

Research Paper

Comparative Impacts of Computer Laboratory Models on Pre-Service Teachers, Self-Regulated Learning Abilities and Motivational Beliefs in Computer Science in Jigawa State, Nigeria (Implication for Special Education & Psychology)

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ABSTRACT

This study will adopt a quasi-experimental research design. The design will be a non-equivalent pre-test post-test control group design. The researcher will make use of an intact class without randomization which is why quasi experimental design is adopted. There will be four levels of independent variables in this study and they are as follows: Computer on wheels, Computer in class and Computer laboratory and control group. Three levels of dependent variables will also guide the study. They are: Achievement Self-regulated learning abilities, and Motivational beliefs. Other variable will be a moderating variable which is gender. ICT infrastructure include the internet, (an intranet and extranet), the software, the hardware, power source, the manpower and building structures where resources are stored and manage. Howard, et al., (2015) opined that schools equipped with needed ICT infrastructure stand a chance to excel ahead of their peers partly because, ICT is regarded as the most influential instrument for accelerating learning. The National Policy on ICT in Education (FME, 2010) guides the development and deployment of ICT in education in Nigeria. The policy identifies the critical role of ICT in attaining the national vision, the Sustainable Development Goals (SDGs) and education for all. The policy's vision is anchored on ICT-furthered education that is engaging, enriching, empowering and enabling, whilst its mission seeks to meet the human resource requirements of Nigeria by attaining and enhancing sustainable socio-economic development and global competitiveness (FME, 2010; Hero, 2020).

Keywords: *Pre-Service Teachers, Self-Regulated Learning Abilities, Motivational Beliefs*

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ICT infrastructure include the internet, (an intranet and extranet), the software, the hardware, power source, the manpower and building structures where resources are stored and manage. Howard, et al., (2015) opined that schools equipped with needed ICT infrastructure stand a chance to excel ahead of their peers partly because, ICT is regarded as the most influential instrument for accelerating learning. The National Policy on ICT in Education (FME, 2010) guides the development and deployment of ICT in education in Nigeria. The policy identifies the critical role of ICT in attaining the national vision, the Sustainable Development Goals (SDGs) and education for all. The policy's vision is anchored on ICT-furthered education that is engaging, enriching, empowering and enabling, whilst its mission seeks to meet the human resource requirements of Nigeria by attaining and enhancing sustainable socio-economic development and global competitiveness (FME, 2010; Hero, 2020).

Information and Communication Technology (ICT) has the capacity to transform the educational sector by simplifying educational provisions at all levels. ICTs stand for information and communication technologies and are defined as a diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information. These technologies include computers, the internet and related software which are vital for improving teaching, learning and educational administration. ICT plays a critical role in the attainment of sustainable development and global competitiveness. That is why Asogwa, *etal.*, (2015) remarked that if Nigeria is to attain sustainable development and enhance global competitiveness; innovations that align with global trends must be introduced, especially in the deployment of a responsive ICT infrastructure for students' skill development.

Thus, how the policy was implemented in schools is what will bring the key benefits that might have impact of students' learning. For instance, ICT in education policy and standards are the responsibility of the federal government, their implementation rests heavily on the states and the local governments (FME 2010). For the state and local governments, the deployment of ICT is cost-intensive, but the value derivable from ICT is worthy for any investment. For example, in many north-west schools, computers are clustered in computer laboratory settings, rather than being located in classrooms where core subjects are taught. Others deploy computers on a wheeled cart while very few adopt tablet computing. Understanding which of the computer deployment models (computer laboratory model, computers in classrooms and computers on a wheeled cart) is the best option for secondary school students is the focus of this study.

A classroom computer is an electronic device that allows students to access the Internet to research, create, and complete work (Hero, 2020). This means that a laptop or tablet can also be categorized as a classroom computer. Computers are one of the most valuable resources in a classroom because they serve so many useful functions. With computers and the internet, students today have a wealth of information at their fingertips that can help them develop their research and communication skills while preparing them for a future career in a workforce that is increasingly reliant on computer technology (Shaziya & Zaheer, 2021). One of the most common applications of computers in education today involves the ongoing use of educational software and programs that facilitate personalized online instruction for students. Programs like iReady use computers to assess students in reading and math. Students then work on interactive reading and math lessons that are designed to target the

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specific academic needs identified during diagnostic testing. Educational software like this makes it easier to differentiate instruction so that lessons meet each student's unique learning needs. These tools also provide a wealth of useful data and resources that teachers can use to work with their students in the classroom and maximize learning. Online assessments are more efficient than traditional paper testing because it allows for more immediate feedback and data.

Scope of the Study

The scope of this study is limited to Comparative Impacts of Computer Laboratory Models on Students' Self-Regulated Learning and Motivational Beliefs in Computer Studies in Jigawa State, Nigeria. Specifically, Computer teachers and students using three Computer Laboratory Models (Computer Laboratory Settings, Computer in Classroom and Computers on Wheels) on Students' Motivational Beliefs. The Computer teachers who train students with two models were selected to be part of the respondents in the study because; they are responsible for the teaching computer students using the three different models, while the students would be three experimental group who will be use in the experimental group one, two and the control group. The study is limited to the following variable Computer Laboratory Settings (CLS), Computer in Classroom (CIC) and Computers on Wheels (COWs) whiles the criterion or dependent variable Achievement, Self-Regulated Learning Ability and Motivational Beliefs. The moderating variables include gender. The duration of the field work will be two to three months and will be slated while academic activities are ongoing. This is to enable the researcher to access the teachers and students in their respective schools.

Operational Definition of Terms

Operational definition of terms, involve the definition of major variables and terms as their used in this study. This variable includes:

- **Computers in Classrooms (CIC):** is a model of computer deployment where computers are positioned at the point of learning (i.e. in the classroom) and not into separate computer laboratories.
- **Computer laboratory Settings:** Computer laboratory is a room or space equipped with computers (networked or not) devoted to pedagogical use in a school including school libraries.
- **Computers on Wheels (COWs):** a mobile computer workstation encompasses all the requisite computer system connected to a projector, speakers with integrated power outlets and safety locks systematically positioned on a wheeled cart which can be move from classroom to the next by the computer teacher or the technical assistant.
- **Motivational beliefs:** Motivational beliefs are individual willingness to pursue success for the tasks which they are interested and considered important or individual motivation to get involved in tasks for personal curiosity, interests, or challenge, without obvious external rewards, and to acquire the senses of competence and satisfaction in learning.
- **Self-regulated learning (SRL):** Self-generated psychological thoughts, feelings, and behaviors oriented to attaining goals or a learning ability as students, with goal orientation, actively integrating several learning strategies to properly design and apply to their academic performance and to observe the relation between specific

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actions and successful learning. Conceptual frameworks are graphical illustration of key variables or construct being researched and are associated with the objectives of the research (Abani, 2015). The Conceptual framework in study is build based on the relevant related literature reviewed earlier in this chapter. Hence in this study the major variables, Predictor or Independent variables are: Computer Laboratory Models which are of three categories; Computer in Classroom (CIC), Computer Laboratory Settings (CLS) and Computer on Wheels (COWs).

The criterion variables or dependent variable includes Achievement (academic performance and), self-regulated learning abilities (SRLA), and Motivational beliefs while the moderating variables are gender. The conceptual framework is graphically illustrated in Figure 2.1,

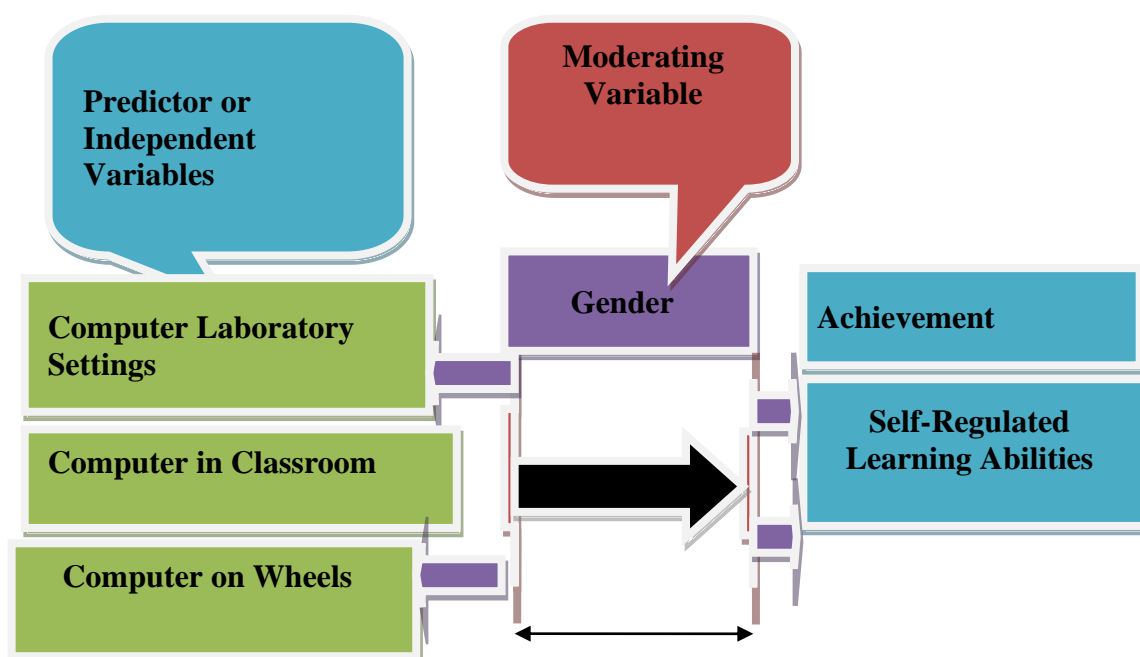


Figure 2.1: Graphical illustration of Conceptual framework of the study
Source: Researcher

The Technology in Special Education

Technology has become very essential in education. This is as a result of the role it plays towards the creation of innovative teaching and learning strategies to the delivery of instruction as the need of learners cannot be met by the use of traditional method of teaching alone (Winthrop *et al.*, 2016). Eassey (2018) argued that with the use of technology, the progress of students can be tracked towards mastery and their learning assessed. In essence, the use of technology can make it easier for teachers to design meaningful learning experience and the students on the other hand would have the opportunity to learn the proper utilization of modern technological tools. The use of technology will remain inexhaustible simply because it is dynamic and has the capacity to influences the way people create, use and share information in the society. As a result of this dynamism, there has been a proliferation of Information and Communication Technologies (ICTs) witnessed in the field of education (Brown, 2011).

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Technology in special education would not only play an important role towards the effective dissemination of teaching and learning processes of special needs students rather will reshape the entire special needs education. Information and Communication Technology (ICT) according to Okoro, Nyeche, Utibeand Ugwulebo (2017) can be defined as anything that allows one to obtain or gather information and communicate with others, or that which has an effect on the surrounding using electronic or digital apparatus. Through the use of ICT, classrooms can be infused with digital learning tools such as computers, hand held devices and other technological tools and can be used to facilitate programs and applications which is giving a lot of students and teachers the opportunity to seek electronic instructional materials from the internet (Agyemang and Dadzie,2010). The availability of the internet on the other hand also gave rise to an electronic learning approach called electronic X.

Computer Laboratory Models

Computer laboratory is a room or space equipped with computers (networked or not) devoted to pedagogical use in a school including school libraries. A computer laboratory must be safe from any disruptive, non-pedagogical content; pupils and teachers may need authorized access credentials. A computer is a machine that can be programmed to carry out sequences of arithmetic or logical operations automatically. Modern computers can perform generic sets of operations known as programs. These programs enable computers to perform a wide range of tasks. A computer system is a "complete" computer that includes the hardware, operating system (main software), and peripheral equipment needed and used for "full" operation. This term may also refer to a group of computers that are linked and function together, such as a computer network or computer cluster.

A broad range of industrial and consumer products use computers as control systems. Simple special-purpose devices like microwave ovens and remote controls are included, as are factory devices like industrial robots and computer-aided design, as well as general-purpose devices like personal computers and mobile devices like smart phones. Computers power the Internet, which links hundreds of millions of other computers and users.

Early computers were meant to be used only for calculations. Simple manual instruments like the abacus have aided people in doing calculations since ancient times. Early in the Industrial Revolution, some mechanical devices were built to automate long tedious tasks, such as guiding patterns for looms. More sophisticated electrical machines did specialized analog calculations in the early 20th century. The first digital electronic calculating machines were developed during World War II.

The first semiconductor transistors in the late 1940s were followed by the silicon-based MOSFET (MOS transistor) and monolithic integrated circuit (IC) chip technologies in the late 1950s, leading to the microprocessor and the microcomputer revolution in the 1970s. The speed, power and versatility of computers have been increasing dramatically ever since then, with transistor counts increasing at a rapid pace (as predicted by Moore's law), leading to the Digital Revolution during the late 20th to early 21st centuries.

Computer Laboratory Settings (CLS)

A computer lab is a space which provides computer services to a defined community. Computer labs are typically provided by libraries to the public, by academic institutions to students who attend the institution, or by other institutions to the public or to people

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affiliated with that institution, McCampbell, Atefeh S; Liedlich, Fred (1996). Users typically must follow a certain user policy to retain access to the computers. This generally consists of the user not engaging in illegal activities or attempting to circumvent any security or content-control software while using the computers. In public settings, computer lab users are often subject to time limits, in order to allow more people a chance to use the lab, whereas in other institutions, computer access typically requires valid personal login credentials, which may also allow the institution to track the user's activities. Computers in computer labs are typically equipped with internet access, while scanners and printers may augment the lab setup. Computers in computer labs are typically arranged either in rows, so that every workstation has a similar view of one end of the room to facilitate lecturing or presentations, or in clusters, to facilitate small group work. In some cases, generally in academic institutions, student laptops or laptop carts take the place of dedicated computer labs, although computer labs still have a place in applications requiring special software or hardware not practically implementable in personal computers, van *et al.*,(2002).

While computer labs are generally multipurpose, some labs may contain computers with hardware or software optimized for certain tasks or processes, depending on the needs of the institution operating the lab. These specialized purposes may include video editing, stock trading, 3-D computer-aided design, programming, and GIS. Increasingly, these have become the main purposes for the existence of traditional desktop-style computer labs, due to rising ownership of inexpensive personal computers making use of the lab only necessary when the expensive, specialized software and more powerful computers needed to run it are required.

A computer laboratory is important in every private and government school to enhance the scientific and technological research and invention capacity of students. I don't mean computer lab to pass on the formalities and just to showcase that in papers. I mean the good and practical computer lab that makes students interesting and enthusiastic about technology and science.

If there is a computer lab then students can invest their free time in learning programming, automation and to improve basic computer skills. That will help them later to define their career goals, entrepreneurship, and job opportunities. For skills development, students need to practice. And to do that effectively they need a computer lab. To practice what teachers have taught in the class, they need a computer lab.

METHODOLOGY

Research Design

This study will adopt a quasi-experimental research design. The design will be a non-equivalent pre-test post-test control group design. The researcher will make use of an intact class without randomization which is why quasi experimental design is adopted. There will be four levels of independent variables in this study and they are as follows: Computer on wheels, Computer in class and Computer laboratory and control group. Three levels of dependent variables will also guide the study. They are: Achievement, Self-regulated learning abilities, and Motivational beliefs. Other variable will be a moderating variable which is gender. Table 3.1 shows the layout of the research design.

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Table 2.1. Research Design Layout

Groups	Pre-test	Treat ment	Post-test	Self-regulated learning	Motivational beliefs
Experiment 1	O ₁	X ₁	O ₂	O ₃	O ₄
Experimental 2	O ₁	X ₂	O ₂	O ₃	O ₄
Experimental 3	O ₁	X ₃	O ₂	O ₃	O ₄
Control	O ₁	X ₄	O ₂	O ₃	O ₄

keys

- O₁, O₁, O₁, O₁: Observation on pre-test for the experimental and control groups.
- O₂, O₂, O₂, O₂: Observation on post-test for the experimental and control groups.
- O₃, O₃, O₃, O₃: Observation on self-regulated learning for experimental and control groups.
- O₄, O₄, O₄, O₄: Observation on motivational beliefs for experimental and control groups.
- X₁: Computer on wheels
- X₂: Computer in class
- X₃: Computer laboratory
- X₄: Control group

Population of the Study

The population of this study consists of all the two hundred level computer science students in colleges of education in Jigawa State Nigeria. The target population was made up of 874 NCE two students who have registered for Basic Computer Science (BSC 2011) in 2023/2024 academic session.

Sample and Sampling Techniques

The sample for this research consists of 218 NCE two Computer science students that was purposively selected from four colleges of education in Jigawa state Nigeria, namely One state was selected from each cluster using hat draw method. Secondly, one College of education was randomly selected in each state using convenient sampling. Thirdly, the randomly selected four Colleges of education for the main study was purposively assigned to each of the three experimental and one control groups. Each school was assigned into experimental group one; Computer on wheels (COW), experimental group two; Computer in class (CIC), experimental group three; Computer laboratory settings (CLS), and Control group was the conventional Lecture Method (LM). Fourthly, NCE two computer science students were purposively used in each college of education as intact classes. The students' gender was taken in to consideration at the point of data analysis.

Method of Data Collection

The data collection will begin by collecting the introduction letter from the Head of the Department, Educational Foundations; Jigawa state college of Education, Gumal The letter will be taken to the Management of the sampled colleges of education to seek permission to access the target students and use relevant facilities of the schools. The researcher will be introduced to relevant computer science lecturers of the chosen schools who served as the research assistants for the study. The researcher will expose the lecturers to the purpose, content and techniques of the research program. The lecturers of the sampled experimental schools will be trained on the use of COWs, CIC and CL for two weeks.

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Computer achievement test will be administered in the following week to the sampled students of both experimental and the control groups as pre-test to examine students' previous knowledge (entry knowledge) of computer before the treatment. The experimental groups will be exposed to COWs, CIC, CLS respectively while the control group will be exposed to conventional lecture method of teaching. After four weeks of experimental exposures, computer science achievement test will be conducted to both experimental and control group as post-test; self-regulated learning questionnaire and motivational questionnaire will also be administered to the students same week. A detailed procedure for data collection was presented in table 2.3.

Table 2.3 Strategic Plan and Time Frame for the Research Study

S/N	Steps	Schedule of Activities	Duration
1	Visitation	The researcher will visit the selected schools to notify them on the objectives of the research and seek for their permission to use the available resources in their college where necessary.	2 weeks
2	Identification and recruitment of research assistant	The researcher will meet with and train the research assistants who will the computer lecturers of the respective college. The assistants will be trained on the process of data collection and administration of the treatment instruments.	2 weeks for all the schools
3	Administration of the instruments	The researchers commence the research processes from the conduct of the pre-test, the administration of the treatments, to the conduct of post-test, self-regulated learning questionnaire, and motivational based questionnaire.	5 weeks
Total			9 weeks

Method of Data Analysis

The data obtained from the pre-test, post-test, self-regulated learning questionnaire and motivational questionnaires will be analysed using descriptive and inferential statistics. The research questions will be answered using mean and standard deviation. All the Hypotheses will be tested at 0.05 level of significance using Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) where significant difference exists in the pre-test scores of the students. A statistical package for social sciences version 23 will be used for the analysis.

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Data Analysis

Table 3.1 Population for the Study

S/N	Senatorial zones	Educational zones	Population	Population of schools per senatorial zones
1.	Jigawa South		3456	19250
2.			3738	
3.			3297	
4.			2324	
5.			2809	
6.			3626	
7.	Jigawa Central		9910	43152
8.			4979	
9.			3065	
10.			4318	
11.			9459	
12.			11421	
13.	Jigawa North		2951	8544
14.			5593	
	Total		70946	70946

Source: Jigawa State College of Education and College of Health Technology 2015

Sample Size

To achieve the stated aim and objectives of the study, a total sample size for the study was three hundred and eighty-two (382) recommended for such population by Research Adviser (2006), as it may be very difficult, if not impossible to study the whole population due to time and money.

Table 3.1: Descriptive Summary of the Variables

Variables	N	Min Stat	Max Stat	Mean(x)	Standard deviation
Pre-Service Teachers	382	1	3	2.028	.2743
Self-regulated Learning Abilities	382	1	2	1.180	.3852
Motivational Beliefs	382	1	2	1.151	.3593
Age	382	15	25	18.374	1.3196
Academic Achievement	382	40	77	55.0615	6.13632

Sources: Field work, 2016

The table above present descriptive summary of variables, the result showed parental rearing practice was measured based on authoritative, authoritarian and permissive with a minimum/maximum score of 1-3 respectively. School climate was measured based on favorable and unfavorable with a minimum/maximum statistic of 1 and 2 respectively the \bar{x} =1.180 and sd =.3852 respectively. Peer Interaction was scored based on minimum/maximum statistics of 1 and 2 for high and low with a \bar{x} =1.151 and sd :3593 respectively. The students' academic performance was recorded with a minimum/maximum scores of 40 and 77 respectively. The mean score \bar{x} =22.13 and sd =2.279. Three hundred eighty two.

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DISCUSSIONS OF FINDINGS

This aspect of the study comprises the discussions of the major research findings, based on the research objectives of the study. This ensures a comprehensive understanding of the findings of the study as well as to know the theoretical and practical implications of the findings. Based on the findings, the study found no significant difference in Self-regulated Learning and motivational beliefs among Pre-service- Teachers of Computer Science Education In Jigawa State This does not relate with the study of Ogunleye, Omirin and Balogun (2013) where the result showed that student differs in motivational beliefs with self-regulated learning being most influential at $t=113$ with a probability value $p<0.1$. It is likely that what account for the differences from the studies is that there is what is called involvement in education by in-service teachers there is supportive involvement by Pre-service teachers towards computer education and motivational beliefs. It can be clearly seen that now a days Pre-service teachers are more of supporting student's education than monitoring.

The research findings showed that there is no significant difference in motivational beliefs from self-regulated learning abilities at $t= -.123$, this does not support the study of Makewa, Role and Yegoh (2011) on school climate and academic performance in favorable and unfavorable achieving schools of Nandi secondary school Kenya with a sample of 103 teachers from both boys and girls secondary schools.

Recommendations

- It is recommended that pre service teachers should be well exposed to computer laboratory models and should have a well-defined self-regulated learning abilities and strong motivational beliefs in computer science education.
- It is recommendable for pre-service to explore all available computer laboratory avenues with a firm motivational belief in the computer models in teaching and learning processes.
- Motivational beliefs should be encouraged on pre-service teachers in the usage and applicability of computer models in teaching computer science education across schools.

REFERENCES

- Ajai, J. T., & Imoko, B. I. (2015). Gender differences in mathematics achievement and retention scores: A case of problem-based learning method. *International Journal of Research in Education and Science*, 1(1), 45-50.
- Akengin, G. (2011). Computerizing traditional and computer assisted education in the teaching of colour to 6th grade students and determination of its retention. *Educational research and reviews*, 6(5), 432-435.
- Aliustaoğlu and Tuna (2018)
- Alvarez, C., Alarcon, R., Nussbaum, M. (2011). Implementing collaborative learning activities in the classroom supported by one-to-one mobile computing: A design-based process. *Journal of systems and software*, 84(11), 1961-1976.
- Anagbogu, M. A. & Ezeliora, B. (2007). Sex differences and scientific performance and competitive teaching method in the teaching of biology at the senior secondary level. *Ilorin Journal of Education*, 4(1), 10-20.11, 1-13.
- Andreas Zendler, Hanna Greiner, (2019). The effect of two instructional methods on learning outcome in chemistry education: The experiment method and computer

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- simulation, *Education for Chemical Engineers*, 30(7), Pages 9-19, <https://doi.org/10.1016/j.ece.2019.09.001>.
- Aniodoh, C. O. & Ngozi, O. E (2012). Effects of concept mapping on student achievement in some selected difficult concepts in chemistry. *African Journal of Allied Education*, 6(1), 36-43.
- Aremu, A. (2008). *A cry for help endangered species in the science and technology classroom*. Paper presentation at the Joint Staff – Student Seminar, Department of Teacher Education. Ibadan, Nigeria: University of Ibadan.
- Asante, K. O. (2010). Sex differences in mathematics performance among senior high students in Ghana. *Gender and Behaviour*, 8(2), 3279-3289.
- Asogwa, D. U., Abdullahi, M., Bello, A., & Suleiman, G. D. (2015). The Need for Students Information Management System (SIMS) for Nigerian Universities in A Technological Age: Challenges and Strategies for Proper Integration. *The International Journal of Social Sciences and Humanities Invention*, 2(12), 1765-1769

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Conflict of Interest

The author(s) declared no conflict of interest.

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