of computer simulation to teach motor vehicle mechanics work.

Keywords: Computer Simulation; Computer Tutorial; Achievement; Retention of Learning; Motor Vehicle Mechanics Work;

Introduction

Technological developments have resulted in a big gap between teaching methods at schools and the ways students are getting information in society in the last quarter of 20th century. Capri, Ozseevgec, Sayilkam & Emre (2004) noted that nowadays most students get information via visual content sources like computer. This situation has made it difficult to teach students by traditional means. Hence, the usage of computers in the classrooms is one of the popular topics today and the ratio of the usage of Computer Assisted Instruction (CAI) has been rising. Some of the CAI methods include; problem solving, drill and practice, games, tutorial and simulation. However, Bayraktar (2002) noted that computers were more effective when used in tutorial and simulation modes.

Computer tutorial provides information, generally new information, to the students in much the same manner as a human teacher or tutor might. Schibeci (1997) described computer tutorial as similar to that of
teacher or text book in explaining information or concepts to learners. It carries the full burden of instruction. As a result, computer tutorials typically use text and graphics to present contents. Embedded questions and review activities are used to assess the ability of the students in acquiring the contents. Computer tutorial also utilizes branching programmed instruction, hypertext, photos and sounds (Edward, Norton, Tailor, Waiss & Dusseldorp, 1997). Tutorial usage with branching programmed instruction helps students develop problem-solving skills, motivate students and provide interactive feedback, (Vockell & Schwartz, 2005), which improve students’ interest, achievement and retention of learning. According to Mann (1995) educators who adopted the tutor mode of computer operation recommended that computer tutorial be designed to teach all manner of knowledge and skills to a wide range of students.

Besides the use of computer tutorial for improving students’ interaction with the learning environment, another way of enhancing learning is to help students create models of dynamic systems by combining words with animation (Schnotz & Bannert, 2003). This approach has assisted in the development of a special type of interactive animation: computer simulations (Nerdel & Prechtl, 2004). Computer simulation is a simplified imitation of real or in some cases imaginary system or phenomena which allows students to interact with phenomena (Alessi & Trollip, 2001). Computer simulation instructional delivery can be both visual in the form of animated visuals and audio inclusive in presentation. Presentation is done in a more direct real life situation, all intricacies involved in an activity is visually and audio critically presented. Interactive learning by using computer simulations for abstract topics, where students become active in their learning provides opportunities for students to construct and understand difficult concepts (Orora, Keraro & Wachanga, 2014).

Students’ achievement connotes performance in school subject as symbolized by a score or mark on an achievement test. Achievement of a student is defined as the learning outcomes of the student which include the knowledge, skills and ideas acquired and retained through his course of study within and outside the classroom situations. It is quantified by a measure of the student's academic standing in relation to those of other students of his age (Anene, 2005). Students’ achievement is dependent upon several factors among which are instructional methods and learning environment (Atherson, 2003). Students learn best when they are interested, involved and appropriately challenged by their work. Teachers with good instructional methods challenge students to work at higher intellectual level which helps to increase achievement scores, improves transfer and retention of learning.

Retention of learning is the repeat performance by a learner of the behaviour earlier acquired, elicited after an interval of time (Momoh Otte, 1997). When students are actively engaged in their learning, they have a longer concentration span; complete work on time; stay on-task and have better retention rate (Miller, 2006). According to Demmert (2001), retention of learning is affected by the degree of original learning, the learners’ memory capacity, and the method of teaching. Hence, it is essential that technical teachers use teaching method which ensures students’ active involvement in learning and provide suitable learning environment to improve achievement, retention and stimulate interest of technical college students to learn motor vehicle mechanics work.

Motor vehicle mechanics work is one of the engineering trades in the technical colleges in Nigeria designed to produce competent automechanics craftsmen. The craftsmen have three options. These options according to the Federal Republic of Nigeria (FRN, 2004) is to either secure employment in the industries, pursue further education in advance craft in a higher technical institutions or set up their own business and become self-employed. Unfortunately, despite all efforts by the government to ensure qualitative education at the technical colleges and bring about high quality products both in academic and employability, National Business and Technical
Examination Board (NABTEB) results of students indicate high failure rate in the main trades. Federal Ministry of Education (FME, 2000) reported that, in the NABTEB certificate examinations conducted in May 2000 the average failure rate F9 were: Electrical 25%; Construction trade 41% and Engineering trades which include Motor vehicle Mechanic Work 49%. In the same vein, Chief examiner’s report of NABTEB examination conducted in May/June, 2012 revealed that candidates recorded poor performance in motor vehicle mechanic work (NABTEB, 2012). Many of the motor vehicle mechanics work graduates who could not pass their NABTEB examination, and become employable are found in the streets without job. The prevalent high rate of unemployment among this category of technical college graduates, no doubt, defeats the fundamental objective of acquisition of skills for self-reliance emphasized in the National Policy on Education. Additionally, the cost of youth unemployment to economic and social development is extremely high because, it perpetuates inter-generational cycle of poverty and is associated with high levels of crimes, violence, substance abuse and the rise of political extremism (International Labour Organization (ILO), 2003).

According to Federal Ministry of Education (FME, 2000), one of the factors which have been found contributing to students’ poor achievement in the technical colleges is poor teaching. Oranu (2003) commenting on the issue of poor quality of teaching in the technical colleges in Nigeria observed that the teaching methods which are teacher-centred are the main teaching methods employed by technical teachers for implementing the curriculum. Obviously, the use of teacher-centered methods placed emphasis on knowledge transmission from the teacher to passive students and encourages rote learning (Boyle, Duffy & Dunleavy, (2003) which make students apathetic and repulsive to learning. However, with advancement in technology, petrol engine automobiles are getting more and more complicated because automobiles today might have as many as 50 microprocessors on them (Nice, 2001). Microprocessors are computers. Computers today are playing significant roles in motor vehicle. In essence, computers are used to control virtually, most operations in motor vehicle. If it is taken into account that students especially at the technical colleges have difficulty in learning concepts in motor vehicle mechanics work due to introduction of new contents as a result of advancement in technology, it is important to make the concepts of motor vehicle mechanics work more concrete and real. For this, computer assisted instruction methods such as computer simulation and tutorial will play an important role.

Furthermore, nowadays, it has been seen that visual materials are used everywhere and students are interested in technological tools like computer. As a result of supporting instruction with different voice, image and animation, more permanent, pleasurable and effective learning occurs (Demirel, 2004). According to Halis (2002) students are more influenced by visual stimulus than auditory ones. This situation makes it more difficult to get students interest and to give permanent knowledge at schools without using visual contents. Computer tutorial and simulation are usable ways to make instruction more interesting and to make the learnt knowledge permanent.

There are research evidences supporting effectiveness of computer simulation and computer tutorial on students’ learning in science and technology education. For instance, Douglas, Millar, Kwanza & Cummings (2004) in science classroom, Cole, Banks & Tooker (1999) in electronics, and Huang (2009) in architectural drawing investigated effects of computer simulation on students’ achievement. The study found out that computer simulation was more effective than traditional method. In another study, Fongsrisin (2004) in photography, Muhammad & Aktaruzzaman (2011) in educational research, and Onasanya, Daramola & Asuquo (2006) in introductory technology determined effectiveness of computer tutorial on students’ learning. Result revealed that students taught using computer tutorial performed better than students taught with traditional method. In a related
study, Birkenholtz, Stewart, McCaskey & Ogle, (1999) compared effects of using microcomputers in education: Assessment of computer tutorial, drill-and practice, and simulation strategies in vocational agricultural education students’ achievement. The found no significant difference in students’ achievement taught using any of the three microcomputer-enhanced teaching strategies. While many educators have put and are putting tremendous effort into devising new ways of using computer technology in the classroom, with the clear expectation that such technology will dramatically increase students’ learning outcomes, the results of these studies provide technical teachers with cumulative bank of research-based evidence of effectiveness of computer simulation and computer tutorial against the traditional methods in teaching science and technology education subjects.

Additionally, the developments in the use of computer have brought new learning and teaching opportunities to the extent that computer technology has proved its position in education and instruction. According to Kara & Kahraman, (2008) researchers today are not searching if the computers are effective for educational and instructional activities but searching how to use the computer technology more effectively. Hence, today’s research should provide systematic cognitive analysis of computer-based learning activities and explore the instructional implications of their adoption into school curricular. However, little is known about comparative effects of the use of computer simulation and computer tutorial on students’ learning outcomes. Thus, research is needed to determine whether the use of computer simulation and computer tutorial will have differential effects on students learning. Therefore what are the comparative effects of computer tutorial and computer simulation on students’ achievement, and retention in motor vehicle mechanics work?

Research Questions

The following research questions were posed to guide the study;
1. What is the comparative mean achievement score of students taught motor vehicle mechanics work with computer simulation and those taught with computer tutorial?
2. What is the comparative mean retention of learning score of students taught motor vehicle mechanics work with computer simulation and those taught with computer tutorial?

Hypotheses

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

HO₁: There is no significant difference between pretest mean scores of motor vehicle mechanics work students in the computer simulation group and those in the computer tutorial group

HO₂: There is no significant difference between mean achievement scores of students taught motor vehicle mechanics work with computer simulation and those taught with computer tutorial

HO₃: There is no significant difference between the retention mean scores of students taught motor vehicle mechanics work with computer simulation technique and those taught with computer tutorial technique

Methods

Design and Area of the Study

The study adopted the quasi-experimental research design. Specifically, the study adopted the quasi-experimental research design. The non-randomized pretest posttest control group design was used. The study was conducted in NBTE accredited technical colleges offering motor vehicle mechanics work in Lagos State.
Population and Sample for the Study

The population for the study comprised all one hundred and forty-eight (148) National Technical Certificate (NTC) II students studying motor vehicle mechanics work in all the five technical colleges offering motor vehicle mechanics work in Lagos State in 2011/2012 academic session. The sample size was 136 students. Simple random sampling technique was used to select four technical colleges and thereafter, intact classes of the four Technical Colleges were randomly assigned to the treatment conditions such that there were two treatment groups, namely: computer simulation group and computer tutorial group. In all, two technical colleges constituted a group assigned to computer simulation group taught with computer simulation and two constituted another treatment group assigned to computer tutorial group taught with computer tutorial. 71 students were in the computer simulation group while 65 students were in the computer tutorial group.

Instrument, Validation and Reliability

The instrument used for data collection was Automechanics Achievement Test (AAT). A test blue print was used to construct the AAT items in order to ensure content validity of the test. The items of AAT were drawn in line with the following six major classes of cognitive domain of Bloom’s taxonomy of educational objectives: knowledge, comprehension, application, analysis synthesis and evaluation. 150 multiple choice items were drawn for the AAT, after which the AAT, the lesson guide for the teachers were subjected to face validation by three experts. A trial test was conducted on the AAT for the purpose of determining the psychometric indices of the test. The answer sheet were marked and used for computing the psychometric indices of the test items. A total of 96 items of the AAT had good difficulty, discrimination and distracter indices. The coefficient of stability of the AAT was carried out using test-re-test reliability technique. The reliability coefficient of the AAT was found to be .80 using Pearson Product moment correlation coefficient. The data collected were analyzed using mean to answer the research questions while t-test statistics and Analysis of Covariance (ANCOVA) were used to test the hypotheses.

Computer Simulation Package and Computer Tutorial Package

The computer simulation package was developed by the researchers and with the assistance of a computer programmer. The package covered the following topics: four stroke spark ignition engine, two stroke spark ignition engine, fuel supply system of petrol engine, working principle of injection system, working principle of carburettor system, ignition system, water cooling system and air cooling system. Computer simulation package was developed to display the contents to students using animation, words and sounds while computer tutorial package was developed to display the contents using words, sound, graphics and pictures.

Control of Extraneous Variables

Teachers’ Variability:

• To control the effect of variable such as teacher's variability, which could result to experimental bias, the regular technical teachers in the participating technical colleges, taught their own students. Hence, the researchers were not directly involved in administration of the research instruments and the treatments.