The Effects Of E-Learning On Polytechnic Students' Academic Achievement And Creativity Of Adamawa Stata, Nigeria

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Abstract: This study found out the effect of e-learning on polytechnic students' academic achievement and creativity of Adamawa State, Four research questions in line with the purpose of study were formulated to guide the researcher during the study process. Hypotheses was formulated and tested at 0. 05 level of significance. The design used for the study was pretest posttest quasi experimental design. The students were assigned to control and experimental group. topics were selected from the mechanical engineering national diploma 11 syllabus of National Business and Technical Education Board (NABTEB) Curriculum for the treatmen,.In conducting the research the experimental group were taught using e-learning teaching method, while control group were taught the same topics using lecture method by the researcher. A pre-test were administered to both control and experimental group to determining the students entry level, posttest was also administered to both groups to find out if the treatment had any effect on the students achievement. The instrument for data collection tagged Mechanical engineering test (MET). The collected data were analyzed using the mean score and z-test. The finding of the study revealed that e-learning teaching method enhance students' academic achievements in mechanical engineering while lecture teaching method does not favour students learning, there was a significant difference in mean achievement of student of experimental and control groups. Therefore the formulated hypothesis was accepted based on the result of the pretest. Hypothesis It was therefore recommended that e-learning teaching method should be adopted as teaching method for mechanical engineering students in Adamawa State polytechnic, mechanical engineering teachers should be trained through workshops and seminars on how to use e-learning teaching method. National Board for Technical Education (NBTE) should recommend e-learning teaching method at polytechnic level.

I. INTRODUCTION

A. BACKGROUND OF THE STUDY

Education in Nigeria is an instrument "par excellence" for effecting national development. It has witnessed active participation by non-governmental agencies, communities, and individuals as well as government intervention. It is therefore desirable for the Nation to spell out in clear and unequivocal terms the philosophy and objectives that underlie its investment in education. Education is one of the most promising paths for individuals to realize better and more productive lives (Annah, 2017). The teaching strategies are basic as they influence effectiveness of student learning process and their performance (Wong & Wong, 2011). Wong and Wong their concern is whether teaching instruction used in schools is promoting quality learning and whether students were achieving at the required level of performance and prepared adequately to attain quality standard skills, attitudes and knowledge to develop as complete individuals.

The 21st century has witnessed the agitation for improvement of students' performance through provision of quality education. Developed nations including the United States of America (USA) have laid emphasis on narrowing achievement gaps between the highest and the lowest performing students. Their educational policies have focused

on the achievement of minimum competencies in basic skills including mathematics, reading and science (Annah, 2017). United Nations Educational Scientific Cultural and Organisation (UNESCO) (2017) documented the SDGs 2016-2030, and its overarching goal No. 4 that requires nations to provide equitable and comprehensive quality education and promote life-long learning opportunities for all by 2030. The Sustainable Development Goals also requires that every human being acquire 21st century skills, knowledge, attitudes and values to deal with world challenges and realize sustainable future. According to the review of SDG implementation and interrelations among goals discussion on SDG4- quality education (2019), lifelong skills development will effectively address inequality, access to quality education, acquisition of essential skills for social development, labour market integration and youth unemployment challenge. World Bank (2017) has documented existence of learning crisis in the low and middle-income countries. The findings revealed that schools put a lot of emphasis on schooling without focusing on students learning. Research on the efficacy of ICT-based teaching methods in improving generic skills in addition to content skills among future workforce is increasing. It is generally believed that Information and Communication Technologies (ICT) can empower teachers and learners, promote change and foster the development of 21st century skills. We admire the emerging technologies that fascinate us, as it has become part of our daily life. We are living the world where technology play a major role in simplifying human effort, (Paul & Rathinaraja, 2019). There is widespread belief that ICTs can and will empower teachers and learners, transforming teaching and learning processes from being highly teacher-dominated to student-centered, and that this transformation will result in increased learning gains for students, creating and allowing for opportunities for learners to develop their creativity, problem-solving abilities, informational reasoning skills, communication skills, and other higher-order thinking skills, Pooja (2016). Globally, educational systems are under great pressure to adopt innovative methodologies and to integrate New Information and Communication Technologies (NICTs) in the teaching and learning process, to prepare students with the knowledge and skills they need in the 21st century. Apparently, teaching profession is evolving from an emphasis on teacher-centered, lecture- based instructions to student-centered interactive learning environments. The teachers should be the main motivator and initiator of the ICT implementation at schools. The teachers should be aware of the social change in their teaching activities. They should be the agent of change from the classical method into the modern one. They must also be the part of the global change in learning and teaching modification.

Information and communication technologies (ICT) provide new opportunities for education and training, as they enhance learning and teaching, and facilitate collaborations, innovation and creativity for individuals and organizations (Ala-Mutka, Punie & Redecker, 2008). Although often used as an extension of other teaching tools, the use of ICT has the potential to open opportunities of new ways of doing things, thus developing creativity in learning. Furthermore, ICT use has been found to be associated with creativity of Gorbi

(2013). Thus, the use ICT can support development of public policy for educational change that promote creative and innovative school [and university] environment (Cachia, Ferrari & Punie, 2011)

Previous development model indicate that successful training of scientists require three elements namely, science content (focus), technology and vocational orientation (Lebeaume, 2004). The science content focuses on knowledge of discipline, while technology and vocational orientation help to improve the scientist's process skills. Higher education as the training ground for future scientists must make a big impact on university students' intellectual process, mental ability, learning skill and creativity so that they can proceed with critical and progressive thinking that enable them to provide solutions to current problems (Mahmoodi, Maleki & Sanisales, 2015). An education system that harmonizes with the changing world needs and has a fructuous look at the sciences will provide diverse training and learning experiences to support the learners' creativity and academic ability. In fact, such an education system is more able to provide better thinking skills and ability in learners as the system prepares them for better understanding of the world and the need for constructive innovations.

The application of teaching and learning methods that promotes deep and active learning and creativity in learners is the emphasis of the educational system of the present age. A number of scholars have suggested that there exists a strong relationship between learning and creativity and in fact Truman, (2011), states that creativity can be considered as a sub-type of learning. Higher education, as a social institution must function according to the needs of the community, i.e., should nurture individuals that they educate to be creative and thoughtful with high academic ability. To achieve this objective, the traditional teaching methods (lectures, etc.) do not have the required effectiveness, but implementation of e-learning in teaching-learning process could be a way to realize this goal (Zare et al., 2014).

II. LITERATURE REVIEW

Findings from studies conducted by Opkomu, Bethel Ebika & Mercy, (2018) shows an inadequate and low utilization of electronic learning facilities for teaching purposes. They recommended that schools should organized training programme on how to use electronic learning facilities and equipment for staff. And that, schools should equip and maintain existing e-learning facilities. In the same vain, Nicholas-Omoregbe, (2017) investigated factors that could influence Electronic Learning Management System (ELMS) adoption in 3 private universities in Nigeria. Their findings indicates that power and performance expectancy significantly influenced behavioural intention to use ELMS. In addition, most recognized elements in the theory proposed have significance effects on user acceptance of ELMS. They suggested an extension in the scope of study area to public universities in Nigeria. At the polytechnic level, Ademuyiwa, (2017) surveys the opinions of learners and instructors in Ado Ekiti Federal Polytechnic on the importance of CBT and electronic learning in Polytechnic systems of education. His

studies revealed that both staff and students accepts that E-learning and Computer Based Testing is relevant in polytechnic education system. They suggested that Electronic learning and computer based testing be introduced and use in Polytechnic System and the medium be developed to enhanced practical and technological manpower development.

E-learning is defined as a system based on technology, organization, and management which bestows upon the students the ability to learn via internet and facilitates their learning (Levy, 2006). E-learning makes use of telecommunications technology to get information to achieve .

the teaching and learning objectives (Bowles, 2000). Also Wanting et al. (2000) define e-learning as acquisition of the disseminated knowledge using electronic devices. it can be said that e-learning refers to the use of systems of electronic education such as computer, internet, multimedia disks, electronic magazines, virtual newscasts, and etc. whose purposes are to reduce time and expenses and achieve better, faster, and easier learning (Zare et al, 2014). Employment of information and communication technologies in education has created a new mode of learning which does not require physical attendance; hence, learning has been made possible in environments other than classrooms (Gholamhosseini, 2008). In this context, some study is reviewed next. E-learning is one of the most important learning environments in the information era. Therefore, efforts and experiences related to this type of learning is given due attention around the world.. E-learning can benefit self-regulation through the use of self-directed e-learning. The purpose of the current study is to investigate the impact of self-directed e-learning on undergraduate students' achievement in a science course and creativity.

Creating the groundwork to achieve creative thinking and activate inclusive potential education intelligence is one of the main strategies of pervasive training in educational systems because inclusive intelligence will create its ideas based on interactions with the environment, manipulation of personal experiences and their revision by having access to this skill. Such a view in the area of information literacy leads to achieve effective learning in the learning, under which informed trade-offs with the environment, receive and impart of information is possible. This makes inclusive creativity and wisdom flourish, which will be the beginning of the correct movement of educational system in order to achieve the noble training mission in communities (Montazer, 2002).

Despite that teachers and education administrators believe in creative thinking, but they cannot actually access it; because if the necessary conditions for creative thinking are not prepared, creative thinking remains as written. In addition, it should also be noted that educational materials are not the only important thing in university students' education, but the how and the quality of education, the level of their development, interests and experiences affects their education. This belief made specialists pay due attention to selective methods of providing educational materials (Ham and Adams, 2004). Creative thinking means "ability to think about things in new and unusual ways and achieve unique solutions to problems" (Santrock, 2004). There are three major features of creative thinking as follows:

- ✓ Finding new solutions to a problem (novelty and originality or hypothesizing to solve the problem).
- ✓ Providing a theory or hypothesis that is unusual and different from what is accepted by others.
- ✓ Complexity of thinking process and not expecting it, and also valuable thought (Ranjdoost and Eyvazi, 2013).

Many past research findings support the effectiveness of e-learning for developing students' n creativity. For example, Wheeler, Waiter and Bromfield Wheeler (2002) pointed out that the creativity of students is dramatically increased when using computer-based learning environments. Delavar and Ghorbani (2001) concluded that virtual learning is effective in promoting students' creativity. Bani Hashem, Farokhi Tirandaz, Shahalizadeh and Mashhadi (2014) discovered that e-learning is considered as a positive effective component in the creativity of students. Zanganeh, Mousavi and Badali (2013) found that the use of ICT is effective in the development of creative abilities. The results of the study conducted by Badali, Dana Mazrae, Farokhi Tirandaz and Herfedoost (2013) also showed the effectiveness of e-portfolio in developing creativity and its sub-components (fluency, flexibility, originality and elaboration). In brief, many research findings indicate that e-learning can be implemented in various ways which will benefit students' creativity.

The Africa-America Institute (2019) According to the United Nations that the number of Africa youth will triple making education a priority in term of access and mobility, the state of education (SOE) panel topic explore the role of indigenous Africa knowledge system as the foundation for local and global innovation and discuss skills development required to support globalizing "made in Africa brand, innovation invention and creativity are the major driver of growth and advancement in nations across the globe. A country that invests in creating and enabling environment for its human capital to operate at optimum usually receives yield by way highly innovative product and service. The Africa-America Institute (2015) findings reveals that there are many students gaining access to education in secondary schools and are not gaining basic skills in technology. In addition, Africa faces severe shortage of highly skilled African talent. The skills that will meet today's world challenges will depend on the improvement of students' achievements with the teacher being part of the process or the pathway to learning. Research evidence shows that teaching rigor presents better and effective way of addressing improvement in students' achievements in secondary schools.

STATEMENT OF THE PROBLEM

Today, most of the educational institutions are not supported with the recent information and communication technology (ICT) or system that can support both the business aspect of the institution as well as the teaching and learning aspects. Samin, Thanusha, Logeswary & Annreetha (2017) without both technical support in the classroom and whole school resources, teachers cannot be expected to overcome the obstacles preventing them from using ICT, Samin, Thanusha, Logeswary & Annreetha found that in the view of primary and secondary teachers one of the top barriers to ICT use in education was lack of technical assistance. Isuigo (2018)

however reminded Nigerians that at this point in the 21st century, the need for young people to obtain skills and certificate in technical and vocational education had been become critical more than ever saying that technical and vocational certificates which NABTEB provides are highly needed to meet the increasing and changing demands of the labour market driven by information and communication technology. teachers use the old traditional method of teaching where the teaching and learning process is dominated with one way communication mode. Akinsolu (2010) showed that students' output in secondary schools was poor. Akinsolu findings questioned the contribution of teachers and their competences in influencing students' performance in school. The lecture method of teaching and learning is often ineffective and resulting in a condition where the teaching process become ineffective and discourage the student in learning, these problem are initial from the fact that traditional method is less interactive between the both parties, leading towards assumption that it does not help in deep understanding of concepts. The current teaching and learning delivering method should be revised to align with the current young people adeptness of technology. Therefore, the problem lies ahead is that there is an urgent need to change the teaching and learning delivering method to meet with the 21st century challenges. The skills that will confront today's world challenges will depend on the improvement of student's performance with the teacher being part of the process or the pathway to learning. This has resulted in more emphasis on teaching, through the used diverse methods such as student's interactive learning, it will order the improvement of learning and understanding. Harman and Nguyen (2010), suggested that the existing teaching methodology used by teachers concentrated mainly on teacher-centered learning. Despite huge investments in provision of education in public schools, education stakeholders are greatly concerned with the declining students' performance in schools. Harman and Nguyen (2010) their concern is on how to hold teachers accountable for declining educational achievements and to have motivated, engaged and excited students who are committed to their learning success (Chih, Hwan & Kuo, 2013). It is on this experience that the researcher look at the effects of e-learning on polytechnic students' academic achievement and creativity in Adamawa State,

PURPOSE OF THE STUDY

The objective of this study is to determine the effects of e-learning on polytechnic students' academic achievement and creativity in Adamawa State, specifically the study intends to
- Determine the academic achievement on mechanical engineering students of Adamawa State Polytechnic.
- Determine the academic achievement of mechanical engineering students when taught Using lecturer method
- Determine the academic achievement of mechanical engineering students when taught
- Using e-learning method
- Determine the mean difference academic achievement of mechanical engineering students when taught Using lecturer teaching method and e-learning teaching method

RESEARCH QUESTION

- What is the entry level of academic achievement on mechanical engineering students of Adamawa State Polytechnic.
- What is the academic achievement of mechanical engineering students when taught Using lecturer method
- What is the academic achievement of mechanical engineering students when taught Using e-learning method
- What is the mean difference academic achievement scores of mechanical engineering students when taught Using lecturer method and e-learning method

HYPOTHESES

The null hypothesis will guide the study and will be tested at 0.05 levels significance.

$H_{01:}$ There is no significant difference in academic achievement score of mechanical engineering students when taught Using lecturer method and e-learning method

METHODOLOGY

This chapter presents a description of the methodology that will used for the study this include: Research Design, Method of Data Analysis

RESEARCH DESIGN

The research design for this study will be quasi-experimental design. This research design assess equivalency of groups, compare the groups and measures the degree of changes that occur as a result of treatments or interventions. Hence the design exposes the relationship among variables (UNICEF, 2014).

METHOD OF DATA ANALYSIS

Excel will be used to analyze the data. Mean will be used to answer research questions while the hypotheses will be tested using z-test at 0.05 level of significance. For the purpose of interpreting student's achievement, the four point scoring grade specified by NABTEB will be used, Decision rule results of 40% and above will be considered pass while 39% and below will be fail. Also the null hypothesis will be rejected when the z-calculated is greater than the table value z-critical, at 0. 05 level of significance. Otherwise, the null hypothesis will be accepted when the calculated z-value is less than the z-table value.

III. RESULTS

RESEARCH QUESTION 1

What is the entry level, Mean academic achievement score of mechanical engineering students

The data that provided the answer to this research question were analysed and presented in table 1

Variable	N	$\bar{X}$	REMARK
LECTURE	13	21.00	Poor performance
E-LEANING	14	18.61	Poor performance

Table 1: The entry level of academic achievement of mechanical engineering students of Adamawa State Polytechnic

Table 1 shows the entry level mean scores of students taught using Lecture teaching method and E-Leaning teaching method before administration of treatment. The mean achievements scores in the entry level for both groups were 18.62 and 21.00 respectively. This shows that the two groups were almost equivalent in there achievement. The result revealed that both group are at the same level of attainment and understanding, which give room for posttest because no any order background difference from either of the group.

RESEARCH QUESTION 2

What is the Mean academic achievement of mechanical engineering students when taught using lecture teaching method?

The data that provided the answer to this research question were analyzed and presented in table 2

S/N	Achievement in Percentage	Remarks
1	53	Pass
2	33	Fail
3	40	Pass
4	30	Fail
5	27	Fail
6	40	Pass
7	37	Fail
8	50	Pass
9	27	Fail
10	40	Pass
11	40	Pass
12	57	Pass
13	30	Fail
Mean	**38.76**	**Fail**

Table 2: The academic achievement of mechanical engineering students when taught Using lecturer method

Research question two was set to find out the academic achievement of students in the lecture teaching method group before and after the duration of treatment. Table 2 show the students mean score in the after treatment. The score for entry and after treatment are 21.00 and 38.76 respectively. There is a slight difference in the students' achievement when compared to their entry. The result show that the lecture teaching method do not have much effect on student academic achievement of mechanical engineering student.

RESEARCH QUESTION 3

What is the academic achievement of mechanical engineering students when taught Using e-learning method

The data that provided the answer to this research question were analyzed and presented in table 3

S/N	Achievement in Percentage	Remarks
1	88	Pass
2	79	Pass
3	78	Pass
4	37	Fail
5	67	Pass
6	82	Pass
7	92	Pass
8	74	Pass
9	30	Fail
10	27	Fail
11	80	Pass
12	87	Pass
13	33	Fail
14	90	Pass
Mean	67.43	Pass

Table 3

Research question three was set to find out the academic achievement of E-learning teaching method when taught using E-learning teaching method in in Adamawa State polytechnic. Table 3 show the academic achievement score of the E-learning teaching method, the mean score for entry and after treatment are 18.61 and 67.43 respectively and therefore the mean is high after treatment. Academic achievement test with a Mean of 67.43. The result show that the E-learning teaching method has effect on student academic achievement on mechanical engineering student.

RESEARCH QUESTION 4

What is the mean difference academic achievement scores of mechanical engineering students when taught Using lecturer method and e-learning method

The data that provided the answer to this research question was analysed and presented in table 4

Variable	N	$\bar{X}$	Remarks
lecture	14	38.76	Fail
E-learning	13	67.43	Pass

Table 4

The research question was to determine whether or not if the treatment given to the lecture and E-learning learning groups have an effect on the students of mechanical engineering. The result as shown in table 4 revealed that the lecture group had a Mean 38.76 and E-learning group had a mean of 67.43 after treatment. Comparing the results these shown that the treatment had much effect on students' academic achievement.

HYPOTHESIS 1

$H_{01:}$ There is no significant difference in academic achievement score of mechanical engineering students when taught Using lecturer method and e-learning method.

The data that provided the answer to this research question were analysed and presented in table 5

Variable	N	$\bar{x}$	df	Z_{Cal}	Z_{Crit}	Decision
lecture	14	38.76				
			25	8.83	2.05	reject
E-learning	13	67.43				

N =Number of Respondents, $\bar{x}$ = Mean, df = Degree of Freedom, Z_{Cal} = Z test calculated value, Z_{Crit} = Z test critical valve

Table 5

The mean of lecture group as indicated on table 5 is 38.76 while that of E-learning group is 67.43 On the other hand, the z calculated value of 8.83 is greater than the z critical value of 2.05 consequently, the null hypothesis was rejected. Hence, there is significant difference in academic achievement of mechanical engineering student in favour of E-learning method of teaching. This means that E-learning method has more effect on students' academic achievement in Adamawa State polytechnic.

IV. FINDING OF THE STUDY

Based on the research questions and the hypotheses formulated to guide the study, some findings were made. These finding were stated as follows:-
- ✓ The subjects were the same before the treatment commences with a mean of 21.00 and 18.61 for lecture and E-learning groups respectively.
- ✓ The academic achievement of the E-learning groups group improved significantly after the treatment with mean score of 67.43 as compared to 18.61 before treatment
- ✓ E-learning groups method of teaching had more effect on academic achievement than the lecture method with mean of 61.43 as compare to 38.76
- ✓ There was significant difference in the achievement scores of mechanical engineering student on both groups, this was because of the treatment. This show that E-learning groups group achieved better and higher with a mean of 67.43

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