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TABLE OF CONTENTS

Influence of ICT Resources and Curriculum of Science Utilization ON Secondary Schools Science Teaching in Irepodun LGA, Kwara State
Abidoye, F. Omosholape 1-8

Effects of Keller Plan and Activity Instructional Strategies on Students' Attitude and Performance in Mathematics in Osun State, Nigeria
[1]Popoola, A. A. & [2]Akinrinade, S. A. 9-17

Effects of Role Play and Conventional Methods on Academic Performance of Junior Secondary School Students in Osun State.
Onipede, A.A. (Ph.D) and Adeyi, M.O. (Ph.D) 18-23

An Appraisal of the Effect of Human Behaviour on The Incidence of Flooding in Ado – Ekiti, Ekiti State, Nigeria.
[1]Arohunsoro S. J., [2]igbalajobi O. J. and [3]Imole P. O. 24-33

Assessment of Agricultural Science Teachers' Attitude Towards School Farm in Senior Schools in Ilorin East LGA, Kwara State
***Afolabi, K.O., Ph.D., Adesanya, E.O., Shuaib, S.B Jimoh, S.B.** 34-39

Troubleshooting Skill Acquisition Needs of Vocational Teachers: Implication for an Uninterrupted Practical Teaching
Jonathan Olanrewaju Fatokun and Jonathan Ojo Oke 40-47

Culture of Trust and Secondary School Students' Academic Achievement in Ado Local Government Ekiti State, Nigeria
Prof. Ayodele, Joseph Babatola and Dr. (Mrs). Adeleke, Foluso Florence 48-53

Teachers' Pedagogical Competence as Determinant of Students' Performance in Basic Science in Southwest Nigeria
Adegbola, Funmi Florence Ph. D. 54-60

Effects of Teaching Basic Science on Youths' Performance in Skills Acquisition Programme in Ekiti State
Dr. (Mrs.) K.A. Omotayo & Oniya Toluwa 61-64

Cross Sectional and Longitudinal Trajectory of Students' Performance in Mathematics in Secondary School Certificate Examination
Oginni, O.I. 65-76

Effectiveness of Computer Utilization in the Teaching and Learning of Science Among Secondary School Teachers in Ekiti State
Adedayo, Julius Olugbenga (Ph. D) 77-85

ICT and Steam Teacher Education in Developing Biology Students Teachers'literacy in Nigeria
Durojaiye, Folake Felicia and Dr. Mulkah A. Ahmed 87-92

Impact of Information and Communication Technology, ICT, on Effective Teaching and Learning Process in Technical Colleges in Ekiti State
Adameji, J. O. 93-99

Effect of Sex Education on Knowledge, Attitude and Practice of Sexual Risk Behaviour Among Adolescents in Ado-Ekiti, Nigeria.
Adeloye Emily.O. and Ogunsile Seyi.E. 100-106

Use of Electronic and Print Media in the Teaching and Learning of Science
Aina G.P[1], Prof. S.A Jegede[2], Ojo O.M[3], Adeleye M.A[4], 107-113

Influence of Gender and School Location on Students' Motivation, Attitude and Achievement in Mathematics in Oyo East Local Government Area, Oyo State.
Olosunde, G.R. Ph.D.; Oyegoke, D. A. and Ojebisi, O.A. 114-120

Effects of Self-Regulatory Strategy on Senior Secondary School Students' Practical Skills in Biology in Oyo State Nigeria.
Ogundiwin Oluyemi, Akinleye.; Ibitoye Temitope Martina and Ogunleye Abayomi Taiwo 121-128

Senior Secondary School Chemistry Students' Ratings of The Challenges Encountered in Laboratory Classes in Ekiti State
Olugbuyi, P. O., Ayeni, M. F., Famuwagun, S. O. & Odunyemi, M. J. 129-133

Influence of Students' Attitude Towards Mathematics in Ondo State Secondary Schools
Prof. M.S. Omirin and Oloniboko Janet Omoyemi 134-137

Students' Verbal Ability and Contents of Essay Writing in French Language
Borode Bolaji Rachael and Oyinloye Gabriel Oludele 138-144

Sustainable Development Goals in Nigeria: Role of Chemistry Teacher Education.
Babatunde, V.O. and Olanrewaju, B.Y. 145-149

Influence of Teachers' Characteristics on Effective Teaching and Learning of Agricultural Science in Asa L.G.A., Kwara State
Jimoh, S.B., Afolabi, K.O., Shuaib, S.B. and Adesanya, E.O. 150-157

Influence of Social Media Addiction on Secondary School students' Study Habit in Science in Nigerian
Ajayi, Lois Folasayo 158-162

Gender Interest in Studying Physics in Ekiti StateTertiary Institutions
[1]Aladejana Alaba Lawrence, [2] Olusola Olasimbo Olufemi [3]Oludare Ojo Emmanuel 163-167

Promoting Secondary School Students' Learning of Soccer Skills Through Science Process Skills
[1]Ogunseemi, Olatunbosun Emmanuel, and [2]Aribamikan, Collins Gboyega (Ph.D.) 168-173

The Effect of Advance Organisers on Senior Secondary School Students' Academic Performance in Reading Comprehension and Its COUNSELLING Implications.
[1]Adeoluwa, Olufemi Victor; [2]Ojo, Semola Oyeyinka and [3]Makinde, Veronica Ibitola 174-179

Factors Affecting Teaching-Learning Process and Senior School Students' Performance in Mathematics in Ekiti State, Nigeria
Salami, Olajumoke Olayemi (Ph. D.) 180-187

Improvisation of Instructional Materials in the Teaching of Biology in Senior Secondary Schools in Ekiti State.
Olatunbosun Segun Mobolaji (Ph.D); Otoide Titilayo Folayemi & Abidakun Ojo Titus 188-192

Locus of Control As Determinant of Mathematics Learning Outcome of Polytechnic Students in Southwest, Nigeria
Prof Abiodun A. Popoola and Alaje, Daniel Tunji 193-197

Effects of Experiential and Action Learning Strategies on Senor Secondary School Students' Learning Outcomes in Mathematics in Osun State, Nigeria
Prof. Popoola Abiodun A. and BELLO Lasisi A. 198-206

Readability of Science Textbooks and Academic Performance of Male and Female Senior Secondary School Students in Ekiti State
Dr. Fatoba, Joseph Oba 207-213

INFLUENCE OF ICT RESOURCES AND CURRICULUM OF SCIENCE UTILIZATION ON SECONDARY SCHOOLS SCIENCE TEACHING IN IREPODUN LGA, KWARA STATE

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Abstract

This study examined the Influence of ICT Resources and Curriculum of Science Utilization on Secondary Schools Science Teaching in Irepodun LGA, Kwara State. The research type for this study was a descriptive research of the survey type. This study sample included 120 science teachers in twenty-four (24) Secondary Schools selected by random sampling technique. A self designed teachers' questionnaire was administered to one hundred and twenty (120) science teachers. Three research questions and two hypotheses were formulated. Frequency counts and correlation coefficients were used to analysis the data collected. Finding of this study revealed that the influence of ICT on curriculum to science teaching by science teachers was significant. It revealed that there were no significant influence of ICT resource using in science teaching by science teachers towards teaching based on the gender and year of teaching experience. Based on the findings, it was hereby recommended that; ICT Education should be reflected in the curriculum of science and made compulsory in all secondary schools in Irepodun LGA Kwara State in order to improve in science teaching, the Teacher Registration Council of Nigeria should provide ICT tool recourses for both the male and female teachers also there should be opportunity to be ICT literate through in-service education for both the experienced and less experienced science teachers in order to make use of ICT.

Key Word: Information and Communication Technology (ICT), Resources, Curriculum, Science Utilization, Secondary Schools

Introduction

Education is the total process of human learning by which knowledge is impacted, faculties trained and skills developed. Science Education is a field of study concerned with producing a scientifically literate society. It acquaints students with certain basic knowledge, skills and attitudes needed for future work in science and science related fields. There are several issues in science education in Nigeria that needs to be addressing (Omoifo, 2012).

Science is defined as knowledge of the structure and behavior of the natural and physical world which is based on facts that can be proved in the conditions of modern life, a scientifically and technological literate person is considerably good at playing his full potential in the socioeconomic development of his community (Hornby, 2010). Science is defined as an organized body of knowledge, a method of solving problem and also serves as a search of explanation of natural objects and phenomena (Ayeni, 2002). Ogunleye (2006) observed that science is a dynamic human activity concerned with understanding the working of our world. This understanding helps man to know more about the universe. Science subjects such as Chemistry, Physics and Biology as basis science subjects still suffering set back in the teaching and learning process.

Ige & Arowole (2003) observed that science will continue to play an increasingly important role in every individual's life whether the individual may have chosen science profession or not. Science is concerned with human effort to understand the history of the natural world and how the natural world works, with observed physical evidence as the basis of that understanding. Hence science comprises the basic disciplines such as Biology, Physics, Chemistry Agricultural science (Ahmed, 2010). Cox (2017) stated that the role of teacher in science teaching is to help students apply the concept such as Mathematics, English and science through classroom instruction and presentation.

The rate at which students in our senior secondary schools performance dropped in some of science subjects in favour of other subjects with the type of teachers handling the subjects is a matter that needs urgent attention. When questions are asked from the students on why they did not show interest in offering some science subjects unlike others discipline, the general answer is that the subject is too difficult to comprehend even when some of the students have not attended lesson class once, the wrong notion has been inculcated into them by their seniors they believe without bothering to verify whether it is true or not (Adelokun and Eyengho 2010)

Curriculum is defined as a medium through which educational institution seek to translate the societal values into concrete reality (Alade, 2011). Offorma (2005) viewed curriculum as a vehicle through which education is attained. Adegoke (2005) pointed out that for a curriculum to be effective, it must have a definite and dynamic purpose based on the value of the society and the views of the child as a citizen and a skilled individual. It has provided real opportunities for individualized instruction. Olorundare (2014) describes science as self-criticizing, correcting and improving activities which deal with facts relating to natural phenomenon and how they are interpreted.

Information communication Technology (ICT) is an indispensable part of the contemporary world. The field of Education has certainly been affected by the penetrating influence of information and communication technology worldwide in particular developed countries. Moreover, ICT has made an impact on the quality and quantity of teaching, learning and the application of ICT in Education has revolutionized teaching and learning in schools. Therefore it is essential to implement ICT in teaching science subjects in secondary schools due to the complex and the abstract nature of some of the subjects (Aina 2013).The place of ICT in teaching science education in schools cannot be over emphasized considering its promises in effective teaching and learning. This project examines the effectiveness of ICT on teaching and learning science subject in secondary schools. ICT as instructional media has improved teaching and learning through its dynamic interactive and engaging content.

The main purpose of ICT in the curriculum is to help in the development of human mental, which allow people to both successfully apply the existing knowledge and produce new knowledge. ICT also plays a major role in human activities in everyday living in order to cope and adapt to the demand of the demand of the environment. If the vision of science education is to bring socio-economic development, the role of ICT in science education cannot be over-emphasized (Hannaatu, 2013).

The use of ICT in Nigeria and African countries generally is increasing and dramatically growing. However, while there is a great deal of knowledge about how ICT are being used in developed countries, there is not much information on how ICT are being introduced into schools in developing countries (Beukes-Amiss & Chiware, 2006).

Kudryashova, Gorbatova, Rybushkina, and Ivanova (2015) observed that teacher are to guide and facilitate learning with a variety of strategies students to share responsibility for their own learning by modeling curiosity, skepticism and the skills of inquiry. Teachers' motivation to use ICT in the classroom is at present adversely influenced by a number of constraints including: lack of time to gain confidence and experience with Technology, limited access to reliable resources, a science curriculum overloaded with content assessment that requires no use of the technology and lack of subject specific guidance for ICT to support learning. This technology can be employed in diverse ways to support different curriculum goals and pedagogy such constraints have often stifled the science teachers the use of ICT in ways which effectively exploit its interactivity. Consequently well integrated and effective classroom use of ICT is currently rare.

The use of ICT in school science laboratory is driven by rather than transformative of the prescribed curriculum and pedagogy. However, the science teachers tend to use ICT largely to support, enhance and complement existing classroom practice rather than reshaping subject contents, goals and pedagogy. Generally, teachers' motivation and commitment are high and practice is gradually changing. Training teachers in the using ICT in the classroom appears to have had more success in science than in other subjects (Osborne and Hennessey 2013).

Shedd (2004) examined the incorporating technology in the classroom and the result suggested that anyone preparing to be become teachers must incorporate technology into their class. To become great among the committee of nations, Nigeria must change her method of teaching and learning of science education from traditional way of talk and chalk method and reading by carrying books around. The world is in the era of information and Communication Technology (ICT) where information is not restricted by time space and channel (Ajayi and Ojo 2010).

Nwafor (2014) assessed the availability and utilization of instructional resources in teaching and learning of Basic Science. The study also revealed that teachers do not improvise instructional materials to facilitate their teaching. Instructional materials have been defined by various authors. For example, Instructional materials are the devices developed or acquired to assist or facilitate teachers in transmitting organized knowledge, skill and attitudes to the learners within an instructional situation Nwachukwu (2006).

Teaching experience is a vital tool in the science teaching and learning situations. Experience can be said to be the attitude or skill acquired by the teacher through his perception and participation in instructional programmes. The experience of the teachers will help him to be able to cope and adapt to change in the educational programmes (Lawal, 2011).The adage which says experience is the best teacher holds water in the sense that the more a professional stays on the job, the more he becomes skilled and perfect in techniques of going about his profession.

Teaching experience is a vital tool in the science teaching and learning situations. Experience can be said to be the attitude or skill acquired by the teacher through his perception and participation in instructional programmes. The experience of the teachers will help him to be able to cope and adapt to change in the educational programmes (Lawal, 2011) Awoyemi (1985) concluded that teachers are generally effective within the first ten years of their teaching experience, while anything outside ten years, there is tendency for a slight decline in productivity. In the study, on whether to accept or reject that the experienced social studies teachers performed better than inexperienced social

studies teachers in the implementation of social studies curriculum in Oke-Ogun Zone.

Okeke (2006) obseved that gender refers to the social or culture construct, characteristics, behaviours and role which society ascribes to male and females. Gender is a social or cultural determinant that varies from place to place or culture. It is not universal, unlike sex which is biologically determined and universal too. Colom and Lynn (2004) found out that males have average brain sizes than females and therefore, would be expected to have higher average IQs. Owuamanam and Babatunde (2007) observed that gender stereotyping seems to promote the belief that women should be traditionally feminine and men are to be traditionally masculine. Danmole and Femi-Adeoye (2004) observed the effect of concept mapping technique on senior secondary school students' achievement and retention of ecology concepts and find out that gender is one of the factors interacting with achievement. Afolabi (2007) who examine the influence of the science teachers' attitude and gender factor as determinant of pupils' performance in primary science and found out that the attitude of science teachers have greater effect on the students' academic performance.

Purpose of the study

This study determined the influence of ICT resources in the curriculum of science of science teachers in science teaching to secondary schools in Irepodun Local Government Area, Kwara State.

Specifically, this study determined:

1. the extent at which science teachers uses the ICT resources to science teaching.
2. the influence of years of teaching experience of the science teachers towards the use of ICT resources to science teaching.
3. the influence of gender of the science teachers towards the use of ICT resource in science teaching.

Research Questions

1. What is the extent at which science teachers uses the ICT resources in science teaching?
2. Is the year of teaching experience influence science teachers towards the use of ICT resources in science teaching?
3. Does gender of science teachers influence the use of ICT resources in science teaching?

Research Hypotheses

1. There is no significant influence in the years of teaching experience of the science teachers towards the use of ICT resources in science teaching.
2. There is no significant influence in the gender of science teachers towards the use of ICT resources in science teaching.

Scope of the study

This study was carried out in Irepodun Local Government Area, Kwara State, Nigeria which includes science teachers in all Secondary Schools located in Irepodun, Kwara State, Nigeria. The study was carried out among science teachers in Secondary Schools. Teachers of Biology, Chemistry, Physics, Agricultural science and Mathematics were involved in the study. One hundred and twenty science teachers were involved in the study. A researcher-designed teachers' questionnaire was used as the instrument for the collection of data from science teachers in the sampled schools. Variables that were tested in the study were: years of teaching experience, gender and how ICT resources used in the science teaching.

Data Analysis and Results

Research Question One

what is the extent at which science teachers uses the ICT resources in science teaching?

Table 1: Mean Score, and correlation coefficient for testing extent of Science Teachers' using ICT resource in Science Teaching in Irepodun Local Government Area Kwara State, Nigeria

	Number of respondents	**Mean Score**	**Std. Deviation**	**Test for Correlation coefficient**	***r (Correlation Coefficient)***	***Df***	**p-value**
Total	120	71.11	4.50	3.24	0.63	119	0.00

Table 1 shows the numbers of responses of science teachers to the ICT resources using to science teaching in senior secondary schools in Irepodun Local Government, Kwara State, Nigeria. The total number of respondents was 120 science teachers. The mean score was 71.21. The influence of science teachers' using ICT resources to science teaching was significantly positive since p-value (0.00) < 0.05 (r =0.63; df 119 and p-value 0.00). The r also indicated positive influence in the using of ICT resource in teaching. This shows that science teachers in the Irepodun Local Government, Kwara State, Nigeria, generally had positive influence to the use of ICT resources on science teaching.

Research Question Two:

Is the year of teaching experience influence science teachers towards the use of ICT resources on science teaching?

Table 2: Mean Scores and correlation coefficient for testing influence of Science Teachers' using ICT resource in Science Teaching based on years of teaching experience in Irepodun Local Government Area Kwara State, Nigeria

Experience	**No of Respondent**	**Mean Score**	**Standard Deviation**	**Std. Error Mean**	**Test for Correlation coefficient**	**r (Correlation Coefficient)**	***Df***	**p-value**
Less experience (0-5)	36	83.74	5.90	0.20	2.78	0.72	79	0.06
Experience (above 5years	44	82.94	5.70	0.30				

Table 2 shows that there was no significant influence between the experienced and less experienced science teachers towards the using of ICT resources on science teaching in Irepodun Local Government Area Kwara State, Nigeria since the p-value (0.06) > 0.05. The mean scores range between 82.94 and 83.74and the r value was 0.72. The null hypothesis 2 (Ho_2), which states that there was no significant influence on the years of teaching experience of the science teachers towards the use of ICT resources to science teaching based on years of experience, is not rejected.

Research Question 3:

Does the gender of the science teachers have influence towards the use of ICT resources to science teaching?

Table 3: Mean Scores and correlation coefficient for testing influence of Science Teachers' using ICT resource in Science Teaching in Irepodun Local Government Area Kwara State, Nigeria

Gender	No of Respondents	Mean Score	Standard Deviation	Std. Error Mean	Test for r	r (Correlation Coefficient)	df	P Value
Male	72	73.46	5.60	0.30	2.25	0.67	79	0.66
Female	48	72.71	5.8	0.30				

Table 3 shows that the mean scores for male was 73.46 and for female was 72.71 and that no significant influence existed between the score of male and female science teachers using ICT resources on science teaching since the p-value (0.66) > 0.05. The null hypothesis 3 (Ho_3), which states that there is no significant influence in the score of science teachers' towards the using of ICT resources to science teaching based on gender, is not rejected.

Summary and Discussion

The research findings summarized as follows:

Science teachers had positive influence on teaching using ICT as resources to science teaching in the secondary school in Irepodun Local Government Area, Kwara State, Nigeria.

The influence of science teachers towards science teaching using ICT resources to science teaching in the secondary school based on their years of teaching experience and gender was not significant.

Science teachers had positive influence to the using of ICT resource in science teaching. It could be as a result of helpful behaviour, resourcefulness, enthusiasms, good method of presentation and concern for students and teachers knowledge of the subject matter and the acceptance that they are role model. This is in agreement with the findings of Shedd (2004) examined the incorporating technology in the classroom and the result and found out that there is significant in the use of ICT.

It was also revealed in this study that there was no significant influence of science teachers towards science teaching based on their years of teaching experience. It may be due to the fact that, the experienced and less experience science teachers are able to concentrate on the most appropriate way to teach particular topics to students who differ in their abilities, prior knowledge and backgrounds. This finding is in agreement with the finding of Abidoye (2017) observed the influence of gender and experience of senior school Biology Teachers on their Ecology teaching in Kwara State. The findings showed that no significant influence existed in the experience and less experience biology teachers.

It was established in this study that there was no significant influence of science teachers towards science teaching based on their gender. The males and the female had similar mean attitudinal score; the reason that alluded to this finding may be due to the fact that, male and female science teachers have realized more the importance of science teaching for their future. This study was in agreement to the of Abimbola & Abidoye (2013) on the views of Kwara State senior school Biology teachers on the status of ecology teaching in which they reported that there is no significant different between the teaching of male and female science teachers.

Conclusions

Based on the findings of the study, the following conclusions were drawn. Science teachers had positive influence on science teaching using ICT resources in Irepodun Local Government Area, Kwara State.

The influence of science teachers towards the using of ICT resource to science teaching based on their years of teaching experience and gender was not significant in the analysis conducted.

Recommendations

Based on the findings of this study, it is hereby recommended that;

1. ICT Education should be reflected in the curriculum of science and made compulsory in all secondary schools in Irepodun LGA Kwara State in order to improve more in their science teaching
2. There should be opportunity to be ICT literate through in-service education for both the experienced and less experienced science teachers in order to make use of ICT Resorces.
3. The Teacher Registration Council of Nigeria should provide ICT recourses for both the male and female teachers.

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EFFECTS OF KELLER PLAN AND ACTIVITY INSTRUCTIONAL STRATEGIES ON STUDENTS' ATTITUDE AND PERFORMANCE IN MATHEMATICS IN OSUN STATE, NIGERIA

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Abstract
The study examined the effects of Keller Plan and Activity Instructional Strategies on secondary school students' performance and attitude towards Mathematics in Osun State. The study adopted a pretest-posttest control group quasi-experimental design. The population of the study comprised all the public secondary schools in Osun State, Nigeria. The sample consisted of 200 respondents using multistage sampling procedure. Two validated instruments titled 'Mathematics Performance Test (MPT)' and 'Student's Attitudinal Questionnaire Scale (SAQS)' were used for data collection. Data collected were analysed using frequency count, mean and standard deviation. Analysis of Covariance (ANCOVA), t-test and Multiple Classification Analysis (MCA) were used to test the hypotheses at 0.05 level of significance. The findings showed that the use of Keller Plan and Activity Instructional Strategies had improved students' performance and attitude towards Mathematics in secondary schools in Osun State. The study revealed that there was a significant difference in the pre-test and post-test mean scores of students in the experimental and control groups. There was also a significant different in the pre-test and post-test attitudinal mean scores of students in the experimental and control groups. Based on the findings, it was recommended that Mathematics teachers should enhance the innovative instructional process by using Keller Plan and Activity Instructional Strategies in the teaching and learning process in order to facilitate the high level of students' performance in Mathematics. Also, here is need for inclusion of Keller Plan and Activity Instructional Strategies in the secondary school curriculum as alternative teaching strategies that would develop better attitude and improve the academic performance of Mathematics students.

Keywords: Keller plan, Activity instructional strategies, Attitude, Students' performance.

Introduction
Mathematics is a fundamental activity. It is a way of making sense of the world. Mathematics is the science of patterns, number, space and quantity and it is a very useful subject and necessary to all in the society. It is equally carry certain amount of competence in basic Mathematics for the purpose of commercial activity, business transaction, politics and decision making. Mathematics is a subject that has its influence in every facet of human life: academic, economic, science and technology and day to day activities. As a science, Mathematics can be experimented, observed and applied and as a study area, it can be taught, learnt and understood from these perspectives. It is clear that Mathematics is a subject of everyday application.

Mathematics as a school subject has over the years attracted the interest of educators and researchers who are concerned about its teaching and learning. It is important to the extent that it occupies a central position in the curriculum (Amao & Onasanya, 2010). Okebukola (2004) referred to Mathematics as a central intellectual discipline of the computational society and it is a relationship which revolves around the elementary practice of counting, measuring and description of shapes and objects (Odeyemi, 2004). It is therefore a major aspect of our educational system since its application cuts across all area of human endeavors. For instance, from social or economic perspective, Mathematics is a creation of human mind, concern primarily with ideas, processes and reasoning.

Mathematics provides powerful universal language and intellectual tool for abstraction, generalisation and synthesis. It is the language of science and technology. Mathematics enables us to probe into the natural universe and to master our environment so as to change societal expectations and standard of living. Mathematics skills are highly valued and sought after. It could also be said that Mathematics training disciplines the mind, develops logical reasoning and as well as analytical and problem solving skills to a high degree (Afolabi, 2006).

Kolawole and Oluwatayo (2004) observed that Mathematics is of central importance to modern society. It is essential in physical science, technology, business, financial service and many areas of Information and Communication Technology (ICT). It is also of growing importance in Biology and Medicine as well as in most scientific and industrial researches and development; it is increasingly being reviewed that many complex systems and structure in the modern world can only be understood through Mathematics and that most of the design and control of high technology system depends largely on mathematical input and output. Odeyemi (2004) said that secondary school students with learning disabilities generally make inadequate progress in Mathematics. Their performance is often limited by a variety of factors, including prior low achievement, low expectation for success and inadequate instruction.

Mathematics is a model for thinking, for developing scientific structure for drawing conclusions, and for solving problems. It is a subject that deals with facts, as a result, Mathematics instruction is a training of logical thinking. It is a means of solving many problems. It is confronted with finding solutions to problems that have not been produced by a similar type. Its greatest virtue is its flexibility and the high esteem at which it is held as a trending discipline is partly due to its illustrious pedigree (Ernest, 2004).

Emphasising the importance of Mathematics, Udousoro (2011) made it clear that knowledge of the sciences remains superficial without Mathematics. It is the only subject that is most commonly studied globally. Mathematics is the melting point of most disciplines. It is uniquely essential and hence has an unparalleled number of learners globally. It also provides solution to the problems of quantity and quality as well. It is daily used by all and sundry. Mathematics as a subject is a friend to many but loved by a very few; that is why Udousoro (2011) referred to it as the central intellectual discipline of technological societies. Mathematics is highly needed today much more than before since a lot of equipments based on digital development is going on and calculations are becoming much more complex.

As a result, one cannot escape Mathematics as there is real value in and real-life applications for it. Mathematics has beauty just as it has patterns. It is a tool and it is a language even as it has many uses. So, there is need for students to be properly prepared and equipped to face the challenges ahead if

all they will be effective in this present age. People who have become more and more skeptical towards Mathematics saw it as discipline that pursues needless complications, inventing unrealistic problems and prescribing solving methods within the frame of elementary Mathematics.

Learning of Mathematics depends on the way it is presented to the learner, the way the teacher teaches the subject; present it and the way the learner actively interacts with the subject and environment within which learning takes place (Ogbemudia & Ajasa, 2014). With the increase in science knowledge in the world over much demand is placed and emphasis is laid on the teacher's instructional knowledge and practice, the learner and the environment in the whole process of teaching and learning of Mathematics (Adesoji & Ibraheem, 2009). Mathematics is the study of the measurement, relationship and properties of quantities and sets, using numbers and symbol, arithmetic, algebra, geometry and calculus are branches of Mathematics.

Relative to the other school subjects, secondary school students do not perform well in Mathematics and poor Mathematics appears to have made a student report Mathematics as most disliked subject. The student's poor academic performance and negative attitude towards Mathematics had been blamed on the poor methodology of teaching. This poor performance of students in Mathematics examination at the primary and secondary levels of education (which deteriorates from year to year) may have negative influence on the students and may accelerate drop-out rate of students. However, observation revealed that teaching of Mathematics at the primary and secondary schools in Nigeria has not been very impressive.

Students' performance in Mathematics is declining every year. This calls for an urgent solution so that the aims of founding it will not be defeated. This problem is attributed to poor methods of teaching employed by Mathematics teachers. Chief Examiners Reports (2013-2017) of West African Examinations Council (WAEC) revealed that there is a sharp decline in the performance of students offering Mathematics. In the report, he attributed the unstable performance of students to lack of exposure to some viable methods and this deprives students the opportunity of independent study and lack of good approach to solve Mathematics problems. Invariably, this will even count on their performance in other standard examinations and could also have adverse effect on their performance in higher institution. Popoola (2008) made different efforts to seek different solutions to the performance of students in Mathematics, some of which include the use of teaching strategies like cooperative and competitive methods, guided inquiry, heuristic problem solving and programmed instruction strategies, all aimed at to alleviating the achievement in Mathematics, but a lot is still left to achieved.

Keller Plan (KP) otherwise known as Personalised System of Instruction (PSI) and Activity Instructional Strategy (AIS) were observed as two methods of teaching that have not been put into common practice in the teaching of Mathematics, as it is believed that they are student-centred methods of teaching. These methods afford much time to students to execute what could be a means of enhancing students' performance in the subject.

Keller Plan (Personalised Instruction) is imperative to enhancing the positive transfer of learning. In the learning of Mathematics, the students are exposed in varied quantifiable experiments, problems and exercises in order to master the necessary skills. In order to achieve the mastery of these skills, formative interaction activities are to be executed in a constructive learning experiment. The Keller Plan places emphasis on the traditional lecture and tutorial format. It makes great use of printed

as well as recorded materials which students used to study individually, or by sharing ideas with each other through discussion or in a competitive manner. The audio tutorial plan of instruction provides an excellent way by which modern college teaching may be more systematic and individualised. The Keller Plan lays more emphasis on the importance of written work. The teacher gives practice to the learners on carefully prepared assignments consisting of section from standard textbook. The specific distinctive of Keller Plan include: self pacing, where each student works individually at his own pace, student is not forced to work at the speed of the teacher or other students; use of multimedia, where essential subject matter is presented to writing, on tape, on film and by computer; importance of written work, in which the related stress upon the written work in teacher-student communication is emphasised (Eyre, 2007).

Activity Instructional Strategies (AIS) is a technique adopted by a teacher to emphasis his or her method of teaching through activity in which the students participate rigorously and being about efficient learning experiences. It is a child-centered approach. It is a method in which the child is actively involved in participating mentally and physically. Learning by doing is the main focus in this method. Learning by doing is imperative in successful learning since it is well proved that the more the senses are stimulated, the more persons learn. Akinsola and Animasahun (2007) mentioned that in an activity based teaching, learners willingly learn with enthusiasm, initialise and implement concepts relevant to their needs. Teacher needs to be actively involved in directing and guiding the students' analysis of the information. It requires active problem-solving by students in finding pattern in the information through their own investigation and analysis with continues practice in these processes, students learn not only the contents of the lesson but also develop many other skills. The activities used in this strategy can be generalised under the three categories: exploratory—gathering knowledge, concept and skills; constructive—get experience through creative work; expressional—presentations.

Students' academic performance in the school is influenced by various factors. According to Anderson, Anderson and Shapiro (2004), there are a set of individualised instructional ideas and practices that constantly help most students to learn excellently, quick and self confidently. These ideas and practices produce instructions that are systematic and sufficient help students when and where they have learning difficulties. It provides a clear criterion of what constitutes mastery through these the activities will be well demonstrated to the learners to carry out the activity on their own. Therefore, there is the need to make the teaching of Mathematics more stimulating, the subject more attractive and meaningful for students to learn. Keller Plan is viewed as one of the technique of making teaching more interesting and effective.

It appears that there is inconsistency/ fluctuation in the performance of students in Mathematics which has been attributed to lack of exposure to better learning strategies. This perhaps had deprived students of excepted exercise. It had been a factor responsible for non-coverage of necessary topics in the syllabus which make most of the students lack adequate knowledge of the concepts required in tackling good numbers of Mathematics problems in Osun State secondary schools.

The following research questions have been raised in the study:

1. What is the performance and attitude of Senior Secondary School students in Mathematics?

2. Will the use of Keller Plan and Activity Instructional Strategies improve students' performance and attitude towards Mathematics?

Research Hypotheses

The following research hypotheses have been formulated in the study:

1. There is no significant effects in the pre-test and post-test mean scores of students in the experimental and control groups.
2. There is no significant effects in the pre-test and post test attitudinal mean scores of students in the experimental and control groups.

Methodology

The research design adopted was quasi experimental of pre-test, post-test control group design. The experimental group was exposed to Keller Plan and Activity Instructional Strategies. The control group was exposed to Conventional method of teaching. The population of the study consisted 18,173 public secondary school students in Osun State. Two hundred (200) Senior School Two (SS II) students were drawn from 8 secondary schools, using multistage sampling procedure.

At the first stage, simple random sampling technique was used to select three local government areas in Osun State. At the second stage, three secondary schools were chosen from the selected local government areas using stratified random sampling technique to cater for the variable of location (urban and rural). Purposive sampling technique was used for selecting the students in a school using an intact class to make a total of 200 in all and used for the study. Two instruments were used namely, Mathematics Performance Test (MPT) and Student's Attitudinal Questionnaire Scale (SAQS), for data collection. Test re-test method was used to determine the reliability of the instruments, and coefficients of 0.87 and 0.92 were obtained respectively, which was considered high enough for reliability. Data collected were analysed using descriptive (frequency counts, mean and standard deviation) and inferential statistics (t-test, Analysis of Covariance (ANCOVA) and Multiple Classification Analysis (MCA)) were used to test the hypothesis at 0.05 level of significance.

Results

Research question 1: What is the performance and attitude of Senior Secondary School students in Mathematics before treatment?

Table 1: Academic performance of students in Mathematics prior to treatment

Group	N	Performance in Mathematics		Attitude to Mathematics	
		Mean	SD	Mean	SD
Keller Plan Instructional Strategy	72	13.56	3.10	57.50	7.76
Activity Instructional Strategy	68	13.59	2.25	60.28	8.09
Conventional	44	14.30	3.17	57.89	7.43
Total	**184**	**13.56**	**3.10**	**57.50**	**7.76**

Table 1 reveals that Mathematics students exposed to Keller Plan instructional strategy had mean score of 13.56 while those in the Activity Instructional Strategy and conventional groups were 13.59 and 14.30 respectively prior to treatment. Similarly, pre-attitudinal mean score of students exposed to Keller Plan instructional strategy was 57.50 while their counterparts in Activity instructional and conventional groups were 60.28 and 57.89 respectively. This implies that the level of performance and attitude of Senior Secondary School students in Mathematics before treatment was generally low.

Research question 2: Will the use of Keller Plan and Activity Instructional Strategies improve students' performance and attitude towards Mathematics?

Table 2: Effect of Keller Plan and Activity Instructional Strategies on students' performance and attitude towards Mathematics

Instructional Strategies	N	Performance in Mathematics					Attitude to Mathematics				
		Pretest		Posttest		Mean	Pretest		Posttest		Mean
		Mean	SD	Mean	SD	Diff	Mean	SD	Mean	SD	Diff
Keller Plan	72	13.56	3.10	28.33	5.05	14.77	57.50	7.76	133.60	21.81	76.1
Activity based	68	13.59	2.25	25.43	5.04	11.84	60.28	8.09	127.79	13.46	5.37
Conventional	44	14.30	3.17	18.57	4.17	4.27	57.89	7.43	64.66	8.54	1.11
Total	184	13.74	2.84	24.92	6.14	11.18	58.62	7.87	114.97	32.78	24.91

Table 2 reveals that students in the Keller Plan group had a mean score of 13.56 on performance in Mathematics while those in the Activity based and conventional group had mean scores of 13.59 and 14.30 respectively prior to treatment. After treatment, students taught using Keller Plan instructional strategy had the highest mean score of 28.33, closely followed by those exposed to Activity based instructional strategy with a mean score of 25.43 while their counterparts in the conventional group had the least mean score 18.57. Similarly, students in the Keller Plan group had a mean score of 57.50 on attitude towards Mathematics while those in the Activity based and conventional group had mean scores of 60.28 and 57.89 respectively prior to treatment. After treatment, students taught using Keller Plan instructional strategy had the highest mean score of 133.60, closely followed by those exposed to Activity based instructional strategy with a mean score of 127.79 while their counterparts in the conventional group had the least mean score 64.66. This implies that the use of Keller Plan and Activity Instructional Strategies had improved students' performance and attitude towards Mathematics. The effect of Keller Plan and Activity Instructional Strategies on students' performance and attitude towards Mathematics

Hypothesis 1: There is no significant effects in the pre-test and post-test mean scores of students in the experimental and control groups

Table 3: ANCOVA showing students' performance in Mathematics

Source	SS	df	MS	F	P
Corrected Model	2631.750a	3	877.250	37.022	.000
Covariate (Pretest)	.243	1	.243	.010	.920
Group	2597.464	2	1298.732	54.809*	.000
Error	4265.185	180	23.695		
Total	121198.000	184			
Corrected Total	6896.935	183			

***p<0.05**

The result in Table 3 shows that the computed F-value (54.809) obtained for the groups with a p-value <0.05 was significant at 0.05 level. The null hypothesis is rejected; implying that there is significant difference in the pre-test and post-test mean scores of students in the experimental and control groups. In order to determine the effectiveness of the treatment (instructional strategies) at enhancing students' performance in Mathematics, Multiple Classification Analysis (MCA) was used.

Table 4: Multiple Classification Analysis (MCA) of students' performance in Mathematics by treatment

Grand Mean=24.92					
Variable+ Category	**N**	**Unadjusted Deviation**	**Eta^2**	**Adjusted for Independent +Covariate**	**Beta**
Keller Plan	72	3.41	.38	3.08	.07
Activity based	68	0.51		0.21	
Conventional	44	-6.35		-6.26	
Multiple R				0.071	
Multiple R^2				0.005	

*p<0.05

Table 4 reveals that students exposed to Keller Plan instructional had the highest adjusted mean score of 28.00 (24.92+3.08) in Mathematics, closely followed those exposed Activity based instructional strategy; 24.71 (24.92+0.21) while the students in the conventional group had the lowest adjusted mean score of 18.66 (24.92+(-6.26). This implies that Keller Plan and Activity based are effective instructional strategies for enhancing students' performance in Mathematics. The treatment accounted for about 38% (Eta^2=0.38) of the observed variance in students' performance in Mathematics

Hypothesis 2: There is no significant effects in the pre-test and post -test attitudinal mean scores of students in the experimental and control groups.

Table 5: ANCOVA showing students' attitude towards Mathematics by treatment

Source	***SS***	***df***	***MS***	***F***	***P***
Corrected Model	148112.519	3	49370.840	183.371	.000
Covariate (Pretest)	575.038	1	575.038	2.136	.146
Group	146638.161	2	73319.081	272.318*	.000
Error	48463.286	180	269.240		
Total	2628596.000	184			
Corrected Total	196575.804	183			

*p<0.05

The result in Table 5 shows that the computed F-value (272.318) obtained for the groups with a p-value <0.05 was significant at 0.05 level. The null hypothesis is rejected; implying that there is significant different in the pre-test and post -test attitudinal mean scores of students in the experimental and control groups. In order to determine the effectiveness of the treatment (instructional strategies) at enhancing students' attitude towards Mathematics, Multiple Classification Analysis (MCA) was used

Table 6: Multiple Classification Analysis (MCA) of students' attitude towards Mathematics by treatment

Grand Mean=24.92					
Variable+Category	**N**	**Unadjusted Deviation**	**Eta²**	**Adjusted for Independent +Covariate**	**Beta**
Keller Plan	72	18.63	.75	20.14	
Activity based	68	12.82		12.22	
Conventional	44	-50.31		-50.05	
Multiple R				0.087	
Multiple R^2				0.008	

***p<0.05**

Table 6 reveals that, with a grand mean of 114.97; students exposed to Keller Plan instructional had the highest adjusted mean score of 135.11 (114.97+20.14) in Mathematics, closely followed those exposed Activity based instructional strategy; 127.19 (114.97+12.22) while the students in the conventional group had the least adjusted mean score of 64.92 (114.97+(-50.05). This implies that Keller Plan and Activity based constitute effective instructional strategies for enhancing students' attitude towards Mathematics. The treatment accounted for about 75% (Eta^2=0.75) of the observed variance in students' attitude towards Mathematics.

Discussion

The study showed that the level of performance and attitude of Senior Secondary School students in Mathematics before treatment was generally low. The study showed that use of Keller Plan and Activity Instructional Strategies had improved students' performance and attitude towards Mathematics. At the end of the treatment, the post-test mean scores and standard deviation of the experimental and control groups showed that, there was a significant difference between the pretest and post-test mean scores of those exposed to Keller Plan. The performance of the students in the Keller Plan over Activity based and conventional was supported by the view of Akinsola and Animasahun (2007) that Keller Plan is one of the techniques of making teaching more interesting and effective.

The findings also showed that there was significant different in the pre-test and post-test attitudinal mean scores of students in the experimental and control groups. This is in support of Tobias (2000) who opined that teacher attitudes towards Mathematics factors such as educational background of parents, occupation of parents play crucial roles in influencing students' attitude towards Mathematics. Ernest (2004) also support that students have different attitudes toward Mathematics because the public image of Mathematics.

The result of the findings showed that there was significant difference in the pre-test and post-test mean scores of students in the experimental and control groups. The findings also showed that there was significant different in the pre-test and post-test attitudinal mean scores of students in the experimental and control groups. This is in support of Tobias (2000) who opined that teacher attitudes towards Mathematics factors such as educational background of parents, occupation of parents play crucial roles in influencing students' attitude towards Mathematics.

Conclusion and Recommendations

From the findings of this study, it can be concluded that the adoption of Keller Plan and Activity Instructional Strategies help learners to stimulate positive attitude to the subject, thereby leading to a better academic

performance in Mathematics. Based on the findings of this study, the following recommendations were made:

1. Mathematics teachers should enhance the innovative instructional process by deliberate use of Keller Plan and Activity Instructional Strategies in the learning process in order to facilitate the high level of students' performance in Mathematics.
2. The use of Keller Plan and Activity Instructional Strategies should be encouraged in teaching and learning of Mathematics to further stimulate positive attitude to the subject and enhance their academic performance.
3. There is need for inclusion of Keller Plan and Activity Instructional Strategies in the secondary school curriculum as alternative teaching strategies that would develop better attitude and improve the academic performance of Mathematics students.
4. As much as practicable, Mathematics department in the various secondary schools should be equipped with modern equipment and facilities such that students will be encouraged to pursue a profitable and sustainable career in Mathematics.

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EFFECTS OF ROLE PLAY AND CONVENTIONAL METHODS ON ACADEMIC PERFORMANCE OF JUNIOR SECONDARY SCHOOL STUDENTS IN OSUN STATE.

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Abstract

The study investigated the effect of role play method on academic performance of Junior Secondary School students in Osun State. The study used a quasi-experimental pre-test, post-test design. Data were collected from 200 JSS II students using a stratified random sampling procedure from four Local Government Areas of Osun State. The instrument used for the data collection was (SSAT) Social Studies Achievement Test and was developed by the researcher, validated by expert in Social Studies Education. The research questions were answered using mean and Standard deviation scores, while the hypotheses were tested at 0.05level of significance using t-test. The study showed that students taught with role play method performed significantly better than those taught using conventional method. It was therefore concluded that the use of role play method is better than the conventional in improving academic performance in Social Studies. Based on the findings, it was recommended that government should encourage and emphasized the use of role play method while teaching the students.

Keywords: Role play, Method, Academic performance, Students

Introduction

It is worthy of note that Social Studies is an eclectic discipline which integrates various concepts from various fields of the social sciences, although it goes beyond the factual knowledge of the social science discipline. There are many teaching methods which social studies teachers should be aware of and use at the appropriate time. A sound knowledge of these teaching methods would help the Social Studies teacher to know, in what situation he/she could employ a particular method or a combination of methods. The point here is that a teacher should employ several teaching methods in a social studies lesson in order to arouse and sustain the interest of the social studies students. The teacher has a great role to play in imparting knowledge, in educating the child with the use of appropriate strategy. The parents therefore, put their hope and high expectation on the teacher. It is this important calling that teachers have accepted, and, therefore, much is expected of them (the teachers).

Research has also shown that the commonly used instructional strategy in Nigeria Social Studies classroom is the lecture method. Lecture method is the oldest way of teaching. It is teacher centred. The traditional view of teaching is that the learner is almost blank and therefore does not give possible outcome from the learners (Lawal, 2004). Based on this background, the researcher feel that lecture method would only allow the teacher to participate alone but would not allow full participation of students in Social Studies. Therefore, there could be poor performance of students.

It is observed that what children learn depends not only on what they are taught but also how they are taught, their development level, and their interest and experiences. These beliefs require that much

closer attention should be paid to the method chosen for presentation of materials. A given teaching method is not equally effective in all conditions. The effectiveness of a method depends on who uses it, who learns it, what is taught, in what particular conditions and for what purpose. Educators are concerned with attempt to encourage and popularize the use of carefully planned instructional strategies to see to their efficacy in improving the performance of students in Science and other related disciplines as asserted by (Seweje and Jegede, 2002).

Role playing is a valuable method of helping learners to develop confidence and self-esteem. In all the methods used to teach social studies, role playing seems to be one of the most effective teaching methods for stimulating the interest of learners in what they are to learn. Costant (2011) reported that role playing method includes simple techniques such as play-lets, field trip, textbook , discussion and dramatization – all of them especially are useful in lower classes. Students are immediately involved, their attention held by the situation or events dramatized in the classroom. This method allows for great deal of participation by learners and enlivens the routine procedure of teaching and learning. The students can participate physically, emotionally and mentally. When the content of a lesson is dry or uninteresting, role playing may be an effective way of attracting and holding the learners' attention. Blatner (2000) explained role playing as a process whereby facts or skills to be learnt are converted into play in order to make learning of such facts or skills more interesting and real. Role playing method enhances the learners full and direct participation. It is learners' centred and practical. It develops the learners' power of imagination and their moral character. Role play makes learning exciting and purposeful.

Role playing is a way of developing the skills of initiative, communication, problem-solving self-awareness and working cooperatively in teams. Blatner (2000) described role play as a methodology derived from socio-drama that may be used to help students understand the more subtle aspects of literature, social studies and even some aspects of science or mathematics. Edige (2007) reported that role play can be described as spontaneous and organized activities in which players pretend to be someone else. Students act out the role of people to show a specific situation for study. Learners are able to play many roles, for example, a man and a woman who intend to marry; father, mother and children in a family. In role playing, there is no prepared script, no rehearsal, no memorization of the part to be played.

Marcus (2007) revealed that in role play, two important things must be said about this method. First, that they should not be considered as something for use only on special occasions. Second, they should be carried out by both the students and teacher. Students should be divided into two groups – participants and observers. He went further to highlight the advantages of role play method which include: It helps develop vocabulary, language use and speech. It also provides opportunities for learners to express themselves freely. Role playing helps students to realize that other people have feelings, problems, and experiences often quite different from their own. It provides a good basis for later discussion and review of the topic and its issues. Interest is maintained and also a feeling of confidence as students learn to express themselves. Students learn through role playing. owing to active participation and involvement in the lesson. The method provides the teacher with information about the student which can aid in a better understanding of students. Teaching by role playing, leads to positive attitudinal change because a student, through active involvement in role playing with fellow students, may find his or her own values and beliefs challenged.

Ajaja (2011) explained that students' sensory modalities are in full operation as they are actively involved in classroom activities. He went further to say that students have the opportunity of participating through the use of their senses other than old traditional/ conventional type of learning. He therefore suggested that role play gears up students, stimulate them, arouse students interest and high communication level of performance and class is made lively.

Statement of the Problem

One of the major problems confronting the educational system in Nigeria today has been traced to the poor academic performance of students at Junior Secondary School levels. Some blame the poor performance of students on the wrong choice of teaching method, while others concentrate their blame on poor attitude of students towards the subject and classroom environment, which may not be conducive for practical learning situation. To put the teaching of Social Studies in its proper perspective, especially as regards students performance and transfer of morals into the society, there is the need to consider a change in the method being used in teaching the subject. Owing to the problems Social Studies students encounter through just one method of teaching (conventional method), the researchers deemed it necessary to investigate effects of role play and conventional methods on students performance in Social Studies. Thus, the problems stated above and the choice of the method of teaching to be studied generated the fundamental questions.

Purpose of the Study

The purpose of this study is to determine the effects of role play and conventional methods on academic performance of junior secondary school students in Osun State. It would also determine the method that will be appropriate in improving the performance of students in Social Studies in Osun State.

Research Questions

The following research questions were raised to guide the study:

1. What is the performance of students in the post-test?
2. Which of these methods will determine the academic performance of students in Social Studies?

Research Hypotheses

The following hypotheses are tested in the study:

1. There is no significant difference in the academic performance of Social Studies students exposed to role play method and those exposed to conventional method.
2. There is no significant difference in the pre-test and post-test mean score of Social Studies students exposed to role play method.

Methodology

The research design for this study is quasi-experimental design of non –randomized pre-test, post-test control group. The population of the study consisted of all students of Public Junior Secondary Schools 2 (JSS2) in Osun State. Four secondary schools were purposefully selected for the collection of data among the Junior Secondary Schools in Osun State from which a total 200 students were randomly selected. The students were grouped into two different parts such that role playing method and conventional teaching method were used to carried out the study independently.

The students were selected to provide answers to the Social Studies Achievement Test (SSAT) in form of pre-test and post-test questions before and after the treatment using role playing method and conventional method. The Social Studies Achievement Test consisted of 20 multi- choice objective items based on the topic treated. The items

used for the pre-test were reshuffled for the post-test. The items were subjected to face and content validity through the help of experts in Social Studies Education and Tests and Measurement in the Faculty of Education, Ekiti State University, Ado-Ekiti.

The reliability of the instrument was ascertained using test re-test method. The instrument was administered to 40 Junior Secondary School II students outside the targeted population two times within an interval of two weeks. The two scores were correlated using Pearson Product Moment Correlation Coefficient. The reliability coefficient of 0.84 was obtained for the SSAT. The value was considered high enough for the study. The research procedure took three forms namely, pre-treatment stage, the treatment stage and post-treatment stage. The researcher also involved the subject teachers (social studies) as research assistant in the conduct of the test. The researcher commenced the treatment after which the post - test was administered. The hypotheses were tested using t-test, at 0.05 level of significance.

Results

Question 1: What is the performance of students in the post-test?

The post test scores of students in the two groups were used to answer this question.

Table 1: Mean and standard deviation of post-test scores of students exposed to role playing method and conventional method

Groups	N	Mean	S.D
Role Playing	100	13.79	1.60
Conventional	100	9.98	1.57
Total	**200**		

Table 1 shows the mean post-test scores of students' performance in Social Studies. The mean post-test score for role playing group is 13.79 while conventional group is 9.98. Thus, role playing method which has the highest mean of 13.79 appears to be the better method out of the two methods in the teaching of Social Studies.

Question 2: Which of these methods will determine the academic performance of students in Social Studies?

The pre-test and post-test scores of students in the two groups were used to answer this question.

Table 2: Mean and standard deviation of pre-test and post-test scores of students exposed to role playing and conventional methods

Groups	Test	N	Mean	S.D	Mean Diff.
Role Playing	Pre Test	100	9.30	2.01	**4.49**
	Post Test	100	13.79	1.60	
Conventional	Pre Test	100	9.60	2.35	**0.38**
	Post Test	100	9.98	1.57	
Total		**200**			

From the Table 2, it is shown that the mean difference in students' performance in Social Studies between pre-test and post-test scores for role playing is 4.49 while conventional method is 0.38. It appears that the use of role playing and conventional methods influences students' performance in Social Studies with role playing being the more effective method in the teaching of Social Studies.

Testing of Hypotheses

Hypothesis 1: There is no significant difference in the academic performance of Social Studies students exposed to role playing method and those exposed to conventional method.

Table 3: t-test analysis for Post – test Mean Scores of Students in the two groups

Variations	N	Mean($\bar{X}$)	SD	Df	t_{cal}	P-value	Rem.
Role Playing	100	13.79	1.60	198	17.01	0.00*	Significant
Conventional	100	9.98	1.57				

***P<0.05**

Table 3 shows that the t-cal value of 17.01 is significant because the P value (0.000) <0.05 at 0.05 level of significance. This implies that null hypothesis is rejected. Hence, there was a significant difference in the academic performance of Social Studies students exposed to role playing method and those exposed to conventional method. The mean score showed a significant difference of 3.81 in favour of students exposed to role playing method.

Hypothesis 2: There is no significant difference in the pre-test and post-test mean scores of Social Studies students taught with role playing method.

Table 4: t-test analysis for pre-test and post-test mean scores of students exposed to role playing method

Variations	N	Mean ($\bar{X}$)	SD	Df	t_{cal}	P-value	Rem.
Pre-test	100	9.30	2.01	198	17.50	0.00*	Significant
Post-test	100	13.79	1.60				

***P<0.05**

Table 4 shows that the t-cal value of 17.50 is significant because the P value (0.000) <0.05 at 0.05 level of significance. This implies that null hypothesis is rejected. Hence, there was a significant difference in the pre-test and post-test mean scores of Social Studies students taught with role playing method. The mean score showed a significant difference which indicates that role playing method was very effective.

Discussion

The findings of the study also revealed that students that were exposed to role play method of teaching had better academic performance compared to those exposed to conventional method. The above was confirmed by hypothesis one which revealed that there was a significant difference in the academic performance of Social Studies exposed to role play method and those exposed to conventional method. The reason for this may be as a result of the exposure they have undergone and role play method aided to the better understanding of the subject matter. The finding of this study agreed with the finding of Blatner (2000) who reported that role playing is a process whereby facts or skills to be learnt are converted into play in order to make learning of such facts or skills more interesting, understandable and real. Role playing method enhances the learners' full and direct participation thereby, better understanding.

The finding also revealed that the mean score of post-test group students was higher than the pre-test group. This implies that post-test group had superior mean score when compare to pre-test group exposed to role play teaching methods in Social Studies. The researcher is of the opinion that teacher must teach his/ her students in such a way that the students will have little or no difficulty in mastering the subject matter since it is believed that effective teaching brings on the healthy interaction between the teacher and the students. This agreed with the finding of Seweje and Jegede (2002) who reported that the educators are concerned with attempt to encourage and

popularize the use of carefully planned instructional strategies to see to their efficacy in improving the performance of students.

Conclusion

It can be concluded from the finding of this study that role play method of teaching is an essential method that will improve the academic performance of students in Social Studies than the conventional method of teaching. The use of role play method helps the students to derive maximum benefit from the lesson, hence, it is more effective in the teaching of Social Studies concepts. It also goes a long way in making the lesson interesting.

Recommendations

Based on the findings above, it is recommended that:

1. Role play method should be used as a method of instruction in teaching Social Studies in Junior Secondary Schools (JSS) rather than the conventional method of teaching.
2. Government should encourage teachers on the need and use of role play method of teaching by organizing seminars and workshops through the Ministry of Education.

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AN APPRAISAL OF THE EFFECT OF HUMAN BEHAVIOUR ON THE INCIDENCE OF FLOODING IN ADO – EKITI, EKITI STATE, NIGERIA.

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Abstract

This paper focuses on social responsibility of individuals and groups towards the environmental quality maintenance of the city of Ado-Ekiti as a way of abating the incidence of flooding in the settlement. The paper shows how responsible social behaviour and ethical conducts are germane to handling issues of flooding for the purpose of ensuring an environment free of natural hazard. The paper illustrates undesirable adverse consequences of disregard for ethical issues and in consideration of the importance of social responsibility in relation to the management and/or prevention of flooding in an urban environment. An instance of the linkage between social and ethical issues in an urban centre is illustrated with flooding situation in River Ajilosun in Ado-Ekiti in Ekiti State. Some of the areas where human behaviour causes flooding in the capital city are illegal dumping of refuse in water courses and storm drains, construction of houses on the floodplains and water courses, erection of buildings on sloppy terrains and dereliction of responsibility in keeping a hygienic environment. Insincerity on the of the Town Planning Authority in ensuring a comprehensive implementation and total enforcement of the town planning laws are also part of the unethical factors contributing adversely to flooding in the city. This paper advocates for a change of attitudes on the part of the residents of Ado Ekiti and the municipal authorities for proper entrenchment of a sustainable environmental milieu rid of natural and anthropogenic disasters.

Keywords: Attitude, Behaviour, Flooding, Environment, Hazard

Introduction

Underlying every environmental problem in the society today is the human behaviour attitude and inclination. Ogundele (2003) concludes that eighty percent of the instances of environmental problems are the product of our behaviour. Therefore, solution to the incidence of flooding in Ado Ekiti must focus principally on changing the behaviour of our people and their orientation to environmental issues.

Flooding in Ado Ekiti is a serious environmental hazard which has grown particularly after the creation of Ekiti State on 1st October, 1996. The increasing influx of immigrants into the city in recent time and the concomitant upsurge in population growth and demand for land for various construction works, portends potential hazards and threats to the environment. In order to forestall experience of such dastard occurrence, this paper looks at areas where impacts of human behaviour on occurrence of flooding in the city can be controlled. It is strongly anticipated that such a step will go a long way to engender a sustainably liveable city environment in Ado-Ekiti.

Against the foregoing backdrop the paper examines the behavioural causes of flooding hazards in the study area and suggest measures to correcting such behaviours with a view to controlling the recurrent flood disaster in the city.

(A) Historical Records of Flooding in Ado-Ekiti (UTCL)

Flooding in Ado-Ekiti assumed relatively greater dimensions in its occurrence and geophysical effects since 1996 when Ekiti State was created and Ado-Ekiti was named as the capital city. Although prior to that year, isolated cases of floods/flooding were known to have occurred and affected different parts of the settlement (Adebayo, 1987; Arohunsoro, 2011), more disastrous cases of flooding were witnessed over the subsequent years.

Specifically in 1999, heavy flooding took its toll on Ado Ekiti and was particularly exacerbated by the global warming phenomenon activating climate change with the concomitant savage weather system (Watchtower, 2003; Adebayo, 2010; Arohunsoro, 2011). Cases of flooding in 2009 resulted in widespread spatial/hazards in the city.

Also in 2010 and 2011, several losses were incurred on household properties and engineering structures such as roads and hydraulie structures like bridges/culverts amongst which are the popular Ajilosun street bridge along Ado-Ikere road and the Odo Ayo bridge along the Ekiti State University road. These bridges gave way to the floods of 2009 and necessitated their subsequent reconstruction. Of more pathetic instance was the flooding of Sunday 24th October, 2010 when at Adeparusi in Opopogbooro, a six year old girl was drowned in a ditch while going to church service. Also in 2011, there were widespread flooding across the city in areas such as Adehun, Ekute, Adebayo, Ita-Eku Mercy land, Oke Oniyo, Akeju lane via Oke-Ila road and Embassy Island off Moferere. The rain which caused the flooding of the 29th August, 2011 fell non stop and lasted for about four (4) hours. The heavy rain and flooding of 2nd September, 2011 pulled down fences, destroyed personal effects and caused traffic delay and diversion.

The prolonged rain that fell in the evening of the 3rd of September, 2018 left the land area opposite the Ayemi garage flooded heavily. The floodwater following the prolonged rain rendered the road across the River Ofin bridge impassable for several hours in the night. The nasty experience extended till the following day.

These and many other cases of flooding in Ado-Ekiti have necessitated the need to unite this paper so as to understand the dynamics of human behavior and how it is related to the aggravation of the occurrence of flooding in the city.

Literature Review and Conceptual Framework

Flooding is a situation whereby water accumulates excessively either in stream/run channels such that the channels is exceeded and causes water to spill to the adjacent areas of the channel. When flooding occurs in streets or spaces outside the run channels and banks, it refers to the widespread spatial coverage of an area which is normally dry but becomes submerged particularly due to prolonged rainfall or short duration rainfall in which the intensity of the rainfall exceeds the infiltration capacity of the soil.

Flood is a natural phenomenon which is basically of climatic origin. However, when flooding it results in hazard and disaster.
Globally, flooding remains a disaster which is ubiquitous in nature. The current onslaught of global warming and the climatic changes has pushed many regions across the globe towards excessive rainfall and flooding. However, occurrence of flooding in urban areas and cities pose more threats to both the physical and human environment.

Urban areas are specifically predisposed toward increased area of impervious surfaces created by walkways, paved and asphalt laid roads, concrete edifices and use of impervious zinc sheet as roofing materials. These coupled with the increasing rate of deforestation and urbanization, the resulting

urban surfaces become sealed up and consequently resources the infiltration capacity of the ground surface. The accumulated water arising from this condition contributes to increased runoff in the cities.

Both developed and developing countries face deplorable situation as a result of flooding. In the United States of America flooding has been generating more environmental hazards on the country since the inception of the 21st century. The situation is not connected with the onslaught of global warming (Watchtower, 2003). In the last one decade or two the tropical and equatorial regions of the globe have been pushed to annual flooding arising from the gradual shift in the boundaries of climatic limitations of the area.

Human behavior and attitudes are essential ingredient of ethical consideration in man-environment relationship. The relationship between man his environment is aptly desensed by Heimstra and McFarling (1974) as the psychological foundation of environmental management. The aspect of human behavior as it relates to the interaction of man with his physical environment is termed the environmental psychology (Adebayo, 2004). According to Adebayo (2004) the physical environment is divided into the man-built environment and the natural environment. This man interacts with both types of environment and the attitudes, perceptions and needs of man dictates the direction of the behaviour of man in the environment which implies that both negative and positive attitudes can be exuded by man towards his environment.

As printed out by Adebayo (2004) the environment may act as a positive or negative reinforce for an already determined mode of behavior but it cannot be expected to change the basic direction of this behavior In the behavioural approach to the environmental management, man and types of decision or actions he takes constitute the subjects of study. These towns are usually mediated by cognitive process where cognition is the internalized reflection and reconstruction of thought.

Human behavior involves many processes such as decision aspects, attitude formation and perception in environmental management, the attitude that individuals have towards the environment can affect both the sanctity of the environment and the behavior of individual living in the environment. In the same way, the nature of the environment will directly influence the behavior of the residents of the environment. For instance, in an overcrowded environment, pollution becomes intensified and aggravated. The situation may consequently push people to adopt negative measures for maintaining environmental quality and freeing themselves from any stress this will also directly influence the reaction of people to the environment in the other hand.

The theory of reasoned action (Fig) in one of the fundamental theory to behavioural prediction that was developed by Ajzen and Frshbein in 1975. The theory of reasoned action is built on the assumption that people consider the implication of their actions before they decide to engage or not in a given behavior. The theory sees human action as personal in nature and also reflecting social influences.
The personal factor is the individual's positive or negative evaluation of performing the behavior in the general sense, individuals would infeud to perform behavior when they evaluate it positively and when they believe it is in pursuant that others think they should perform it.

Bel eief	= = >	Attit ude	= = >	Infec tion	= = >	Beha viour

TRA = People Actions Perform/Engage BEHAVIOUR
Infections Not to Engage/ Perform
Fig: theory of reasoned action (Ajzen & Fisher 1980).

According to Ogundele (2003) two concepts are essential to our understanding of the behavioural attitudes of man towards our environment and which are capable of causing serious degradations to the environment where such behaviours are exhibited.

The two concepts are social responsibility of individuals and groups and social ethics. The concept of social responsibility is defined as the personal obligation of everyone as he acts in his own interest, to ensure that the rights and legitimate interests of all others are not infringed (Koontz & O'Donell, 1968). Thus, a socially responsible individual will obey the laws because the rights of others are at stake.

On the other hand, ethics refers to codes of conduct that guide an individual in his or her dealings with others (Ogundele, 2003). It has to do with personal behaviour and moral duty. It is concerned with what is right or wrong. Afolayan (2010) sees ethics as being concerned with what is right or wrong, good or bad, fair or unfair, responsible or irresponsible, obligatory or permissible, praiseworthy or blameworthy. Ethics is also associated with guilt, shame, indignation, resentment, empathy, compassion and care. In the context of this paper, ethics and social responsibility are considered in respect of the/in view of human behavioural influences as determinants of flooding in River Ajilosun drainage basin.

While discussing further about the connection between attitudinal inclination and environmental hazards two theoretical model of the society are important for our understanding of the basis of human behaviour in the society (Ogundele, 2003) these theoretical models are illustrated in Figures 1 and 2.

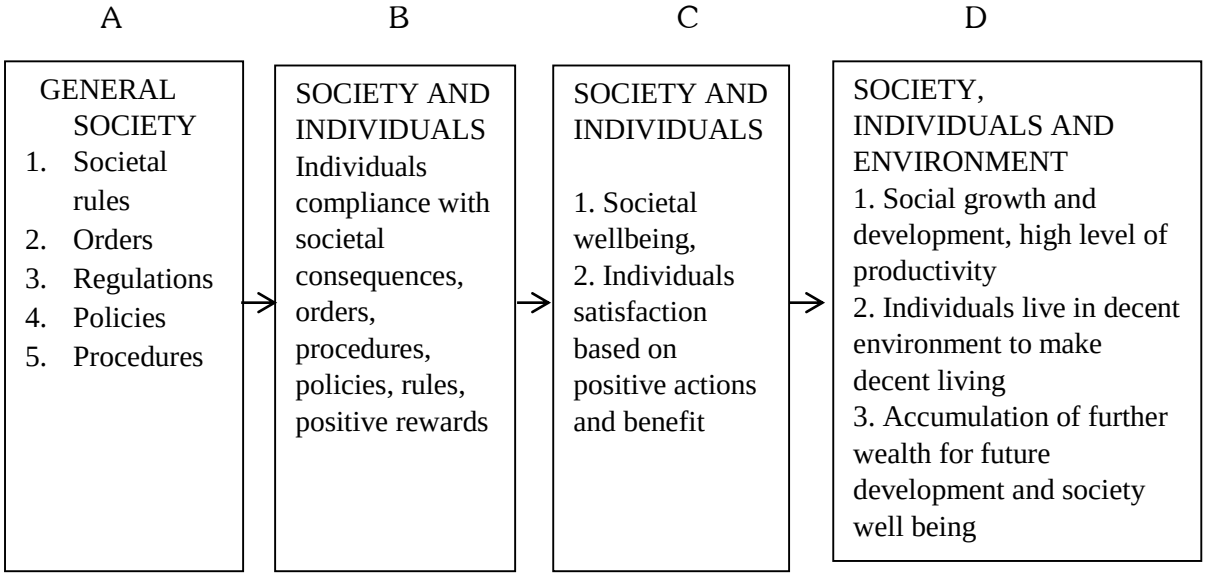

Figure 1: *Model of Disciplined Society (UCTL)*
Source: Ogundele (2003)

Figure 1 represents a model of a society where discipline dominates. The illustration in Figure 1 stipulated features of the society and the rewards exhibiting desirable ethical behaviour on individuals and the larger society.

According to Ogundele (2003) section A stands for the general society, with its rules, orders, regulation, policies and procedures specifying standards of acceptable behaviour with positive rewards following individuals who exhibit desired behaviour. Section B represents interaction among individuals in

the society. Compliance of individuals with standards and standing rules and regulations are social approval yielding orderliness and desirable results in the environment. In section C there exist a situation whereby satisfaction of members of the society is expected to lead to commitment of member to societal goals attainment that produces societal health and wellbeing in return. The representations of D show the society, the individual and the environment in interaction. The outcomes are growth and development leading to decency of the environment, good health and high level of productivities. Thus, according to Ogundele (2003) compliance with rules, regulations, procedures and standards produces decent environment and societal health and individual satisfaction.

The consequences of features of committing acts of indiscipline on individuals and general society are displayed in Figure 2 below:

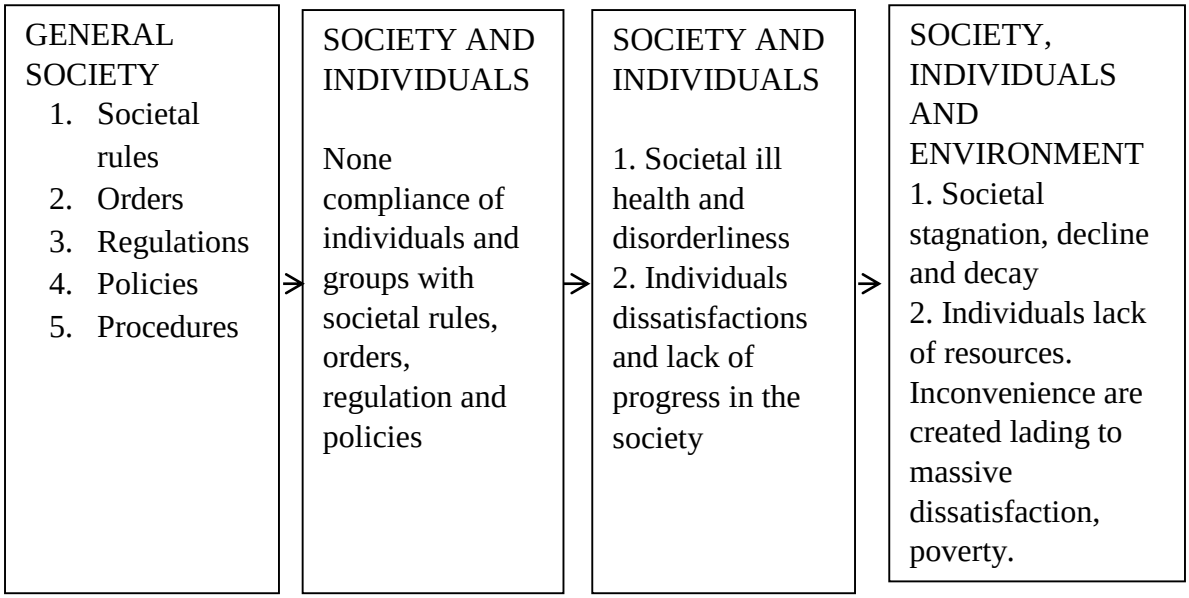

Figure 2: *Model of an Undisciplined Society (UCTL)*
Source: Ogundele (2003)

The model of an indisciplined society in Figure 2 illustrates a society where section A stands for the society with rules, orders, regulations, policies, procedures, rewards and sanctions system. In section B non-compliance of individuals and groups with specified standards in section A would lead to sanctions of members for pursuing selfish goals against the regulations of society. Section C shows ill-health and disorderliness in the society following the breaking of rules and regulations and dissatisfaction of member as a result of sanctions and lack of progress in the society. Finally section D the terminal consequences of violating the societal regulations manifest in stagnation, decline and decay leading to massive dissatisfaction and for the society at large, poverty. According to Ogundele (2003) the second model depicts the situation in Nigeria where indiscipline had led to the neglect of social responsibility issues and ethical conducts. The result is massive and unchecked and consequently result into abuse of our environment. We are going to illustrate this with incidence of flooding in Ado Ekiti city with a particular emphasis on River Ajilosun.

Ogundele (2003) suggested two broad approaches for promoting the practice of

social responsibility and ethic in Nigeria society. There are:

(i) Reducing unethical practices and
(ii) Developing ethical practices.

According to Ogundele (2003) the former which he believes is more appropriate to Nigerian society and can come in the form of

(i) Strict sanctions
(ii) Moral suasion and
(iii) Reward excellence/outstanding ethical behaviour

Specific aspects of Human Behaviour Promoting Incidence of Flooding in Ado Ekiti (UCTL)

Flooding in River Ajilosun is partly due to indiscipline attitude of our people to the environment and lack of compliance with normal rules and regulations guiding human behavioural attitude to one another and to the environment.

There are a number of specific aspects of human behaviour which contribute to incidence of floods in Ado Ekiti in the first place, a serious threat to the environment in Ado-Ekiti and which contributes significantly to the incidence of flooding in the city. These are discussed as follow: i. Illegal and reckless dumping of refuse into streams/water sourses and the lined drains ii. Constructing houses and other buildings in the water ways iii. Non compliance with town planning regulations on building construction iv. Flagrant disobedient to environmental laws e.g environmental laws. (Figures 1, 2,3). The habit of indiscriminate disposal of waste is rampart among the city dwellers and this has generated quite a deal of refuse choking the water courses and storm drains thus leading to the reduction in the unethical behaviour of illegal refuse located close to the river channel. It is one aspect of the peoples' indisciplined behaviour to see them discharging different sorts of refuse in concrete strand drains during rains. The practice usually become more pronounced and exhibited during pick rainfall periods in July, September and October. If the people have imbibed proper ethics of interacting harmoniously with. Storm drains are man-made channel through which storm run-off is transported and evaluated. In activeness is an attitude of government which is demonstrated by not paying prompt attention to construction of drains along the roads. For instance some areas at Opopogbooro, around Ayemi garage, Adebayo street, Fajuyi, Christ School, and along immigration road have roads are badly degraded by storm run- off in August and September. Besides, non construction of drainages in some quarters and the paucity of the hydraulic (areas) of many of the drainages in the city is blocked due to people's nonchalant attitude which may inhibit healthy environment that is decent for conducive living.

In a similar vein, if people don't build or construct their houses on water courses and in the minor/seasonal river valleys, occurrence of floods could have been mitigated and its effects reduced. The attitude of people in Ado-Ekiti with the drainage basins amount to irresponsible social and environmental considerations with the environment, flooding will be minimal if it could not have been absolutely checked
The regulations determining the location of houses along river courses are grossly violated by constructing houses in close proximity to river banks in Ado Ekiti. For instance, the means distance of location of houses to River Ajilosun in the drainage basin is 20.53 metres (SD ± 28.67) in the upper segment and 26.50 metres (SD±23.32) in lower reaches.

These distances fall short of the recommendations of building codes and the town planning regulations and the environment. Undesirable behaviour of residents of the drainage basin manifests in the poor management and degradation of slopes. An instance can be seen on Ayoba hills located at the headwaters of River Ajilosun. The regolith mantled hill which

stands at 1750ft above the see level, has its vegetation cleared and built up at the lower regions of the hills. A human action in this aspect is a sheer reflection of the deviation from the procedures and regulations guiding urban and physical development. Whereas slopes of 12^0 or more ought to be protested from any construction works (Oriola, 2000), nevertheless hills with an average slope gradient of 31^0 is developed into residential houses. This is a clear demonstration of social irresponsibility and lack of consideration for ethical dealings with the environment.

Figure 3: *Refuse-clogged section of River Ajilosun channel at Odo-Otu tributary of the river.* The picture was taken during the peak of dry season in February, 2018.

Figure 4: *Refuse-choked concrete-channelized segments of River Ajilosun at Agere in Oja Oba, Ado-Ekiti.*

The picture was taken few weeks after the early rains in March, 2018.

Figure 3: *Refuse-blocked section of River Ajilosun channel at Atikankan in Ado Ekiti. The picture was snapped after the first few rains in March, 2018.*

Conclusion

This paper has shown that human behavioural attitudes constitutes the fundamental basis for understanding the causes of flooding in river Ajilosun in Ado-Ekiti. Such negative behaviours reflects the refusal of the residents to recognize the consequence of unethical actions on people and the physical environment of the River Ajilosun drainage basin. The neglect of the obligations and social responsibility of individuals to others have gone along way to generate ecological hazards across the space of the drainage basin. Thus public enlightenment campaign in respect of mass communication of the obligations social responsibilities and ethical issues in the environment is germane to an effective control of floods and flooding in River Ajilosun drainage basin.

Recommendations

Since most of the environmental problems in Nigeria are causally related to adverse human behavioural attitudes, aggressive mass media campaigns are needed for the control of floods and flooding in the River Ajilosun drainage basin. In this regards it will be necessary to improve the efficient performance of the existing institutional frameworks for urban development in the drainage basin and other drainage basins in the city. Environmental education through mass media should be undertaken regularly. The undesirable consequence of the residents' behaviour in relation to flood hazards in the drainage basin can be outlined on the radio. Such programme should also be organized in all Faith based organizations. Non observance of the monthly sanitation exercise should be strictly enforced and backed legislative procedures. Culprits should be expressly tried by a mobile court and awarded the penalties which are commensurate with the gravity of the offence committed

Applying these measures to the control of flooding in the basin, strictly sanctions should be offered to any practice that promotes flooding in the drainage basin particularly as regards the habit of indiscriminate dumping of refuse in waterways and lined drains. Residents also need moral persuasion or encouragement to desist from acts which could encourage occurrence of floods and reward excellent flood ethical behaviour in respect of abiding by environmental laws in respect of street cleaning and maintenance and observance of environmental laws relating to prevention of flooding in the drainage basin. Moral persuasions on ethical behaviour can also be preached by faith based institutions from time to time during their programmes and meetings.

Fiscally, public enlightenment campaign in respect of mass communication of the obligations, social responsibilities and ethical issues the environment are considered germane to an effective control of floods and flooding is River Ajilosun basin.

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ASSESSMENT OF AGRICULTURAL SCIENCE TEACHERS' ATTITUDE TOWARDS SCHOOL FARM IN SENIOR SCHOOLS IN ILORIN EAST LGA, KWARA STATE

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Abstract

The study assessed agricultural science teachers' attitude towards school farm in senior secondary schools in Ilorin East LGA of Kwara State. The study adopted a descriptive research of the survey type. The sample of the study consisted of one hundred and twenty (120) randomly selected agricultural science teachers. Four research questions were raised and answered in the study. The instrument used for data collection was a researcher- designed questionnaire. Data obtained were analyzed using percentages, mean and Spearman rank correlation statistics .The study revealed that agricultural science teachers had positive attitudes towards school farm work irrespective of school type, academic qualifications and availability of farm tools. Based on the findings of the study it was recommended that adequate incentives should be given to the Agricultural science teachers to sustain their positive attitude towards school farm; also private and public schools should give proper attention to planning and management of school farm while teachers' academic qualifications should not be used as a yardstick for implementing programmes on school farm.

Keywords: Agricultural Science Teachers, Attitude, School Farm, Teachers' Qualification

Introduction

Education is widely recognized as the most effective tool for development in all its ramifications that any country can invest to better the lots of its citizenry. World Bank (2007) affirmed that it is one of the critical pathways to promote social and economic development. It is also central to the development of a better life and better world. Hence, in the absence of education, development could not be effective and sustainable. Battle and Lewis (2002) remarked that education is a fundamental step that is expected of everyone in this era of globalization. It serves the vital function of human capital development and is a prerequisite to an individual's wellbeing and better standard of living.

Education is the acquisition of knowledge and skills through which an individual's productivity could be enhanced thereby ensuring quality of life. The aggregation of these individual increase in productivity which consequently leads to increase in earning engender national economic growth (Saxton, 2000). A crucial aspect of education through which increased productivity and improved quality of life could be enhanced is through functional agricultural education. Agricultural education is a teaching and learning activity that deals with all aspects of cultivating crops and rearing animals for the economic benefits and human uses. Agricultural education provides learners with necessary skills required for the effective practice of agriculture with the aim of providing food, jobs and raw materials for industries and ensure food security and sustainability (Akinsorotan, 2007)

The objectives of senior secondary school agricultural science curriculum as outlined in

the Nigeria Educational Research and Development Council (2013) are to stimulate and sustain student interest in agriculture, to enable student acquire basic knowledge and practical skills in agriculture and enable students to be self reliant. These objectives would be realised if the teachers to implement them have favourable attitude towards both theory and practical aspect of agriculture.

An Agricultural Science teacher is someone who has acquired training in the pedagogical and content aspects of agriculture and is responsible for the inculcation of agricultural knowledge, skills and attitudes into learners (Olaitan, Asogwa, & Assouzu, 2010). This also includes technical aspect of agriculture which involves carrying out all activities that are done on the school farm. It deals with the whole content of agricultural science as highligted in different sections in the curriculum (Olaitan, Asogwa, & Assouzu , 2010).

School farm is an aspect of school programme of activities that is responsible for productive agriculture in the society. School farm is a designated parcel of land within or close to the school premises where learners engage in practical agriculture in the area of crop and animal farming. Etuk (2014) describes school farm as a channel for learning and acquisition of practical skills in agriculture to complement whatever background knowledge the students must have acquired through classroom instructions in order to develop the entry level skills in agriculture and agricultural related- jobs.

In Nigeria, many secondary school graduates still feel reluctant to engage in the practice of agricultural related occupations even without any prospect of getting employed and most of these graduates are not employed because they lack the practical knowledge and skills required in the agricultural enterprises. This problem could be as a result of unfavourable disposition or level of exposure of learners to agricultural science or farm practical work especially in secondary schools due to the attitudes of their teachers towards school farm.

The attitude of agricultural science teachers towards the school farm as a means for teaching practical agriculture has been recognized as an important factor. Onwumere, Modebelu and Chukwuka (2016) studied the impact of school farm on teaching agricultural science in secondary school in Ikwuano local government in Abia State, Nigeria. The findings revealed that Agricultural Science teachers have a high positive attitude towards school farm. This findings could be as a result of the socio-economic status of the people in the study area or due to the agrarian nature of the people covered. However, in an urban and elite society like the current study area, the reverse may be the case.

Teacher with positive attitude may engage the use of school farm in teaching agriculture while those with negative attitude may just be teaching agriculture theoretically. Also the teacher's attitude to school farm could also determine his ability to motivate student to develop interest in agriculture thereby influencing the extent to which students to choose occupational interest in agriculture.

It is against this background that this study intended to investigate the influence of teachers' attitudes to school farm in senior schools in Ilorin East LGA of Kwara State.

Purpose of the Study

The main purpose of the study was to assess Agricultural Science teachers' attitudes towards school farm in Senior Schools in Ilorin East LGA of Kwara State. Specifically, the study examined the:

1. attitude of Agricultural Science teachers' towards school farm work.
2. influence of availability of farming tools on the Agricultural Science teachers' attitude to school farm.

3. influence of the school type on Agricultural Science teachers' attitude towards school farm.
4. influence of Agricultural Science teachers' academic qualification on their attitude towards school farm.

Research Questions

To guide this study, the following four research questions were raised:

1. What is the attitude of Agricultural Science teachers' towards school farm work?
2. How does avalability of farming tools determine the Agricultural Science teachers' attitude to school farm?
3. In what way does school type affect Agricultural Science teachers' attitude towards school farm?
4. How does Agricultural Science teachers' academic qualification determine their attitudes towards school farm?

Hypotheses

Ho_1 There is no significant relationship between availability of school farm and teachers' attitude towards school farm.

Ho_2 There is no significant relationship between the type of school in which teacher teach and their attitude towards school farm.

Ho_3 There is no significant relationship between the teachers' qualification and their attitude to school farm.

Methodology

This research was a descriptive research of the survey type. The population for this study consisted of all senior secondary school Agricultural Science teachers in Ilorin East LGA of Kwara State. The sample for the study comprised 120 randomly selected Agricultural science teachers in public and private secondary schools in Ilorin East LGA of Kwara State. Cronbach Alpha analysis was used and a reliability coefficient of 0.72 was gotten for the instrument. The data collected were analyzed using percentages, mean, standard deviation and Spearman Rank Correlation .The hypotheses were tested at 0.05 level of significance.

Results

The findings of this study were presented according to the research questions.

Research Question 1

What is the attitude of Agricultural Science teachers towards school farm?

Table 1: *Mean Responses of Agricultural Science Teachers Attitude towards School Farm*

S/N	Attitude of Agricultural Science teachers towards school farm	Mean	SD	Remark
1.	I enjoy going to school farm with my students	57.12	6.21	Sig
2.	I like going to the school farm both in the raining and dry seasons.	54.23	6.01	Sig
3.	I go to school farm even during weekends	63.56	7.29	Sig
4.	I use my personal money most times to supplement farm input on the school farm	38.33	4.24	Sig
5.	I trekked long distances from my house to the school farm	48.26	5.92	Sig

Results in Table 1 revealed that the respondents enjoyed going to the school farm with the students with a mean of (57.12). Also, Agricultural Science teachers like going to the school farm during rain and dry seasons (54.23). Most of the respondents also like going to the school farm even during weekends (63.56). While few of the respondents use their money to sponsor school farm work (38.33) and Some

also agreed that they could also trek long distance to school farm (48.26). The level of involvement and commitment of agricultural science teachers on Table 1 is an indication that agricultural science teachers have positive attitude toward school farm work.

Research Question 2: How does availability of farming tools determine Agricultural Science teachers' attitude towards school farm?

Table 2: Correllation coefficient of Availability of Farm Tools and Agricultural Science Teachers' Attitude Towards School Farm

Variable	N	Df	Corr-coefficient (rho)	Significant Sig. 2tailed
Corr - coeficient of Availability of Farm tools and Attitude	120	118	0.012	0.853

Table 2 shows relationship between availability of farm tools and teachers attitudes towards school farm. From Table 2, the correlation coefficient is 0.012 while the p value is 0.853 at 0.05 level of significance. Since the p value of 0.853 is greater than 0.05 level of significance, the null hypothesis is hereby rejected which implies that there is no significant relationship between availability of farm tools and teachers attitude towards school farm. This implies that availability of farm tools does not really influence teachers' attitude towards school farm.

Research Question 3: In what way does school type affect Agricultural Science teachers' attitude towards school farm?

Table 3: Correllation coefficient of school type and the Agricultural Science teachers' attitude towards the school farm?

Variable	N	Df	Corr-coefficient (rho)	Significant (Sig.2 tailed)
Corr - coeficient on School type and Attitude	120	118	0.199	0.408

Table 3 shows the test of hypothesis on the relationship between school type and Agricultural science teachers attitude towards school farm. From Table 3, the correlation coefficient (cr) is 0.199 while the P value is 0.408 at 0.05 level of significance. Since the P value of 0.408 is greater than 0.05 level of significance. This shows that there is no significant relationship between teachers attitude to school farm and the type of school in which they teach (that is private or public). Thus, teachers' school type does not influence their attitude towards school farm.

Research Question 4: How does Agricultural Science teachers' academic qualification determine their attitudes towards school farm?

Table 4 Correllation coefficient of Academic Qualification on Teachers' and their Attitude towards School Farm.

Variable	N	Df	Corr-coefficient (rho)	Significant Sig. 2tailed
Corr coeficient of Academic Qualification and Attitude	120	118	-0.012	0.123

Table 4 reveals the hypothesis testing on the relationship between the teachers' qualification and their attitude towards school farm. The Table shows that the coefficient correlation (r) value is 0.012 while the P value is 0.123 at 0.05 level of significance. Since the probability (P) is 0.123 is greater than 0.05 level of significance, the null hypothesis is hereby rejected. This shows there is no significant relationship between the teachers' qualification and their attitude to school farm. This implies that both the qualified and unqualified Agricultural Science teachers have almost the same attitudes towards school farm. This might be as a result of the exposure of the Agricultural Science teachers to practical agriculture during their secondary school period.

Discussion

The findings of this study revealed that agricultural science teachers have positive towards school farm .This finding is similar to that of Onwumere, Modebelu and Chukwuka (2016); Olaitan and Mama (2002) and Kidane (2014) whose studies revealed that teachers had positive attitude towards school farm work and Agriculture.

The findings of this study revealed that availability of farm tools does not determine teachers' attitudes towards school farm. The finding contradicted that of Emeya and Ojimba (2012) whose study revealed that availability of farm implements encouraged teachers full participation in school farm. The schools are expected to equip the school farm and ensure that activities are carried out in order to produce results beneficial and worthwhile to the students and the school.

This study shows that academic qualifications do not affect agricultural science teachers' attitude towards school farm. The finding of this study contradicted the finding of Izumi and Evess (2002) whose study found that teachers' qualification is a factor in improving Agricultural Science teachers' attitude towards school farm.

The study also indicated that school type does not determine Agricultural Science teachers' attitudes towards school farm. This finding was in agreement with Bedi and Grag (2002) who found that private and public schools improve students' attitudes to school farm work.

Conclusion

This study concluded that Agricultural Science teachers' have positive attitudes towards school farm work irrespective of academic qualifications, availability of farm tools and school type. This could have positive effects on teaching and learning of agricultural science and students choice of career in agriculture.

Recommendations

Based on the findings of this study the following recommendations were made:

1. Teachers with positive attitude to school farm work should be encouraged by the management by

providing all necessary farm tools and resources to sustain their interest.

2. Administrator of public and private secondary schools should ensure they have school farm to assist teachers in inculcating practical work into learners.

3. Teachers academic qualifications should not be used as a yardstick for implementing agricultural policies and programmes on school farm work in secondary schools.

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TROUBLESHOOTING SKILL ACQUISITION NEEDS OF VOCATIONAL TEACHERS: IMPLICATION FOR AN UNINTERRUPTED PRACTICAL TEACHING

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Abstract

Faults in equipment and simple machines are not predictable due to the various components working together as a system. Since faults in a system could be impromptu and without prior notice, vocational teachers ought to be equipped with troubleshooting strategies that are easy to recall for diagnosing and fixing common faults in any electronics, automotive or mechanical systems that are used in the teaching/learning process. Fault finding often poses various challenges to vocational teachers who are not skilled in troubleshooting concepts, especially during lesson delivery. When fault or failure occurs during the process of teaching and learning, the vocational teacher is confronted with the challenge of knowing how to detect, locate and rectify the fault within the shortest period of time to avoid interrupting the lesson. The teacher is expected not only to attempt to solve the problem at hand, but also to follow the correct sequence of fault diagnosis without damaging the equipment or system. This article critically looks at some fault diagnosis strategies which were infused into the practice of Nigerian technical college teachers in addressing faults that occur during teaching and learning process.

Keywords: Troubleshooting skills acquisition, Troubleshooting skills strategies, Nigerian vocational teachers, practical teaching.

Introduction

The National Policy on Education, of the Federal Republic of Nigeria (2013) has made it mandatory as one of its goals for Technical and Vocational Education the acquisition of Technical & Vocational skills for commercial and economic development of the nation. In pursuance of such goal, the curriculum encourages effective participation of students and teachers in practical work. Among the required skill in such system is the effective handling of tools, machines and equipment in the practical class. This situation calls for vocational teachers to acquire certain level of skills that will enable them to handle instructional aids during the teaching & learning process.

The place of acquiring fault diagnosis and repair of instructional aids (also known as troubleshooting skill) in vocational education to present and future progress of educational system and the nation cannot be overemphasized. The implication and impact of such skill is so enormous for vocational teachers' effectiveness and the development of the nation's educational system. The global focus on pragmatic approach to teaching will be achieved, and it will foster uninterrupted practical lesson for vocational teachers.

Why Troubleshooting Skill?

What makes equipment's fault diagnosis and repair skill acquisition unique for vocational teachers can be observed from its fundamental meanings and concepts. Failures and faults in equipment and simple machines or instructional aids are not predictable because of the various

components working together as a system. This situation always poses a lot of challenges and difficulties to vocational teachers who are not skilled in troubleshooting concepts especially during lesson delivery. Liang (2012) observed that development of knowledge and skills such as in the case of troubleshooting is one of the objectives of training technicians and technologist.

Troubleshooting skills also referred to as fault diagnosis and repairs skills form the basis of maintaining equipment and devices. It could either be troubleshooting a mechanical device, electronic or electrical system. The purpose is solving a problem or checking the misbehavior of the system against expected behavior until the fault is located and rectified. Whether a faulty power generator, projector, Liquid Cristal Display (LCD) television or computer unit, troubleshooting attempt to check the circuit behavior one by one to isolate the faulty state in order to restore the system back to normal functioning.

In this article, troubleshooting is the complete process of identifying the symptoms of a fault to the taking of appropriate corrective actions on a system (Schaafstal, Schraagen & Van Berlo, 2000). Troubleshooting involves using procedures to isolate and identify what is wrong with a device that used to work and repairing or replacing that part or subsystem to fix the device (Crismond, 2013). Crismond referred to the art of troubleshooting as a bridge that connects engineering design and scientific inquiry. To troubleshoot effectively, students need to know and use many concepts from science, technology, engineering and mathematics disciplines as well as have knowledge of materials, construction techniques, and tools for exploring the devices, including mathematical models (Crismond, 2013). Effective troubleshooting is all about checking a circuit or system behavior against your expectations, one by one, until you find one that does not match (Johnson, 1995).

When faults or failure occurs, during the process of teaching and learning, the vocational teacher is confronted with the challenge of how to detect, locate and rectify the fault within the shortest period to avoid interruption in the lesson. The teacher is expected not only to attempt to solve the problem at hand but also to follow correct sequence of fault diagnosis skill without damaging the equipment or system.

Troubleshooting is a common form of problem solving skill. It is a means of diagnosing and detecting faults in equipment or a machine. Troubleshooting attempts to isolate faulty state in a system repair or replace the faulty components in order to reinstate the system to normal functioning (Ottosen, 2012; Dounas-Frazer and Lewandowski (2017).

Troubleshooting is normally associated with the repair of physical, mechanical or electronic systems. According to Jonassen (2011), troubleshooting problems are in between well structured (i.e. algorithms) and ill – structured (system analysis, design) on the continuum of problems in devices or system.

Challenges in Fault Diagnosing and Detecting.

Most modern technologies applied in designing equipment and tools are becoming complex and difficult for a novice to operate (IDC, 2016; Tafur, Evangelou & Strobel, 2012). Inability of the users to handle it when it suddenly develop a fault usually translates into loss of productivity, damages and bringing down the reputation of the user. This is as a result of the fact that troubleshooting or fault diagnosing and detecting is always accompanied with certain peculiar problems, such problems highlighted by Jonassen and Hung (2006) and Jonassen (2010) and include:

- It sometimes appear ill – defined because the troubleshooter must determine what information is needed for problem diagnosis.
- It requires the construction of a conceptual model of the system being troubleshoot (i.e. how the sub-systems in a system interact).
- It usually possess a single fault state, although multiple faults may occur simultaneously (e. g. faulty fuse, or battery, short-circuit e. t. c.)
- It has known solutions with easily interpreted success criteria.
- It rely most efficiently on experience – based rules for diagnosing most of the cases, making it more difficult for novices to learn.
- It requires the learners to make judgments about the nature of the problem, and
- Vary significantly in terms of system complexity and dynamicity.

Troubleshooting is predominantly a cognitive task that include the search for likely causes of faults through a potentially enormous problem space of possible causes (Schaafstal, et al., 2000). It is therefore obvious that before operating an equipment for instructional purpose, the user ought to possess some basic troubleshooting knowledge and skills to apply whenever faults or failure occur.

Basic Knowledge and Skills Required to Troubleshoot

Fault diagnosing and detecting is usually taught as a linear series of decisions that direct the fault isolation. This flowcharts and decision tables are usually recommended to lead beginners through a series of actions that will isolate and detect the fault.

The form of troubleshooting skill required for vocational teachers is the beginners' troubleshooting skill. Although, fault diagnosing and detecting skill acquisition is a holistic activity rather than a specific practical task (Bukar, 2000). Vocational teachers should see it as a task that involves the combination of all the three domains of learning. Fault diagnosis predominantly requires the ability to reason quickly and apply the known principles through critical observation of components characteristics and use of suitable test instruments using few manual skill (Jonassen, 2011).

Some technical experts have identified the basic knowledge and skills required in troubleshooting. As reported by Ericsson and Smith (1991), the following kinds of basic system knowledge are most generally accepted as essential for troubleshooting:

i) The domain knowledge: this refers to the general theories and principles upon which the system or devices was designed.
ii) System/devices knowledge: this is the conceptual knowledge of how a system works. System or device knowledge is an understanding of the structure of the system, the function of the components within the system and the behavior of the components as they interact with other components in the system (IDC, 2016).
iii) Performance/procedural knowledge: this involves the task performance required and procedures that must be known and practiced. Dounas-Frazer and Lewandowski, (2017) argued that procedural knowledge is specific to the system and the tools used to troubleshoot it.
iv) Strategic knowledge: strategic knowledge plays an essential role in troubleshooting by reducing the problem space, isolating the potential faults and testing and evaluating hypothesis and solutions. Dounas-Frazer & Lewandowski (2016) argue that beginners in troubleshooting skill's learning requires strategic knowledge because, it helps the troubleshooters confirm the hypothesis and solutions they have generated or seek new alternatives when the existing hypothesis or solutions are confirmed false or unfeasible.

Jonassen and Hung (2006) classified the skills required for Technical troubleshooting and stressed that technical trouble shooting skill is a form of problem solving skill. Technical fault diagnosing, detecting and repairs has to do with the ability to detect, locate and rectify faults in electronics, mechanical and automotive systems, especially as it concerns educational aids, such as projector, generator, television, monitors, personal computer and many others.

Based on evidence gathered from past exploratory studies, five factors were linked with technical fault diagnosing and detecting skill. Highlighted among these factors are the technical fault diagnosis experience, cognitive skill, critical thinking skill, cognitive style and problem solving style skill (Jonassen & Hung, 2006, p. 104). When technicians and trainers were assessed based on these variables, the six skills were ranked according to their level of importance in troubleshooting process. Years of experience was the strongest indicator of technical fault diagnosis skills. Findings indicate that a solid base of content knowledge is necessary in order to be skilled enough to solve technical fault problems. Cognitive technical knowledge proved to be an effective Predictor of technical fault diagnosis skills and ranked second. When the assessment were analysed, the strongest correlation was between cognitive technical knowledge and the information acquisition dimension. Critical thinking skills factor was found to be an effective predictor of trouble shooting skills. It ranked third. Findings have well revealed that combination of the first three factors serve as particular strong indicators of technical troubleshooting capabilities (Rivera-Reyes & Boyles, 2013). Cognitive style is field dependence. It is not all that an effective predictor of trouble shooting skills. Problem solving style was found to be the least important indicator to acquire an effective technical fault diagnosis and repair skill.

Models for troubleshooting

Although, various instructional models have been developed for troubleshooting by researchers, none of these models integrated the different knowledge states, especially the experiential knowledge which was incorporated by Jonassen and Hung (2006). These authors proposed that the process of learning how to troubleshoot must include the five steps of troubleshooting process. These include, constructing the problem space, identifying fault symptoms, examining and diagnosing fault(s), generating and verifying solutions, and recalling the previous experiences. These steps are followed sequentially based on the state of the system that requires troubleshooting until the fault(s) are removed and the system restored to normal functioning.

In a latter development, Ross and Orr (2009) advanced troubleshooting model and emerged with a six-steps standardized troubleshooting model referred to as the DESCAR model. It was an improvement on the Jonassen and Hung (2006) model which increased the troubleshooting skill abilities of college students in Information and Technology profession. The DESCAR model was integrated into the standard curriculum of an information technology program at a large college and was found that there was improvement in several areas of troubleshooting where the model was reinforced. DESCAR model (Figure 1) comprised of six steps which encourage students to deliberately get engaged in the troubleshooting process.

The steps include, defining the problem; examine the situation; consider the causes; consider the solution; act and test and finally review the troubleshooting process. The different stages of the troubleshooting process are comparable to those found in other methods. The specific contribution of the DESCAR model is the inclusion of a more cyclical process by means of backward steps and the explicit recommendation to

use the method in an interpersonal context (Ross & Orr, 2009). A critical analysis of the models revealed that, the art of troubleshooting is not just a physical task; rather it is a combination of cognitive, affective and psychomotor domains.

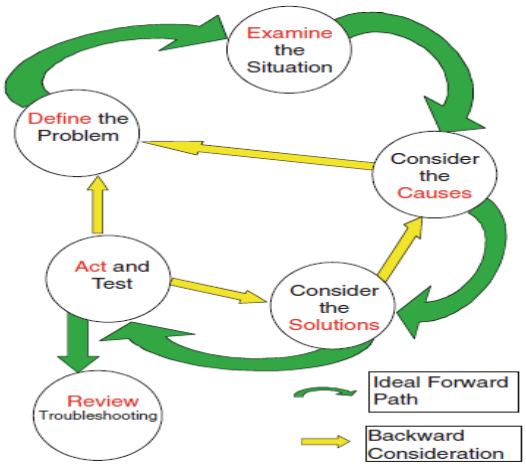

Figure 1: *DESCAR Model of Troubleshooting by Ross and Orr (2009)*

The necessity of adequate troubleshooting skill for vocational teachers

The instructional process will not be effective if the instructor or teacher is poorly qualified and ill equipped with the technical knowledge of the equipment being utilized. When a vocational teacher does troubleshooting such as in the beginner's level, the output of the process provide feedback to the troubleshooter and enhances the skill and confidence to conduct an uninterrupted teaching and learning process. Tafur, Evangelou and Strobel (2012) argues that through the process of fixing a faulty artifact or equipment, the individual can close the gap in his or her technological problem-solving literacy. Teaching and instructing principles require among other things that, the learning process should among others; (i) address challenging problems which helps to stimulate learning, (ii) enhance effective transfer of learning, (iii) be a process of the whole individual that operates with least possible interruption and (iv) be logical and orderly (Rosenshine, 2012)

In order to achieve the purpose of learning by vocational teachers, the above principles suggest the need for adequate fault diagnosis, detecting and repairs skill so as to avoid common problems of interruption that usually occur when teaching and training process is in progress. The vocational teacher who has possessed the basic knowledge and skill in technical fault diagnosis and repairs ensure any problem(s) emerging from the instructional aid is solved without interfering with the process of teaching. Since fault(s) in a system could occur impromptu without prior notice, the vocational teachers ought to be equipped with some easy to recall steps for diagnosing and fixing common faults in any electronics, automotive or mechanical systems that is used in the teaching/learning process. The following algorithms were infused into the technical college students' programme and were found productive and efficient for novices and beginners in troubleshooting skills.

Three basic Television system problems and troubleshooting algorithms identified in this article include:

1. Common problems with LCD Television/Computer Monitor Unit
2. Connection problem.
3. Video/Colour problem.

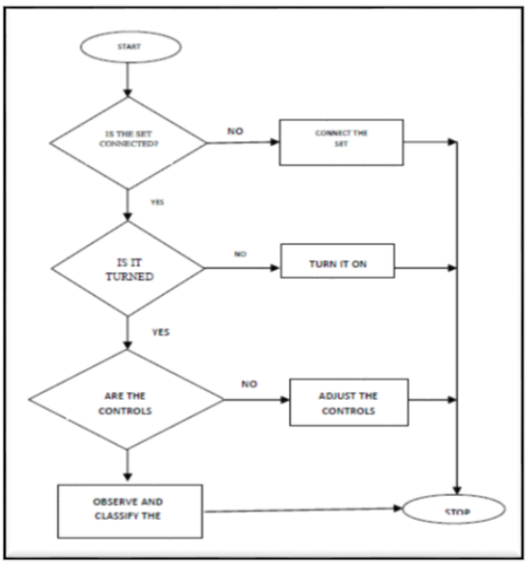

Figure 2: *Flowchart for locating common problems in Television/ Computer Monitor Unit*

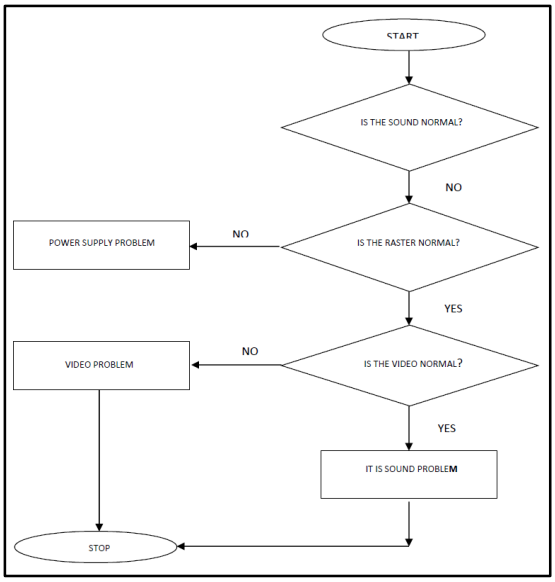

Figure 3: *Flowchart for Locating Connection Problem*

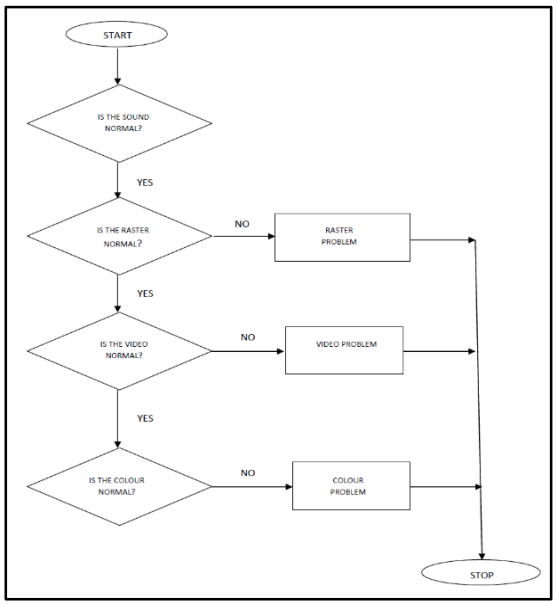

Figure 4: *Flowchart for Locating Video Problem*

Table 1: Basic Generator troubleshooting tips

Problems	Cause	Correction
Engine is running but no AC output is available	One of the circuit breakers is open. Fault in generator. Poor connection or defective cord set. Connected device is bad.	Reset the circuit breaker. Contact authorized Technician Check and repair. Connect another device that is in good condition.
Engine runs good at no load but "bogs down" when loads are connected.	Short circuit in a connected load. Engine speed is too slow. Generator is overloaded; Shorted generator circuit. Clogged or dirty fuel filter.	Disconnect shorted electrical load. Contact authorized Technician Reduce the load. Contact authorized Technician Clean or replace fuel filter.
Engine will not start; or starts and runs rough.	Start switch in off (O) position. Fuel valve is in "Off" position. Failed battery Low oil level Out of fuel	Turn key in Start switch (I) to run. Turn fuel valve to 'ON' position. Replace battery. Fill oil to proper level. Fill fuel tank.
Engine shuts down when running.	Load is too high. Dirty air filter. Dirty fuel	Reduce the load to manual specification. Replace air filter. Clean or replace filter.
Engine 'hunts' or falters	Clogged or dirty fuel filter. Carburetor is running too rich or too lean.	Clean or replace fuel filter. Contact expert.

Source: www.auroragenerators.com

Troubleshooting as described in figures 1 to 3, and Table 1 shows the quick-to-apply strategies for developing problem-solving skills by vocational teachers. These are needed to increase the problem solving skills and literacy of non-engineers and technologists.

Conclusion.

Training of vocational teachers who are not specialized in maintenance and repairs of electrical/electronics and mechanical instructional materials and equipment will be inadequate if there is no basic knowledge of troubleshooting skills of commonly used equipment in the classroom for lesson delivery. It is therefore obvious that troubleshooting skill acquisition needs of vocational teachers is an essential aspect of effective service delivery. This knowledge and skill if acquired will enhance efficient and uninterrupted teaching and learning. Vocational teachers require this skill to make them better in their job.

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CULTURE OF TRUST AND SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN ADO LOCAL GOVERNMENT EKITI STATE, NIGERIA

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Abstract

The purpose of this study was to find out the relationship between culture of trust and secondary school students' academic achievement in Ado Local Government, Ekiti State. The study adopted the descriptive research design of the survey type. The study population consisted of all the public secondary school teachers in Ado Local Government Area. The sample used was made up of 100 teachers selected from five secondary schools, using simple random sampling technique. The research instrument was self-designed and tagged "Culture of Trust Questionnaire" (CTQ). An inventory was used to collect students' WAEC results for the periods of 2013/2014 to 2015/2016 academic sessions. The instrument (CTQ) was validated by research experts and tested for reliability. A reliability coefficient of 0.78 was obtained using test re-test method. The data collected were analyzed using percentage scores, mean, standard deviation, Pearson Product Moment Correlation and t-test statistics. All hypotheses were tested at 0.05level of significance. The findings revealed a significant relationship between culture of trust and students' academic achievement. It also revealed that the gender of teachers had a significant influence on their trust relationship. Based on the findings, it was recommended among others that government and education stakeholders as a matter of policy, should encourage trust initiatives in secondary schools.

Keywords: Culture of Trust, Academic Achievement, Relationship, Cooperation, Harmony

Introduction

The quality of education in Nigeria tends to be evaluated in terms of the numbers of student passing national examination. Meanwhile, teachers have been known to have important influence on students' academic achievement. It appears that the secondary schools are not effective in recent years because teachers have been alleged by stakeholders of not doing their job as expected in the school system. Trust relationship seems lacking among the secondary schools teachers. Trust, as explained by Hoy & Miskel (2013), is the teachers' willingness to be vulnerable to another party based on the confidence that the party is benevolent, reliable, competent, honest and open. Trust is an important aspect of relationships in many organizations including schools.

Given the strategic place of secondary education in the Nigeria education system, it is important that it should be "near perfect" in both standard and quality but the present state is a major concern as it is evidenced in various external examinations conducted on yearly basis. The researcher observed that the statistics released by WAEC in Nigeria between 2011-2015 May/June showed 30.9%, 38.81%, 36.57%, 31.28% and 38.68%, respectively that obtained five credits and above. Source: dailypost.ng>Education. Also in 2016 and 2017, the statistics released by WAEC for May/June showed 53% and 59.22% five

credits pass including English and Mathematics which is still considered inadequate. (Adesulu, 2016). Moreover, only 50 percent of the participants, obtained the minimum of credits in five subjects and above, including English Language and Mathematics in 2018. Source: MySchoolGist.

The researcher observed that culture of trust could affect students' learning outcomes. A major problem in any organization is the lack of trust among personnel. According to Hoy & Miskel (3013), if the relationships in schools are to be open and healthy, as we have seen, it seems likely that teachers must trust not only their leaders but also their colleagues as well as students and parents. It appears teachers do not trust their colleagues as competent and open. Teachers do not trust their students as competent learners. The need for trust exists in many social relations in school because of the high level of interdependence. For example, no meaningful teaching and learning can take place in the classroom environment where teacher's interaction seems to be poor. This idea was supported by Aladejana (2015), that the teacher is very important in dictating the classroom environment by verbal and non-verbal communication. Bryk & Schneider (2002), studied culture of trust in Chicago public schools, they found that trust was pivotal in improvement in mathematics and reading performance. They reported that schools with strong positive trust levels were three times more likely to be categorized eventually as improving in mathematics and reading than those with very weak trust reports.

Trust has the potential to exist on many levels in a school community – between teachers and students, teachers and parents, teachers and teachers, teachers and principals, students and parents, parents and parents. The researcher observed that trust is an important aspect of relationship in the process of teaching and learning. Its presence or absence can make a difference (Kirkman, 2014). Konwea (2017) noted that individuals in inter-personal relationship share common goals and objectives, and have a sense of trust. Trust in schools is important because it facilitates cooperation (Tschannten-Moran, 2001). Culture of trust seems to go a long way in influencing students' learning outcome. Trust relationship has important, positive and long-lasting implications on students' learning outcomes. In the opinions of Rimm-Kaufman and Sandilos (2016), a student who feels a strong personal connection to her teacher talks with the teacher frequently and receives more constructive guidance and praise rather than just criticism from her teacher. Students often appreciate their relationship with the teachers and the prevailing climate of harmony and trust within the school.

Culture of trust in secondary schools could be influenced by gender. Gender, according to Adigun, Onihunwa, Irunokhai, Sada and Adesina (2015), is the range of physical, biological, mental and behavioural characteristics pertaining to and differentiating between the female and male population. Males and females could show great differences in their cultural interest. These differences, as explained by Nnamani and Oyibe (2016), may be attributed to the psychological differences and cultural differences. Feminine cultural model seems to be opposed to the male. The larger society seems to see females as the difficult sex.

The extent to which the teacher trusts their students as competent learners, the more productive is likely to be. This was supported by Aladejana (2015), that history teacher seemed to find fault with everything about me, giving me up as a never-do-well. The extent to which the culture of trust could influence students' achievement in a school setting is the basis for this study.

Statement of the Problem

The problem of this study arose from the assumption that the student academic achievement is poor as a result of problem arising from culture of trust. Trust which could impact the academic achievement of students in secondary schools appears lacking. It appears the expected level of teachers performance as reflected in the students' learning outcomes had not been achieved in schools over the years. It has been argued that trust relationship in some school communities are missing. It seems teachers do not trust their colleagues as competent and open. Teachers do not trust their students as competent learners, instead found their personal affront and sees them as never do well instead of encouragement. Male teachers seem to have perceived culture of trust than that of female counterparts. Students' academic achievement seems to be a function of trust relationship in schools hence, the need for investigation into the trust of relationship as a change process towards academic achievement in secondary schools.

Purpose of the Study

The purpose of the study was to examine the relationship between culture of trust and academic achievement in secondary schools in Ado Local Government area of Ekiti State with a view to making suggestions for better achievement. The study investigated the extent to which culture of trust relate to students academic achievement. The study also examined the influence of gender on culture of trust among the teachers.

Research Questions

The following research questions have been raised in the study:

1. What is the level of culture of trust in secondary schools in Ado local government, Ekiti State?
2. What is the level of students' academic achievement?

Research Hypotheses

The following hypotheses have been formulated in the study

1. There is no significant relationship between culture of trust and students' academic achievement in Ado Local Government secondary schools.
2. Gender will not significantly influence the culture of trust among the teachers.

Methodology

The research design adopted for this study was the descriptive research of the survey type. All public secondary school teachers in Ado Local Government Area of Ekiti State constituted the population of the study. One hundred teachers were sampled from selected five secondary schools using simple random sampling technique. A questionnaire titled "Culture of Trust Questionnaire" (CTQ) was designed and used to collect the data used for the study. An inventory was used to collect students WAEC results for the periods of 2013/2014 to 2015/2016 academic sessions. The instrument (CTQ) was validated by research experts and tested for reliability. A reliability coefficient of 0.78 was obtained using test-re-test method. Ten items were designed to elicit responses on culture of trust with the desired responses based on the 4points Likert – scale of measurement such as: Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD). The data collected were analyzed using percentage scores, mean, standard deviation, Pearson Product Moment Correlation and t-test statistics. All of the hypotheses were tested at 0.05level of significance.

Results

The results of the study are presented under two major sub-headings namely: descriptive and inferential.

Descriptive Analysis

Research Question 1: What is the level of culture of trust in secondary schools in Ado local government of Ekiti state?

Table 1: Level of Culture of Trust in Ado Local Government Area of Ekiti State

	Frequency	Percentage
Low level (8.0-15.72)	7	7.0
Moderate level (15.73-22.47)	74	74.0
High level (22.48-32.0)	19	19.0
Total	**100**	**100**

Table 1 revealed the level of trust relationship. The result showed that out of 100 teachers sampled, 7% had low level of trust while 74% had moderate level and 19% had high level. This showed that the level of trust of relationship among teachers in Ado local government area of Ekiti State was moderate.

Research Question 2: What is the level of students' academic achievement?

Table 2: Level of Students' Learning Outcomes

Learning Outcomes	Freq	%	Mean	SD	Remarks
Less than 4 Credits	195	21.08	6.66	3.37	Low
4 Credits	104	11.24	9.81	8.51	Low
5 Credit and above	626	67.68	29.16	9.47	High

Cut off point: 15.2

Table 2 showed that 67.68% of the respondents had 5 credits and above including English and Mathematics, 11.24% had 4 credits while 21.08% had less than 4 credits. From the table, it is obvious that the level of students' academic achievement was high.

Hypotheses 1: There is no significant relationship between culture of trust and students' academic achievement.

Testing of Hypotheses

Table 3: Relationship between Culture of Trust and Students' Academic Achievement

Variables	N	Mean	SD	r_{cal}	rtab
Culture of trust	100	19.10	3.377	.268*	.007
Academic achievement	925	48.00	26.131		

***p < 0.05**

From Table 3, the r_{cal} of 0.268 is significant at 0.05level of significance. This implies that there is significant relationship between culture of trust and students' academic achievement. Thus, the null hypothesis is rejected.

Hypothesis 2: Gender will not significantly influence the culture of trust among secondary school teachers

Table 4: t-test Analysis of Male and Female Teachers' Trust Relationship

Variation	N	Mean	SD	Df	t_{cal}	rtab
Male	30	20.00	1.438	98	1.763*	.01
Female	70	18.71	3.872			

***p < 0.05**

Table 4 shows that the t_{cal} value 1.763 is significant at 0.05level of significance. The null hypothesis is therefore rejected. Thus, gender has a significant influence on the culture trust relationship. The mean scores

implies that male teachers in terms of trust relationship differs from that of female. Male teachers in terms of trust relationship (ẍ = 20) was higher than female teachers (ẍ = 18.71).

Discussion

The study revealed that the trust of relationship in secondary schools in Ado Local Government Area of Ekiti State was moderate while students' academic achievement was high. The study also revealed that there was significant relationship between culture of trust and academic achievement. This by implication means that trust relationship has important, positive and long-lasting implication on students' academic achievement. What can be responsible for this finding may be the fact that the secondary school management has realized that individuals in interpersonal relationship share common goals and objectives and have sense of trust. The interest of one cannot be achieved without reliance upon another. This finding is consistent with views of Tschannen-Moran (2001), that trust in schools is important because it facilitates cooperation.

The study showed that gender has a significant influence on their trust relationship. This equally suggests that male and female show great differences in their interest as regards trust relationship. These differences as explained by Filgona and Sababa (2017) may be attributed to the psychological differences and cultural differences.

Conclusion

Based on the findings of this study, it can be concluded that there is the need for good interpersonal relationship in secondary schools as a critical factor to increase students' academic achievement.

Recommendations

It was therefore recommended that government and other stakeholders as a matter of policy should encourage trust initiatives in secondary schools. School administrator should try as much as possible to supervise teachers and ensure good interpersonal relationship among teachers to stimulate greater improvement in teaching and learning. Moreover, there should be no disparity in the interest of male and female teachers towards interpersonal relationship.

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TEACHERS' PEDAGOGICAL COMPETENCE AS DETERMINANT OF STUDENTS' PERFORMANCE IN BASIC SCIENCE IN SOUTHWEST NIGERIA

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Abstract

This paper investigated teachers' pedagogical competence as determinants of students' performance in Basic Science in South- West Nigeria. The study adopted a descriptive research of survey type. The sample consisted of 2160 students which were randomly selected across the four States in South- west Nigeria together with 243 teachers teaching Basic Science in Junior Secondary School which were purposively selected. Data were collected with instruments titled "Basic Science Teachers pedagogical Competence Questionnaire (BSPCQ) and Basic Science performance test (BSPT)". The reliability of the instruments were determined through test re-test method which yielded a correlation co-efficient of 0.87 and 0.92 for BSPCQ and BSPT, respectively at 0.05 level of significance. Mean, Ranking order and Multiple Regression were used to analyze the data. Findings revealed that, teachers' pedagogical competence can significantly influence students' performance in Basic Science. It was recommended that, emphasis should be laid on teachers' mode of teaching in the classroom by recruiting professional teachers. Teachers should also intensify efforts in using various teaching styles which could influence students' performance. In addition; teachers should make use of instructional materials while teaching to motivate students towards good performance in the classroom. Teachers should show their levels of competence that can influence students' performance in Basic Science. Government and other educational stakeholders should arrange for seminars and workshops for their teachers to boost their levels of competence in the classroom.

Keywords: Teachers' pedagogical competence, Students' performance, Basic Science.

Introduction

Teaching and learning at all levels of education involve the development of subject matter expertise and qualified teachers are supposed to be experts in their fields of study. Competent teachers as experts have personal ability to develop student's capabilities towards learning. In other words, any activity undertaken by a person is expected to yield maximum result (Adnan 2015).

Pedagogical competence, according to Suciu and Mata (2011) is either the composition of potential capacities which allow for efficient manifestation of an activity, or a minimum professional standard, often specified by law, which professionals should reach. Also, Popoola (2013) described pedagogical competence as a concept that talks about one's competence in the learning management. Hence, it is the duty of a competent teacher to teach students with teaching styles that appeal to their knowledge. Application of knowledge and skills in the classroom through the use of various teaching styles plays a significant role in the intellectual development of the students.

Moreover, researches have shown that teachers are instrumental to successful teaching and learning in the classroom. However, for a teacher to be able to deliver

effectively, he must be able to provide more learning opportunities for students both in quality and quantity (Akhyak, Idrus and Bakar 2013). Today, many Basic Science teachers are not aware that whatever step taken by them exerts impact on students' performance. Oser, Fritz and Oelkers (2001) stressed that a good knowledge of pedagogical competence will contribute to student's typology and principle of development which will lead to a future successful application in any field. They stressed further that this will also develop interdisciplinary thinking, creativity and managerial qualities of students in any field. This implies that teacher must possess good managerial policy which can positively influence the performance of students.

To ensure and promote pedagogical competence of teachers, Latchem, Odabasi and Kabasi (2006) in an international overview of professional development of teachers, submitted that there is a need for teachers to embrace new forms of educational delivery, such as open, distance, blended and work-based learning and master the latest tools and methodologies of information and communication technology. Teachers are role models to students in the classroom and students copy from them. Therefore, teachers must comprehend both learning and instructional principles in a meaningful way to impart knowledge to them.

Gold Haber and Brewer (2000) reported that a positive relationship exists between teacher's preparation for what they teach and student's performance.

Teacher's knowledge of subject matter is vital to effective teaching and learning. Subject matter comprehension will help a teacher to be confident and vast in transferring knowledge to his /her students. According to Uya (2011), a teacher who has a deep understanding of the concept to be taught, is more likely to be effective in his teaching. In the same vein, Haidir and Ahmad (2015) asserted that planning a good instructional design will give an interesting teaching environment and positive impact to students. The researchers believed that, the inability of a teacher to prepare well will affect student negatively in their performance.

Knowledge of subject matter, according to Eggen and Kauchak in Jose, Claudia and Luis (2006), is divided into three dimensions under which it can be measured. They are: content knowledge, pedagogical knowledge of content and general knowledge. This implies that a teacher has to teach what he or she understands very well.

Teaching without a specific teaching style would amount to no teaching because the influence of teaching is expected to be reflected in the attitude and performance of the students taught. The study by Popoola (2013) confirmed that, input determines output. Also, Hamilton-Ekeke (2013) maintained that a competent teacher is one who engages students in dialogue to achieve genuine learning because when students and teachers are engaged in shared critical dialogue, they mutually create and construct knowledge instead of passively transmitting it, since they can share their experiences, reflect upon them and finally make critical evaluation regarding the way they themselves have obtained that knowledge and those experiences.

The study of Kosgei, Mise, Odera and Ayugi (2013) revealed that teachers should have and also apply specific abilities for their influence to be reflected in their students' performance. In the same vein, Afolabi (2009) in his study affirmed that among several other factors responsible for poor performance in Basic Science, inadequate teaching style serves as a major factor.

It is very unfortunate that some Basic Science teachers seem not to understand this, and that has been of great concern to policy makers for so many years. The poor performance of students in science subjects

has continued to be a major cause of concern to all, particularly those in the mainstream of science education (Akpoghol, 2001).

Communication is very important to teaching and learning of Basic Science and the tool of communication is language. Language reveals a lot of what we think and believe. The inappropriate use of language can transmit negative message to students of Basic Science. For instance, teacher's use of foul language at the beginning of the lesson such as you cannot pass this subject or you are a dullard seems to create fear in some of the students. Students can react to language stimuli spontaneously (Oyinloye and Gbenedio 2010). Foul language can inhibit learning in such a way that could make a student develop negative attitude to the teacher and the subject he teaches.

Again, lack of motivation is observed as one of the challenges affecting students' attitude and performance in Basic Science. Motivation promotes teaching effectiveness and students' learning activity. Prompt payment of teachers' financial benefits motivates them to discharge their duties effectively. The experience of the researcher with what is going on among public secondary school teachers has shown that a teacher who is well motivated is likely to improve in his teaching and this will ultimately affect students' attitude and performance. As posited by Akpohere (2011), lack of adequate motivation in a system has a negative effect on staff performance. He stressed further that, motivation is the force or condition within an organization that compels workers to willingly work for the progress of the organization. Human beings generally require some sort of internal and external drives, incentives, encouragement and satisfaction of basic needs to get the best from them towards the accomplishment of the group's goals and objectives. Educationally, teacher's productivity can be high or low based on the kind of motivation given to them.

Furthermore, instructional materials which also serve as motivated materials can be employed by teachers to facilitate instructional process. Oyedun (2000) believed that, for effective and positive production in any establishment, there must be enough working tools to be used by the personnel, as this creates an enabling environment or medium through which knowledge is transferred from the familiar to the unfamiliar-analogical process. Instructional materials are materials used to improve teaching and learning. They can be real-life objects or improvised materials. These materials are always around us, but some Basic Science teachers do not normally use them while teaching in the classroom. As a classroom teacher, the researcher observed that most Basic Science teachers teach in abstract even though they were supplied with mobile laboratory equipment. They neglect the laboratory activities which they are supposed to carry out. Teachers cannot provide all the instructional materials needed by them but they are supposed to make use the available materials. This seems to have led to the negative attitude developed by some students towards learning of Basic Science and this as well affects their performance in the classroom. However, Oyedun (2000) and Williams (2004) in their studies confirmed the extent of utilization of instructional materials in secondary schools and found that the use of instructional materials seems not adequate and this leads to poor performance of students in Basic Science. Also, the study of Moronfola (2002) revealed a significant effect of material resources on the students' academic performance. Isola (2010) noted that material resources have significant effect on students' performance in each subject. Teachers are expected to use teaching styles which can influence students' academic performance in the classroom.

Purpose of the study

The purpose of this study is to examine teachers' pedagogical competence (such as teacher's knowledge of subject matter, communication, teacher's teaching style, motivation and the use of instructional materials) as determinants of students' performance in Basic Science. It is also to examine the joint interaction of these variables on students' performance in Basic Science.

Research Questions

The following Questions were raised for the study.

1. What pedagogical competence influence students' performance?
2. Which of the teacher's pedagogical competence would influence students' performance in Basic Science?

Research Hypotheses

The following research hypothesis was tested at 0.05 level of significance.

Teachers' pedagogical competence will not significantly determine students' performance in Basic Science

Methodology

Research design

This study employed descriptive research design of the survey type to describe the influence of teachers' pedagogical competence of (knowledge of the subject matter, motivation, level of communication, teachers' teaching style and instructional materials) as determinants of secondary school students' performance in Basic Science. The design is suitable because it enabled the researcher to gather relevant information from Basic Science teachers and students using qualitative measure of survey.

Sample and Sampling techniques

The sample of the study comprised 2,160 Junior Secondary School students offering Basic Science using multistage procedure. Three States out of six States in South West of Nigeria were selected for the study using random sampling techniques, while three Senatorial Districts were selected of the selected state. The third stage involved the random selection of three Local Government Areas from the three Senatorial districts of each state selected, making a total number of 27 Local Government Areas. The fourth stage involved the use of simple random sampling technique to select three public secondary schools from each of the selected Local Government Areas making a total number of 81 public secondary schools. Stage four involved the selection of at most 40 students from each of the selected schools (making a total of 2160 students) using simple random sampling technique. The fifth stage involved the purposive selection of three teachers teaching Basic Science in junior secondary school classes from each of the selected schools (making a total number of 243 teachers). In all, the total sample of 2,160 students and 243 teachers were selected for the study.

Research Instruments

Three sets of instruments were used to collect data for the study. These are Basic Science Teachers' Pedagogical Competence Questionnaire (BSTPCQ) and Students' Attitudinal Questionnaire (BSPT). The Basic Science Teachers' Pedagogical Competence Questionnaire (BSTPCQ) contained 25 structured items and Basic Science Performance Test (BSPT) also contained 25-item structured respectively. The Basic Science performance Test (BSPT) has two sections. Section A requested information about the name and sex of the student, and the school location. Section B contained 30-item objective questions which were prepared by the researcher based on the contents of the topics taught by the teachers as at the time of the study. The students were asked to pick the appropriate option on each item. These items were given to three experts in the field of Basic Science and two experts in the area of test, measurement and evaluation from the University for Face and Content validities respectively.

Test-retest was used to determine the reliability of the instruments from which yielded reliability coefficients of 0.87, and 0.92 for BSTPCQ and BSTP respectively. Pearson's Product Moment correlation was used to determine the reliability of the instrument. Each of the items of the BSPT was scored one mark. Thus the total mark obtained by a subject is twenty-five (25) marks. The data collected were analyzed using mean, ranking order and multiple regressions.

Results:

1. What pedagogical competence influence students' performance?

Table 1: Mean and ranking order of teachers' pedagogical competence influencing students' performance in Basic Science

S/N	Teachers' pedagogical competence	N	Mean	SD	%	Relative Ranking
1	Use of instructional materials	2089	3.27	1.024	20	2ND
2	Knowledge of subject matter	2089	3.19	1.011	19.51	4TH
3	Teachers' motivation	2089	3.25	1.014	19.88	3RD
4	Communication style	2089	3.19	1.011	19.51	4TH
5	Teachers' teaching style	2089	3.45	1.212	21.10	1ST
	Total	2089	16.35	5.272	100	

Table 1 showed the mean analysis of the teachers' pedagogical competences influencing students' performance in Basic Science. Teachers teaching style has the highest mean score of 3.45; teachers' use of instructional materials has a mean score of 3.27; teachers' motivation has a mean score of 3.25, while teachers' knowledge of subject matter and communication skill have a mean score of 3.19 each. It can be deduced from the table that the highest variable that can influence students' performance in Basic science is teachers' teaching style.

Hypothesis 1: Components of teachers' pedagogical competence will not significantly influence students' performance in Basic Science.

Table 2: Multiple regression analysis of teachers' Pedagogical Compe-tence and Student Performance in Basic Science

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std Error	Beta		
(Constant)	29.935	1.524		19.636	0.000
Use of Instructional materials	0.104	0.065	0.027	1.599	0.110
Knowledge of subject matter					
Teachers' Motivation	0.516	0.044	0.197	11.596	0.000
Teachers' communication style	0.925	0.054	0.251	17.130	0.000
Teachers' teaching style	0.509	0.050	0.199	10.273	0.000
	1.440	0.062	0.451	23.162	0.000

P< 0.05 Dependent variable: Students' performance in Basic Science
Multiple R = 0.753 F-ratio = 546.296
R^2 = 0.567
Adjusted R^2 = 0.566
Y = (Group) =29.94 I = 0.104 UIM+
$YI = a + bx_1 + c\ x_1 + dx_3 + \ldots\ldots$

Table 2 revealed that there is positive multiple correlation between independent variables and students' performance in Basic Science (R= 0.753). This implies that all the predictor variables are factors that can influence students' performance in Basic Science. The value of the coefficient of determinant (R^2=0.567)indicated that all the independent variables jointly accounted for 56.7% of the total variation in students' performance in Basic Science while the remaining 43.3% unexplained variation could largely be due to other variables not examined in this study. This implies that there are other variables that accounted for students' performance in Basic Science. The calculated F ratio (546.296) was significant at 0.05 level significance. Thus, the hypothesis is rejected. This implies that the independent variables will jointly provide significant influence on students' performance in Basic Science.

Discussion

The finding revealed that the highest variable that can influence students' performance in Basic science is teachers' teaching style. The findings of Kosgei, Mise, Odera and Ayugi (2013) supported that teachers use and application of specific abilities for their teaching influence their students' performance in the subject. The study of Afolabi (2009) also affirmed that inadequate teaching style serves as a major factor that have been identified to cause poor performance of students in science and science related subjects. The finding also showed positive correlation between teachers' pedagogical competence and students' performance in learning Basic Science. The teacher's use of instructional materials was rated highest among other teachers' pedagogical variables that could determine students' performance in learning Basic Science. This finding is in agreement with Isola (2010) and Popoola (2013) who in their studies asserted that teachers pedagogical skills such as the use of instructional materials serve as a major factor that determine the performance of students in the subject. On the contrary, the findings of Oyedun (2000) and Williams (2004) also revealed that the extent of utilization of instructional materials in secondary school lead to poor performance of students in Basic Science.

Conclusion

It can be concluded from the findings of this study that of all the teachers' pedagogical competence variables teachers teaching skills has the highest influence on students' performance in Basic Science. The finding also revealed that teachers' pedagogical competence can influence students' performance in Basic Science with the teachers' use of instructional materials.

Recommendations

The following recommendations were made based on the findings:

1. Teacher should adopt the best teaching style which can influence students' performance in Basic Science.
2. Teachers should use relevant instructional material to teach student to influence students' performance in Basic Science.
3. Teachers should show their levels of competence that can influence students' performance in Basic Science.
4. Government and other educational stakeholders should arrange for seminars and workshops for their teachers to boost their levels of competence in the classroom.
5. Teachers of Basic Science should be given opportunities to update their knowledge through in-service training.

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EFFECTS OF TEACHING BASIC SCIENCE ON YOUTHS' PERFORMANCE IN SKILLS ACQUISITION PROGRAMME IN EKITI STATE

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Abstract

The study sought to evaluate the effects of teaching basic science on skill acquisition. The purpose was to determine what effect the knowledge of basic science would have on in skills acquisition among youth in Nigeria. The study made use of quasi-experimental research design. The sample consisted of eighty youths chosen from two acquisition centres in Ekiti State. The two centres were randomly selected. Two research hypotheses were generated and two instruments were constructed by the researcher which include; Basic Science Achievement Test (BSAT) and Skill Acquisition Scoring Sheet (SASS). Data collected through the instruments were analysed using mean and t-test at 0.05 level of significance. The result of the study show that there was a significant difference in the performance of youths taught basic science and those not taught basic science in skill acquisition. Based on the findings, it was therefore recommended that youth should be taught basic science in order to enhance their achievement in acquisition of skills.

Key Words: Skill acquisition, Performance, Youth, Acquisition centre and Determinant

Introduction

Evidence abound in the society that Science and Technology is a vehicle for all-round development of any nation. Therefore, to a very great extent, the level of the technological development of any nation may determine the standard of living of the citizen of that nation. Due to this, any nation that wishes to be recognized globally must ensure that she encourages Science and Technology.

Science is the study of nature and environment through which people can develop both enquiry and disciplined logical power of thought. It has been the key to technological take off and has played a vital role in improving the lots of mankind through agriculture, transportation, communication, medicine and others. A scientifically literate society should be the one in which citizens possess curiosity, manipulative ability to plan, design and conduct investigations. The teaching of science thus places greater emphases on the process skills acquisition than learning of scientific facts (National Teacher Institute 2011). The understanding of science helps man to know more about the universe. Without the application of science, it would have been impossible for man to explore the other planets of the universe. By and large, the present trend of development is geared towards technological advancement and this cannot be achieved without due consideration of the status of Science teaching in both junior and senior secondary school levels.

The importance of practical work in Science is widely accepted and it is acknowledged that good quality practical work promotes the engagement and interest of students as well as developing a range of skills, Science knowledge and conceptual understanding. Despite the utilitarian value of science in

technological advancement. Lack of practical activities in science has resulted in poor manipulation and observation skills (Adepoju, 2002).

Skills simply mean the ability to do something well, usually acquired through training and experience or the competence to perform a given task. Skills are therefore best acquired in the course of activities and mastered with a varying degree of precision depending on the practice done (Omiko, 2015).

Basic science involves the study of elementary biology, anatomy, earth/solar system, ecology, genetics, chemistry and physics as a single science subject in the Junior Secondary school. The definition of Basic Science as was given by Omiko (2015) as a science in which concepts and principles are presented so as to express the fundamental unity of scientific taught and avoiding premature or undue stress on the distinction between various scientific fields.

Basic Science and Technology Curriculum. (2012), which specifies that aims of Basic Science which is directed at enabling students who are exposed to it, to acquire the following skills:

1. Observe carefully and thoroughly
2. Report completely and accurately what is observed.
3. Organise information acquired
4. Generalizing on the basis of the acquired information
5. Predicting as a result of the generalization
6. Designing experiments (including control where necessary) to check predictions.
7. Using models to explain phenomena where appropriate; and
8. Continuing the process of inquiry when new data do not conform to predictions.

Gender is also implicated in students' achievement in sciences. The issues of gender and gender stereotyping permeate every aspect of human endeavour. Okeke (2007) observed that the consequences of gender stereotyping cut across social, economic, political and educational development especially in the areas of science and technology. To Okeke, gender refers to the socially, cultural constructed characteristics and roles which are ascribed to males and females in any society. Gender is major factor that influences career choice and subject interest and students. Okeke (2007) described the male attributes as bold, aggressive, tactful, economical, use of words, while the females are fearful, timid, gentle, dull, submissive and talkative.

In Nigeria, and perhaps he whole of Africa, gender bias is still prevalent (Arigbabu & Mji, 2004). It is common to see gender stereotypes manifested in the day to day life of an average Nigerian.

Purpose of the study

The purpose was to determine what effect the knowledge of Basic Science would have on performance in skills acquisition among youths. Also to examine the effects of gender on performance in skill acquisition among youths in Ekiti State.

Research Hypotheses

Based on the stated problem, the following null hypotheses were postulated and tested in the course of the study:

(ii) There is no significance difference in the performance of youths exposed to Basic Science and those were not exposed to basic science?

(i) There is no significant effect of gender on youths' achievement in skill acquisition?

Methodology

The study adopted quasi-experimental pre-test and post-test research design (one experimental group and one control group).The base line of the knowledge of the youths would be established by pre-test, while post-test after the treatment would be

used to measure performance. The population of the study consisted of 4,200 youths of skill acquisition centres in Ekiti State. The sample consisted of eighty respondents chosen from two acquisition centres in Ekiti State. Purposive sampling technique was used to select centres that were considered eligible to participate in the study, to be eligible, the centres must have: both male and female youths and graduate teachers in integrated science.

Two research instruments were developed by the researcher tagged: Basic Science Achievement Test (BSAT) and Skill Acquisition Scoring Sheet (SASS). The face and content validity of the instruments were done by the experts in the field of test and measurement, skill acquisition and science education. The corrections and observations were taken into consideration before the instruments were administered on the respondents. The reliability of the instruments (BSAT and SASS) were first determined through the test re-test procedure, where the final version of the instruments were administered on forty youths (20 males and 20 females) randomly selected from two centres that were not used for the study. After two weeks, the same instruments were re-administered on the same set of youths. The reliability coefficients of 0.72 and 0.68 respectively were obtained thereby making the instruments to be suitable enough and adequate for the study. The postulated hypotheses were subjected to inferential statistic of t-test analysis at 0.05 level of significance.

Results and Discussion

Table 1: t-test analysis of youths taught with basic science in skill acquisition and those not taught Basic Science.

Group	N	Mean	Std. Deviation	df	t_{cal}	t_{table}
Group taught with Basic Science	40	30.20	4.75	78	12.59	1.66
Group not taught with Basic Science	40	17.65	4.15			

Table 1 revealed that t_{cal} (12.59) was greater than t_{table} (1.66). Hence, the null hypothesis was rejected. This implies that there was a significant difference between the performance of youth taught with Basic Science and the group not taught basic science.

$H0_2$: There is no significant effect of gender on youths' performance in skill acquisition?

Table 2: t-test analysis of the of male and female taught with Basic Science in skill acquisition.

Sex	N	Mean	Std. Deviation	Df	t_{cal}	t_{table}
MALE	20	73.45	6.73	38	0.15	1.67
FEMALE	20	73.10	7.98			

Table 3 revealed that t_{cal} (0.15) was less than t_{table} (1.67). Hence, the null hypothesis was not rejected. This implies that there was no significant difference between the performance mean scores of male and female students taught with basic science.

Discussion

The study also showed that there was a significant difference between the performance of youth taught with Basic Science and the group not taught Basic Science skill acquisition. This also was supported by Mustapha (2009) and Danmole (2011) that the development of any nation begins with science which is an instrument of psychomotive domain of any students.

The study showed that there was no significant difference in the performance mean male and female students taught with basic science in skill acquisition. This claim was also in agreement with Oyedeji (2006) which claims that gender is not an identifiable factor affecting the learning of any concept.

Recommendations:

Based on the findings, it was recommended that: Government should endeavour to employ Basic Science teachers into their skill acquisition centres. Skill acquisition curriculum should be incorporated with the teaching of selected topics in Basic Science in order to improve the manipulative and inquiry spirit of trainee. Trainers in the society should be encouraged to learn basic science in continuous education centres to bust their competency in skill acquisition.

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CROSS SECTIONAL AND LONGITUDINAL TRAJECTORY OF STUDENTS' PERFORMANCE IN MATHEMATICS IN SECONDARY SCHOOL CERTIFICATE EXAMINATION

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Abstract

The study examined the cross sectional and longitudinal trajectory of students' performance in Mathematics in the external examination. It also investigated the influence of students' grade variations (A1, B2-B3, C4-C6, D7, E8, F9) students' disciplines (Art, Science, Commercial) on students' performance in Mathematics over the longitudinal period of three sessions from 2014/2015, 2015/2016, 2016/2017 in external examinations. The study adopted an ex-post facto design of descriptive research. The sample used for this study was 2120 students. Multistage sampling procedure was employed, while, school A-F were cross sectionally and randomly selected across the three geopolitical zones in the state. The instrument used for the study was the secondary school Academic Performance Results Inventory in Mathematics (SSAPRIM). The findings shows that there exists no significant relationship in students' performance in Mathematics from 2014-2017 in all schools under consideration. There is also a significant difference in the students' performance in Mathematics and their grades. Based on the findings of this study, it was recommended among other things that Mathematics lesson should be improved upon so that the fluctuation of students' results in internal and external examination would become a thing of the past.

Keywords: *cross-section trajectory; longitudinal trajectory; students' performance; examination.*

Introduction

Mathematics has become a precursor to the much needed technological scientific development of nay nation in the world. Its understanding has become a subject of global discourse, which cannot be undermined in human's minds. Adeyemi (2007) gave reasons why most candidates find it difficult to pass their examinations, such reasons include having to repeat classes, lack of inadequate knowledge in their various subjects, inadequacy of professionally qualified teachers in schools and insufficient facilities. These reasons might perhaps have led to the unprecedented failure recorded in Mathematics over the years in West Examination Council School Certificate.

The dismal of West African Examination Council (WAEC) may be a result of the careless attitude of the government y its refusal to adequately fund the education sector. The dwindling budgetary allocation in the education sector has been detrimental to the development of education sector in the country. United Nations Educational, Scientific and Cultural Organization (UNESCO) recommended that 26 percent of any country's budget should be allocated on education sector, but instead poor allocation by the Nigerian government persist. Other countries that understand the importance of education has taken proactive steps to adequately fund their education sector. Ghana for example allocates 29 percent to its budget on education sector, even more than the UNESCO'S recommendation. The same in South African with allocation of 35

percent to her education sector. If Nigeria fails to implement UNESCO's recommendation on education on education budgetary allocations, the future of Nigerian child is still in jeopardy.

Underperformance in Mathematics is particularly recognized as a major problem in schools in Nigeria (Oginni, 2016) as a result of misconception in the teaching of the subject. Some researchers (Alio & Ogbu, 2016) have suggested that students do not possess the skill that would enable them function effectively in the society. These include learners' ability, attitudes and perceptions, family and socio-economic background, parent and peer influencers, school related variables such as poor learning, environment, learning cultures and teachers curriculum, school and class size and effectiveness of school.

WAEC Chief Examiner's report (2018) revealed that 30.09% (94,607 candidates) obtained A1-C6 IN Mathematics, 109,069 candidates representing 34.72% also obtained D7-E8 while 99,275 (31.58%) obtained F9 in Mathematics. He attributed the failure to their avoidable engagement in social media at the detriment of their academics. However, it has been observed on yearly basis, particularly in some schools in the state, especially in 2014 and 2015, that the percentage of candidates that obtained credit in five subjects and above ,including English and Mathematics was 31.28 and 38.68 percent respectively (Thisday Newspaper, August. 16, 2016).

Gender differences in Mathematics achievement and ability has remained a source of concern (Asante, 2010). Gender differences in secondary Mathematics are a prominent issue that has been the focus of many studies, while reported differences in Mathematics between boys and girls as contentious. Some studies have shown girls outperforming girls (Stevens, Wang, Olivarez & Hamman, 2007), while others find boys performing better than girls. Contrary to these was the study of Oginni & Owolabi (2013) on gender that there was homogeneity in the performance of students in Mathematics in special students.

Science discipline at the ordinary level in secondary schools in Nigeria is among the high profile area where Mathematics is made compulsory, because of its application to other science subject like Physics and Chemistry cannot be underrated. English Language is popular among art students. Nevertheless both subjects are compulsory at that level. The poor performance of science, art and commercials students in Mathematics has raised a concern due to the fact that country aims at achieving high technological advancement bin the 21st century. The percentage of the students who scored grade A-C has been very low in science subjects compared to non-science subjects. The future of our society will be determined by the citizens whoare able to understand and help shape the complex influences of science, art and commercial subjects on our world (Ungar, 2010). There are marked differences in the students' outcomes in Mathematics. Some of the students have a feeling that Mathematics are tough for them, hence they shy away from class (Siwel & Kizito, 2012).

Schools with the basic infrastructure like textbooks, instructional materials, well-equipped laboratory, standard building and necessary resources may perform much better than schools which do not have these resources in senior secondary certificate examination (Ambogo, 2010). Another factor that affects Mathematics students' performance in WASSCE is curriculum. The International Mathematics Study (Schmidt et al, 1996) sponsored by the International Association for Evaluation of Educational Achievement (IEA) considered the study of Mathematics at three levels ranging from art, commercial and science classes.

Some of the related factors that affect students' performance in school may be

class size, unconducive environment, ineffective teaching methods, and unqualified teachers among others. Most of the secondary school students could have not register for Mathematics examination during West African Senior Secondary Certificate Examination (WASSCE) if the subject is optional. This action of high rate of absenteeism, students' poor attitude towards the subject could be as a result of perceiving the subject to be an imposition on them. Based on the unending importance of mathematics in nation building, it is therefore imperative to investigate the cross sectional and longitudinal trajectory of students' performance in secondary school certificate examination.

Methodology

The study adopted an ex-facto design of descriptive research. The sample used for this study was 2120 students. Multistage sampling procedure was employed. Stage one involved the selection the selection of two Local Government Areas from each local Senatorial District of the state. Stage two involved the selection of schools from each local government termed A, B, C, D, E and F school with the entire students' result in the six zones utilized. The instrument used for the study was Secondary School A academic Performance Inventory (SSPAI) which contains the grades obtained by students in WASSCE results in Mathematics, which varied from the candidates grades ranges from distinction, credit passes (A1, B2, B3, C4, C5 and C5) pass and fail (D7, E8 and F9), for the year 2014 to 2017 in Ekiti State. The sex and disciplines (Arts, Commercial and Science students) of students inclusive based on their subject offered during examination. The instrument has been standardized by WAEC. A research question was raised and three hypotheses were formulated. The data were analyzed by using descriptive such as graph and bar chart while inferential statistics was used to test the hypotheses such as correlation, Analysis of Variance (ANOVA) and Duncan Multiple range test.

Research Question

What are trends of students' performance in School A, B, C, D, E & F Mathematics from 2014 to 2017?

Research Hypotheses

1. There is no significant relationship in the students' performance in WASSCE Mathematics examination form 2014 to 2017 considering the different schools
2. There is no significant difference in the performance of students' that obtained credit and above (A1-C6) and Pass (D7-F9) in the May/June WASSCE in Mathematics form 2014-2017
3. There is no significant difference in the performance of students' in Mathematics in Art, Science and Commercial in 2014 to 2017.

Results

What are the trends of students' performance in Mathematics from 2014-2017?

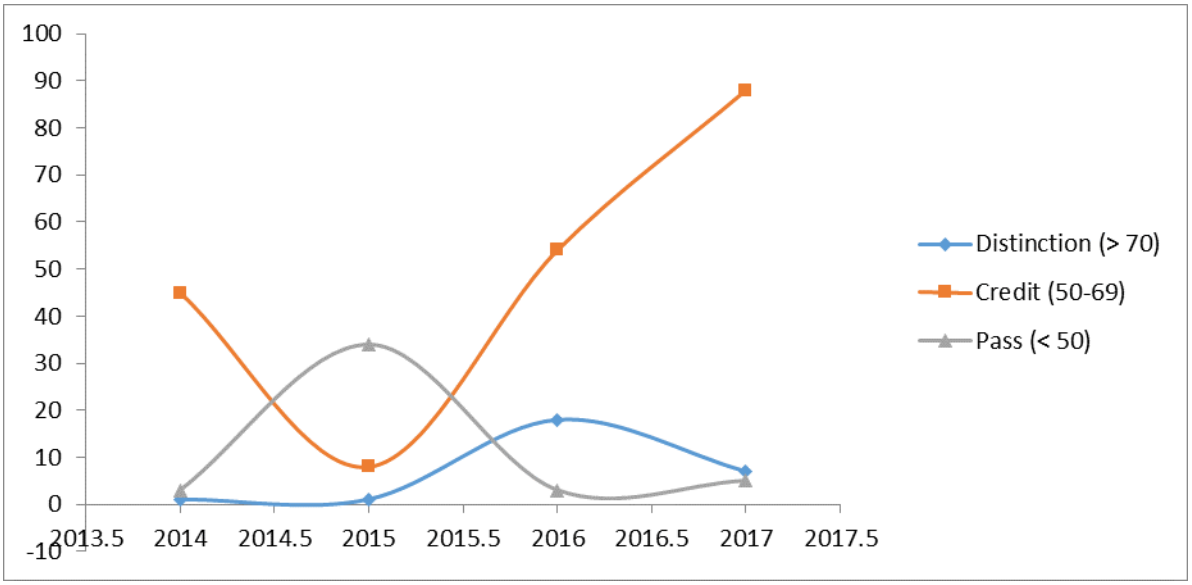
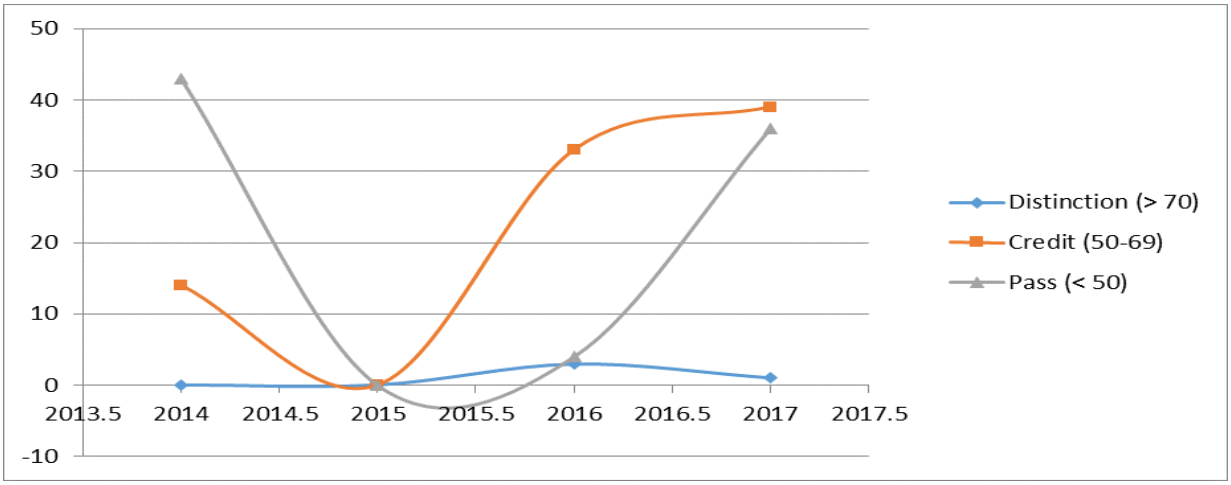


Fig. 1: *Graph of students' performance in Mathematics from 2014 to 2017 (School A)*

Fig. 1 shows a linear movement (though very low) in 2014 and 2015 and experience a steady increase in 2016 before it declines again in 2017 for the students with distinction, and for credit; it shows a steady rise in 2014, 2016 and 2017, but low in 2015. The pass level was very low in 2014, and later rose in the year 2015, and eventually dropped in 2016 and 2017 respectively.



Comparative analysis of WASSCE students' performance in Mathematics from 2014-2017 (School B).

Fig 2: *Graph of students' performance in Mathematics for 2014 – 2017 (School B)*

Fig. 2 shows that there was no distinction in the performance of the students in the year 2014, while it rose up slightly in 2016 it comes down again the year 2017. For credit, there was a steady downward trend from 14 in 2014, 2016 and 2017 but a sharp downward trend in 2015. It also shows no pass in 2014 but we see to 2016 it increase to 4 and ever rose far higher in 2017 to 37.

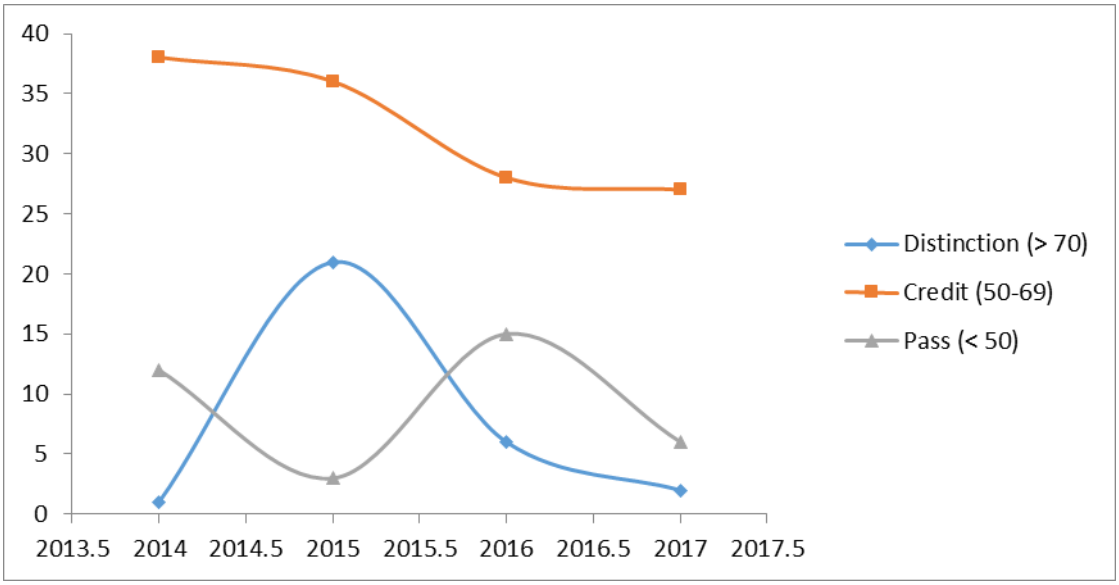
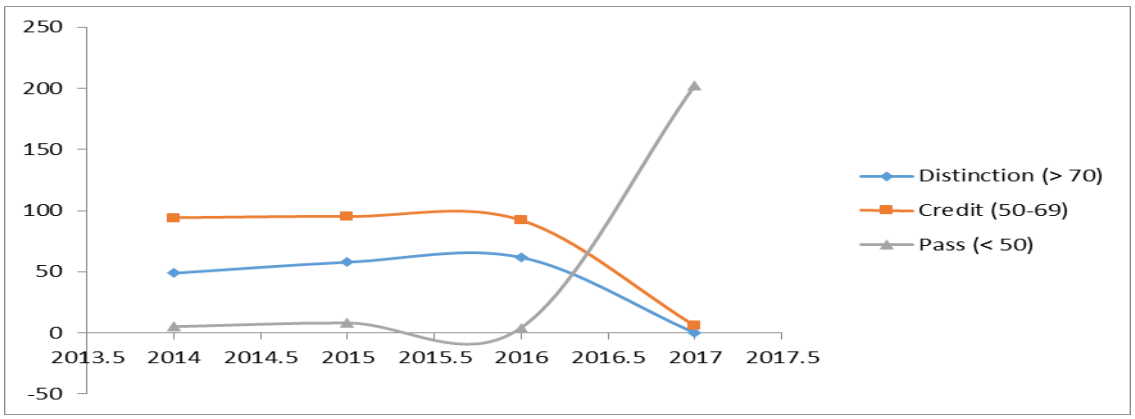


Fig 3: *Graph of student performance in Mathematics from 2014 to 2017 (School C)*

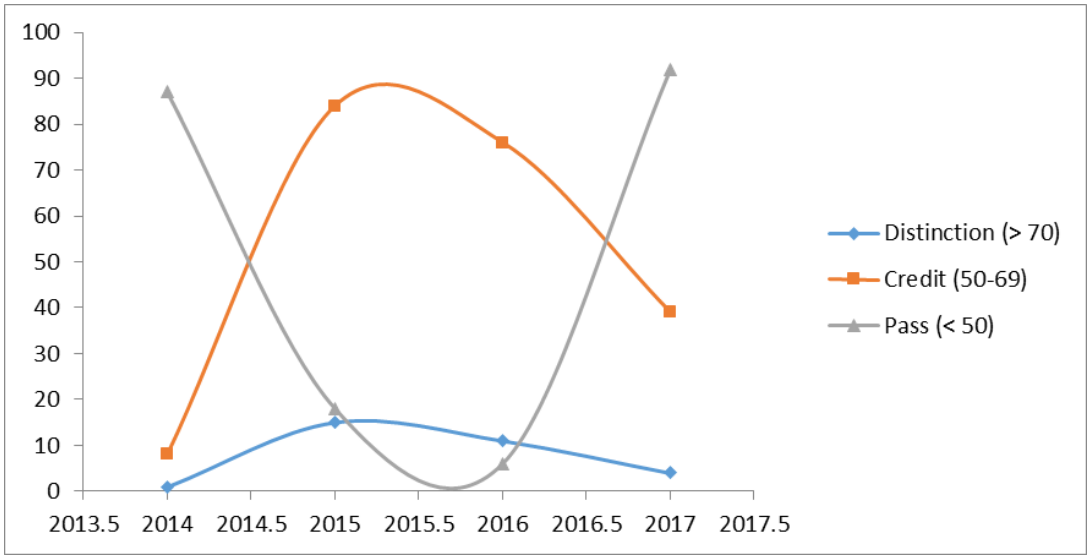
Fig 3 shows that from 2014 to 2015, there was a sharp increase in the distinction level but decrease in 2016 and further decline in 2017. Also in 2014 to 205 there was a steady linear and high relation in the level of increase in the students' performance with credit in Mathematics but reducing slightly for 2016 to 2017 in a linear trend although still high. However, there is sinusoidal movement in the pass level in 2014 to 2015 and from 2015 to 2016 and suffers a downward trend in 2017 which implies a fluctuation in pass level.



Comparative analysis of WASSCE students' performance in Mathematics from 2014-2017 (School D)

Fig. 4: *Graph of students' performance in Mathematics from 2014 to 2017 (School D)*

Fig 4 reveals that there was a low and linear relationship in distinction grade of students' performance in school D form 2014 to 2016 until the diminishing return set on the performance form 2014 to 2016. There was averagely credit linear relationship in students' performance from2014 to 206 until it reduces to nearly zero in 2017. However for pass grade level; there was nearly zero level performance in pass from the year 2014, 2015 and 2016 until it rose sharply and surprisingly to 200 above in 2017.



Comparative analysis of WASSCE students' performance in Mathematics from 2014-2017 (School E)

Fig. 5: *Graph showing students' performance in Mathematics from 2014 to 2017 (School E)*

Fig 5 shows that, in 2014, the distinction level was extremely low, the credit level was likewise very low while the pass level was very high, for 2015 the distinction level was very low while the credit level moved surprisingly form extremely low to a very high level while the pass was equally moderately. In 2016, the credit level reached its highest credit level and later dropped in 2016 and further reduction in 2017. The pass level of students was at the highest in 2014 and 2017 but it reduces in 2015 to its lowest in 2016.

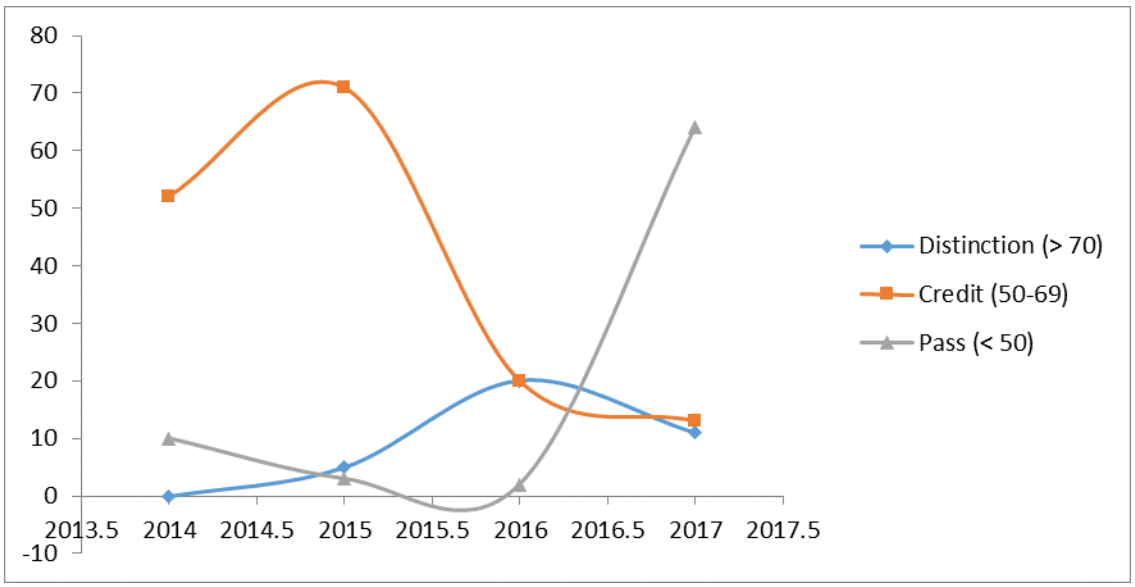


Fig. 6: *Graph of students' performance in Mathematics from 2014 to 2017 (School F)*

Fig 6 shows a non-stationary movement in the performance of students at distinction level it started from zero level in 2014 and increase steadily up to year 2016 until it decline slightly in 2017 for credit level it move from lower in 2014 with slight increase in 2015 and decline sharply up until 2017. Considering pass level, it experienced a downward trend to 2016 until it rose sharply in 2017.

Hypotheses Testing

The null hypotheses postulated were tested at 0.05 level of significance in this study

1. There is no significant relationship in the students' performance in WASSCE Mathematics examination from 2014 to 2017 considering different schools as shown in Table 1

Table 1: Duncan Multiple Range Test for students' performance in WASSCE Mathematics from 2014 to 2017 in School A.

Alpha	0.05	No of mean	2	3	4	Means with the same letter are not significantly different			
Error DF	8	Critical value	58.41	60.86	62.24	Duncan grouping	mean	N	Years
Error Mean Square	962.25					A	33.33	3	2017
						A	25.00	3	2016
						A	16.33	3	2014
						A	14.33	3	2015

Table 1 shows the variations in mean to be 33.33,25.00,16.33 and 14.33. This implies that there exists no significant relationship in students' performance in Mathematics from 2014-2017 in School A. Hence, the null hypothesis (for school A) is not rejected.

Table 2: Duncan Multiple Range Test for students' performance in Mathematics from 2014 to 2017 in School B.

Alpha	0.05	**No of mean**	2	3	4	**Means with the same letter are not significantly different**			
Error DF	8	**Critical value**	28.81	30.03	30.70	**Duncan grouping**	**mean**	N	**Years**
Error Mean Square	234.1667					A	20.00	3	2015
						A	17.00	3	2014

Table 2 shows the mean variation of 20.00, 17.00,16.33 and 11.67respectively.Which implies that there exists no significant relationship in the mean differences of students' performance in Mathematics from 2014-2017 in School B. Hence, the null hypothesis (for School B) is not rejected

Table 3: Duncan Multiple Range Test for students' performance in Mathematics from 2014 to 2017 in School C.

Alpha	0.05	**No of mean**	2	3	4	**Means with the same letter are not significantly different**			
Error DF	8	**Critical value**	28.81	30.03	30.70	**Duncan grouping**	**mean**	N	**Years**
Error Mean Square	234.667					A	20.00	3	2015
						A	17.00	3	2014

Table 3 shows the variations in mean 20.00, 17.00 16.33 and 11.67. This implies that there exists no significant relationship in students' performance in Mathematics from 2014-2017 in School C. Therefore, the null hypothesis (for School C) is not rejected.

Table 4: Duncan Multiple Range Test for students' performance in Mathematics from 2014 to 2017 in School D.

Alpha	0.05	**No of mean**	2	3	4	**Means with the same letter are not significantly different**			
Error DF	8	**Critical value**	130.1	135.6	138.6	**Duncan grouping**	**mean**	N	**Years**
Error Mean Square	4774.333					A	69.33	3	2017
						A	53.67	3	2015

Table 4 shows mean variations of 69.33,53.67, 52.67 and49.33 respectively. Which implies that there exists no significant relationship in students' performance in Mathematics from 2014-2017 in School D. Hence, the null hypothesis (for School D) is not rejected.

Table 5: Duncan Multiple Range Test for students' performance in Mathematics from 2014 to 2017 in School E.

Alpha	0.05	**No of mean**	2	3	4	**Means with the same letter are not significantly different**			
Error DF	8	**Critical value**	80.36	83.76	85.65	**Duncan grouping**	**mean**	N	**Years**
Error Mean Square	1822.5					A	45.00	3	2017
						A	39.00	3	2015

Table 5 shows mean variations of 45.00, 39.00, 32.00 and 31.00. This implies that there exists no significant relationship in students' performance in Mathematics from 2014-2017 in School E. Hence, the null hypothesis (for School E) is not rejected.

Table 6: Duncan Multiple Range Test for students' performance in Mathematics from 2014 to 2017 in School F.

Alpha	0.05	**No of mean**	2	3	4	**Means with the same letter are not significantly different**			
Error DF	8	**Critical value**	53.83	56.09	57.36	**Duncan grouping**	**mean**	N	**Years**
Error Mean Square	817.25					A	29.33	3	2017
						A	26.33	3	2015

Table 5 shows variations in the means of 29.33, 26.33, 20.67 and 14.00 respectively. Which implies that there exists no significant relationship in students' performance in Mathematics from 2014-2017 in School F. Hence, the null hypothesis (for School F) is not rejected.

Hypothesis 1: There is no significant difference in the performance of students that obtained credit and above (A1 – C6) and Pass (D2 – F9) in the May/June WASSCE in Mathematics from 2014 to 2017.

Table 7: ANOVA Summary of Students' Performance in Terms of Grading

Source	Df	Sum of Squares	Mean Square	F value	Pr > F
Model	2	10491.26316	5245.63158		
Error	54	72369.57895	1340.17739	3.91	0.0259
Corrected Total	56	82860.84211			

Table 7 shows that $F_{(2, 54)} = 3.91$, $P < 0.05$ at 0.05 level of significance. Hence, the null hypothesis is rejected. This implies that there is a significant difference in the students' performance in Mathematics in terms of their grades.

Hypothesis 2: There is no significant difference in the performance of students in Mathematics in Art, Science and Commercial in 2014 to 2017.

Table 8: ANOVA Summary of students' performance in Mathematics in terms of Discipline

Source	Df	Sum of Squares	Mean Square	F value	Pr > F
Model	2	1795.142857	897.571429		
Error	18	1618.857153	89.936508	9.98	0.0012
Corrected Total	20	3414.00000			

Table 8 shows that $F_{(2, 18)} = 9.98 < 0.05$ at 0.05 level of significance. Hence, the null hypothesis is rejected. This implies that there is no significant difference in the students' difference in the students' performance in Mathematics in the area of Art, Commercial and Science.

Hypothesis 4: There is no significant difference in the performance of students' in Mathematics from 2014-2017.

Table 9: ANOVA Summary of Students' Performance in Mathematics form 2014 – 2017 (School A)

Source	Df	Sum of Squares	Mean Square	F value	Pr > F
Model	3	684.250000	228.083333		
Error	8	7698.00000	962.250000	0.24	0.8681
Corrected Total	11	8382.250000			

Table 9 shows that $F_{(3, 8)} = 0.24$, $P > 0.05$ at 0.05 level of significance. Hence the null hypothesis is not rejected thus implies that there is no significant difference in the comparative analysis performance of students' in Mathematics from 2014 to 2017 WASSCE.

Table 10: ANOVA Summary of Performance of Students in Mathematics from 2014-2017 in WASSCE. School B

Source	df	Sum of Squares	Mean Square	F value	Pr > F
Model	3	684.250000	228.083333		
Error	8	7698.00000	962.250000	0.24	0.8681
Corrected Total	11	8382.250000			

Table 10 shows that $F_{(3, 8)} = 0.24$, $P > 0.05$ at 0.05 level of significance. Hence the null hypothesis is not rejected thus implies that there is no significant difference in the comparative analysis performance of students' in Mathematics from 2014 to 2017 WASSCE.

Table 11: ANOVA Summary of Students' Performance in Mathematics form 2014 – 2017 in WASSCE Mathematics in School C

Source	df	Sum of Squares	Mean Square	F value	Pr > F
Model	3	106.916667	228.083333		
Error	8	1873.33333	962.250000	0.15	0.9254
Corrected Total	11	1980.250000			

Table 11 shows that $F_{(3, 8)} = 0.15$, $P > 0.05$ at 0.05 level of significance. Hence the null hypothesis is not rejected thus implies that there is no significant difference in the comparative analysis performance of students' in Mathematics from 2014 to 2017.

Table 12: ANOVA Summary of Students' Performance in Mathematics form 2014 – 2017 in WASSCE Mathematics in School D

Source	df	Sum of Squares	Mean Square	F value	Pr > F
Model	3	715.58333	238.52778		
Error	8	38194.66667	4774.333333	0.05	0.9842
Corrected Total	11	38910.25000			

Table 12 shows that $F_{(3, 8)} = 0.05$, $P > 0.05$ at 0.05 level of significance. Hence the null hypothesis is not rejected. Thus, there is no significant difference in the comparative analysis performance of students' in Mathematics from 2014 to 2017.

Table 13: ANOVA Summary of Students' Performance in Mathematics form 2014 – 2017 in WASSCE Mathematics in School E

Source	df	Sum of Squares	Mean Square	F value	Pr > F
Model	3	386.25000	128.75000		
Error	8	14580.00000	1822.50000	0.07	0.9740
Corrected Total	11	14966.25000			

Table 13 shows that $F_{(3, 8)} = 0.07$, $P > 0.05$ at 0.05 level of significance. Thus, the hypothesis is not rejected. This implies that there is no significant difference in the comparative analysis of the performance of students' in Mathematics from 2014 to 2017 in School E.

Table 14: ANOVA Summary of Students' Performance in Mathematics form 2014 – 2017 in WASSCE Mathematics in School F

Source	df	Sum of Squares	Mean Square	F value	Pr > F
Model	3	410.916667	136.972222		
Error	8	6538.00000	817.250000	0.17	0.9153
Corrected Total	11	6948.916667			

Table 14 shows that $F_{(3, 8)} = 0.17$, $P > 0.05$ at 0.05 level of significance. Thus, the hypothesis is not rejected. This implies that there is no significant difference in the performance of students in Mathematics from 2014 to 2017 in School F..

Table 15: Correlation Summary Students' Performance in Mathematics from 2014 – 2017

	Year 2014	Year 2015	Year 2016	Year 2017
Year 2014 Pearson Correlation	1	0.444	0.434	0.067
Sig. (2 tailed)		0.098	0.106	0.814
Year 2015 Pearson Correlation	0.444	1	0.446	0.273
Sig. (2 tailed)	0.098		0.096	0.324
Year 2016 Pearson Correlation	0.434	0.446	1	0.369
Sig. (2 tailed)	0.106	0.096		0.176
Year 2017 Pearson Correlation	0.067	0.273	0.369	1
Sig. (2 tailed)	0.814	0.324	0.176	

Table 15 shows that there is a weak relationship in students' performance in Mathematics between 2014 and 2015, 2014 and 2016, 2014 and 2017 with r = 0.444, r= 0.067 respectively. It was also discovered that year 2015 students' performance has a very weak relationship with 2016 and 2017 students' performance with r = 0.446 and r = 0.0273. Lastly, students' performance in year 2016 has a very weak relationship with students' performance in year 2017 with r = 0.369.

Discussion

The findings of this study revealed that the cross-sectional and longitudinal trends in students' performance in Mathematics for distinction was generally low, followed by credits and higher number of students with pass in 2014 and 2017. This supported the Sun News report that 1.6 million of students that took 2014 May/June WASSCE, only a little more than half a million (31.28%) passed with the minimum requirement for admission into the tertiary institution (The Sun News, Outrage trails of students' poor performance 2014).

The study shows that there is no significant relationship in the students' performance in Mathematics from 2014 to 2017 in all the schools under consideration. This is in line with the work of Asante (2010) that students' performance in Mathematics has not improved despite its importance even with the introduction and use of technology.

The findings of the study also revealed that there is significant difference in the students' performance in Mathematics and their grades which implies that although there was no significant relationship in the students' performance, their grades differs significantly and this may be due to different factors such as attitudes, beliefs, learner's abilities, perceptions, family and socio-economic status, parent and peer influences, class size, which is synonymous to the earlier study of Alio & Ogbu (2016) that students do not possess the skill that would enable them to function effectively.

The finding revealed further that there is significant difference in the performance of Mathematics between Commercial and Art students and also between Science and Art students as well as Commercial and Science students. This is supported by Agha (1998) that students who read Sciences (Physics, Mathematics and Chemistry) the way they read ordinary literature (story book), may not perform well in Mathematics. Also, it may be due to the fact that the same approach and method that some teachers use to teach Science and Commercial studies are used on Art students without considering their educational differences.

Also, the finding indicates a weal relationship in students' performance in Mathematics from the studied year. This was in agreement with the submission of Chief Examiner's report (2018) that the performance of students is poor on yearly basis. This may not be unconnected with the overreliance and overconcentration of students on whatsapp, facebook, twitter, instagramand other social media at the detriment of their studies.

Based on the findings of this study, the following recommendations were made:

1. That the government should reform and re-organize Mathematics curriculum in order to bring a positive effect on students' performance
2. Examination bodies (WASSCE, NECO etc.) should spread the Mathematics items evenly to cover the cognitive domain.
3. Students should not over rely on what the teacher teach but they must endeavor to look through the subject curriculum and syllabus and develop independent reading in order to cover the syllabus required by the examination bodies.
4. That effective teaching and learning of Mathematics at all levels of schooling should be ensured by all concerned stakeholders in order to reverse the trends of abysmal performance in Mathematics

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EFFECTIVENESS OF COMPUTER UTILIZATION IN THE TEACHING AND LEARNING OF SCIENCE AMONG SECONDARY SCHOOL TEACHERS IN EKITI STATE

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Abstract

This paper is a study on the effectiveness of the use of computer in the process of teaching and learning science in the secondary schools in Ekiti state, Nigeria. The study was a descriptive research of a survey type. Four research questions were raised and three hypotheses formulated. The sample for the study comprised 400 science teachers purposively selected from 50 secondary schools across the state. The research instrument was a questionnaire designed by the researchers titled 'Effectiveness of Computer Use in Teaching and Learning of Science' and was administered personally by the researcher. The data obtained were subjected to descriptive analysis of mean and percentages and inferential statistics of X^2 and F-ratio tested at 0.05 level of significance. The results of finding revealed that most of the science teachers have Computer but do not make use of it in their teachings, even though they have the believe that the use of Computer could enhance teaching and learning of science. Based on these outcomes, it was recommended among others that the government should make adequate provision of Computer for all the Science teachers to enhance their teaching and learning process.

Keywords: Computer utilization, effectiveness, teaching, learning, school science, students performance.

Introduction

Access to information and communication technologies is increasing daily for its involvement in economic, education and political aspects of human endeavours. Explorations in electronic communication networks have led to numerous advances for opportunities in the developing countries. Advances in internet networking by many African countries have put them on the global connectivity and consequently enhanced their development. This development manifests in terms of increase in knowledge and skills capable of improving the quality of life. Information and knowledge are interrelated. Well informed, knowledgeable and skillful citizens are instruments for human – centered development. Acquisition of knowledge in this modern society is facilitated by information technology. A non-responsive attitude to the use information technology is synonymous to absconding from school. It is a choice between being left out or benefiting from enormous benefits of information technology.

The application of information and communication technologies (ICTs) has globally taken its ground firm in education enterprise. Computer seems to be the central device of ICT and the impact of its use in teaching and learning cannot be overemphasized. There has been a global sensitization on the use of computer in teaching and learning at all levels of education. It is rather becoming increasingly difficult to run a school without using computers. Education and training are keys to building indigenous capacity that would

reduce dependence on developed world and as well solve local complex problems. The input of computer technology in this regards is desirable. In fact, (Ali, 1996) submitted that:

> *Information technology and education have dual impact on each other. Information technology has a greater impact on education in the development of new concepts, improving resources sharing and advancing research. Information technology education is the main solution for building indigenous capacity in Africa.*

The effective utilization of computer in teaching and learning processes is anchored on adequate availability of facilities necessary for its operation. These include a well furnished building or hall or room as the case may be, continuous power supply, and other computer accessories. The presence of these necessary facilities would encourage the usability of computers by the teachers to teach, set questions, and give assignments.

The impact of using computer in teaching has been noted to produce better academic performance of students.

Benefits of Computer in Science Education

The benefits of computer as a major and central device of ICT in Science Education can be adopted from Denby's (2002) submission which include:

- learners are more highly motivated
- students are more engaged in activities
- it arouses students' interest and sustains students' attention for a longer time
- it provides access to resources that are relevant to science teaching but not readily available
- visualization and manipulation of complex models are possible through multimedia resources of ICT
- provision of wider range of materials capable of aiding science teaching and learning e.g. still and moving images
- It offers itself an alternative teaching style to the old convectional style of the teacher
- it serves as a source for quality and update information about science
- it gives room for repetitive learning
- scientific activities/learning can be extended beyond the teaching space and class contact time
- it gives room for teachers' creativity in their teaching and in the students' learning of science.

The study of Abinbade, (2003) revealed that use of microcomputers in the United Kingdom (UK) has made it easier for the teachers to emphasize the practical application of mathematics than ever. This was in agreement with the observation of Omotayo, Ajayi & Ayodele (2013) that 70% of the science teachers and 76% of the science students agreed that ICT had highly assisted the Nigerian students in the teaching and learning of science subjects.

Issues on Advent of ICT in Educational system in Nigeria

The awareness of IT with its application and importance in transformation of man's society began to increase by the second half of the 1970s. By then, computer and computeracy were no longer exclusively preserved for scientific, defence and industrial sectors of developed countries but gaining extension into the educational system of both developed and developing countries of the world (Owhotu, 2006). By 1980, the schools have become the test-ground of IT policy globally. For instance, a developed country like UK in 1980 launched the micro-electronics in education programme (MED) in collaboration with the British Department of Industry. The programme was meant to educate the young Britons in computer applications needed to cope with the demands of the world of work.

On this basis, by the end of 1982, the department had made available computer and accessories to all the secondary schools in the country. Eventually, IT was made a core subject through the enactment of the British National Curriculum in 1988.

The curriculum, according to Owhotu (2006) stipulated that teachers should have:

i. a clear understanding of what IT can offer them
ii. the capacity to make effective use of it
iii. suitable curriculum support materials and advice
iv. sufficient access to appropriate equipment and technical support.

The developing countries were not idle or unaware of the IT trend and it's potent on educational growth of a country. Indian for example, launched the Computer Literacy and Studies in Schools (CLASS) project in selected secondary schools to start with in 1983. The intent according to Dalta in Owhotu (2006) "was not intended to introduce computer science in schools rather, its intent was to demystify the computer applications and the computer's potential as a learning mode". With a time lag, Indian government had built strong partnership with IT and provided computer literacy and education at all levels of her education system.

Nigeria, like other developing countries, embraced the intervening potent of information technology at enhancing the education of a country. In response to the upcoming application of IT in education, the government of Nigeria in 1987 launched the National policy on Computer literacy and Education to catch up with the rest of the world on IT trend of event (Aminu, 1987).

The implementation of the policy began with the teachers training in the 45 Federal Government Colleges, Colleges of Education and Armed Forces secondary schools. Thereafter, 56 schools were used as pilot-schools where 504 pieces of computer were distributed among the schools (Owhotu, 2006). The success of this intervention was faced with some challenges like funding, poor electricity supply and technical know-how which lingered on till 2002. However, 2003 witnessed a new dawn in the use of computer in Nigerian secondary schools. In 2001, the Federal Government of Nigeria launched a National Policy on Information and Communication Technology and later embarked on more concrete initiations like the establishment of the National Information Technology Department Agency (NITDA), under the Federal Ministry of Science and Technology and the National Institute for Information Technology (NIIT). This was a giant strive that served as the blue-print for the development of 21st century IT survival.

In September 2006, Nigeria hosted the world Digital Africa 2006 conference on the theme "ICT for education development empowerment in children and learning" where one-laptop-per-child initiative was launched. This resulted into the provision of one million dollar laptops for the e-secondary school project in Nigeria. On this basis, Nigeria software developers have been working on integrating local curriculum contents into the project covering all school subjects from Junior secondary class 1 to Senior secondary class 3 (The Vanguard, 2006).

Introduction of Computer into Secondary Schools in Ekiti State

Ekiti state is noted all over the country Nigeria as a frontier in knowledge and education.

Any issue that pertains to education is not held with levity but given the needed prompt attention.

This impetus was extended to the introduction of computer into her secondary schools for utilization in the process of teaching and learning.

To start with, the state government organized a seminar for a teacher per few selected schools across the state through her

Education Tax Fund titled "Capacity Building Training in Computer Pioneers and New Information and Communication Technologies" which was held at the Federal University of Technology, Akure (FUTA) between 24th and 29th June, 2007. The seminar was co-sponsored by Ekiti state government with Nigerian Communication Council (NCC). The intent was to expose the participants to computer appreciation and introductory aspect of computer literacy. Later, a workshop was held at the Ministry of Education, Ado Ekiti for some selected teachers between 16th and 20th February, 2009. These teachers were regarded as the computer teachers in the affected schools and expected to train their colleagues on computer appreciation and introduction to computing.

In late 2012, all the students of secondary schools in senior classes 2 and 3 (SSII & SSS III) in the state were given 'Note Computers' to intimate them with computer awareness and appreciation. This was withdrawn from them after graduation, with the intent of distributing them to their successors. The problem still remained. The teachers who are to use the computer to teach the students were in the dark as to the nitty-gritty and technical know-how of computer. Invariably, the students misused the 'Note Computers' placed at their disposal for unethical purposes.

The state government, in her strives to make computeracy see the light of the day in her secondary schools, deemed it needful to make computers available to the teachers. However, the teachers were requested to pay for the laptops on installmental basis from their salaries. On this premise, some of the teachers subscribed to this arrangement while some declined. Thus in 2013, 6500 laptop computers were distributed to all willing secondary school teachers in Ekiti state in two strands. This was a giant step at making a considerable number of the secondary school teachers have access to laptop computer of their own. In addition to making computer available for the teachers, the state government ear-marked a period of two months for the training of the teachers who owned the computers on group basis, each group engaged in a week intensive training on Microsoft words processing, spreadsheet and power point presentation. This was expected to put the teachers on their toes as to the application of computer in teaching and learning process. This may include note making, questions settings, lesson presentation and the like.

Statement of the Problem

Realizing the significant roles computer can play at enhancing effectiveness in the teaching and learning of science, the government of Ekiti State, Nigeria made computers available to all the teachers in the secondary schools across the state, including the science teachers. However, trend of students' academic performance over the recent years seems not to produce any difference. The performance of science students, who are expected to be frontiers in the technology application, neither showed any variation. The questions then arose: Are the teachers not making use of the computers in their teachings? or Does it means that the use of computer cannot enhance effectiveness in students' learning?

Objectives

The study was purposed to investigate:

i. whether computer was adequately provided for the science teachers;
ii. whether there is adequate provision of facilities to operate the computers;
iii. the use to which the teachers put the computers in their possession:
iv. the effectiveness of computer use at enhancing better academic performance of students.

Research Questions

The questions asked as the basis for the study are as follow:

1. Is there adequate provision of computers in the schools?
2. Are there enough facilities available for operating the computers?

3. Do the science teachers employ computers in their teachings?
4. Can the use of computer make any improvement in students' academic performance in the science subjects?

Research Hypotheses

The following null hypotheses were formulated as a guide for the study:

1. There is no significant difference in the use of computer by the teachers of sciences at the three senior secondary classes.
2. There is no significant difference in the use of computer by the teachers of Biology, Chemistry, Physics and Mathematics.
3. There is no significant difference in the use of computer in teaching science between male and female teachers of the senior secondary schools.

Methodology

This study was a descriptive survey research. The targeted population was the teachers

teaching the science subjects in secondary schools in Ekiti state. The science subjects here are biology, chemistry, physics and mathematics.

The targeted population for this study comprised all the teachers of the above science subjects in all the 184 public secondary schools in Ekiti state. From this, 140 science teachers were purposively selected from 7 schools. There were 35 teachers randomly selected from each of the science subjects (i.e. biology, chemistry, physics and mathematics) making a total of 140 that constituted the sample. In all, there were 77 male and 63 female teachers.

A questionnaire titled 'Effectiveness of Computer Use in Science Teaching' was the instrument used for this study. It has two parts A and B, where parts A was based on the bio data of the respondents and parts B consisted of 10 items statements on the focus of the study. Respondents were required to pick from two options of "Yes" or "No" for each of the items.

The instrument was administered by the researcher personally. It took the researcher three weeks to administer the questionnaire on the sample in the schools. As the instrument was distributed and retrieved immediately by the researcher, all the questionnaires distributed were returned.

Results

Descriptive Analysis

Question 1: Is there adequate provision of computers in the schools?

Table 1: Frequency counts and percentages of adequate provision of computers in the schools

Items	Yes		No	
	N	%	N	%
School has computer	51	36.40	89	63.60
Adequate computer available	47	31.60	93	66.40
Has personal computer	52	37.10	88	62.90
Average	50	35.46	90	64.54

Table 1 above showed that 51(36.4%) of the schools have computer while only 47(31.6%) have adequate computers in the school. 52(37.1%) of the science teachers have their personal computers. on the average, only 35.46% claimed that their schools have adequate computer. It can therefore be adduced that the provision of computer in the schools for teaching and learning is not adequate.

Question 2: Are there enough facilities available for operating the computers?

Table 2: Frequency counts and percentages of facilities available for operating the computers

Items	YES		NO	
	N	%	N	%
Enough facilities for computer operation	26	18.60	114	81.40
Building	93	66.40	47	33.60
Furniture	63	45.00	77	55.00
Power Supply	37	26.40	103	73.60
Accessories	22	15.70	118	84.30
Ventilation	75	53..60	65	46.40
Average	52.67	37.62	87.33	62.38

From table 2, it is revealed that 26(18.6%) agreed that there exist enough facilities to make the computer functional. 93(66.4%) have building for the computers, 63(45.0%) have adequate furniture in the computer rooms with 75(53.6%) ventilation while 37(26.4%) have regular power supply and only 22(15.7%) have necessary computer accessories available in the schools. on the average, 52.67 i.e. only 37.62% agreed that there are enough facilities in the schools for operating the computers.

Question 3: Do the teachers employ computers in their teachings?

Table 3: Frequency counts and percentages of computer use by the teachers

Items	YES		NO	
	N	%	N	%
Use computer for teaching	18	12.90	122	87.10
Assignment	11	7.90	129	92.10
Test Construction	-	0.00	140	100.00
Examination Construction	6	4.30	134	95.70
Average	8.75	6.25	131.25	93.75

It is showed from table 3 that only 18 out of 140 sampled teachers (equivalent to 12.9%) make use of computers in their teaching-learning process, 11(7.9%) use computer to set questions, no one (0.0%) use computer for class tests and only 6(4.3%) use computer to set examination questions. Averagely, only 8.75(6.25%) of the science teachers employ computer in the teaching–learning process.

Question 4: Can the use of Computer make any improvement in students' academic performance in the science subjects?

Table 4: Frequency counts and percentages of computer impact on students' academic performance in the science subjects

Variations	N	%
Yes	110	78.60
No	30	21.40

Evidently from table 4 above, 110 (78.6%) of the sampled teachers believed that the use of computer in teaching and learning science is capable of improving the academic performance of the students in the science subjects.

The bar chart below further shows the teachers' view of the impact of computer at improving the academic performance of the students in the sciences.

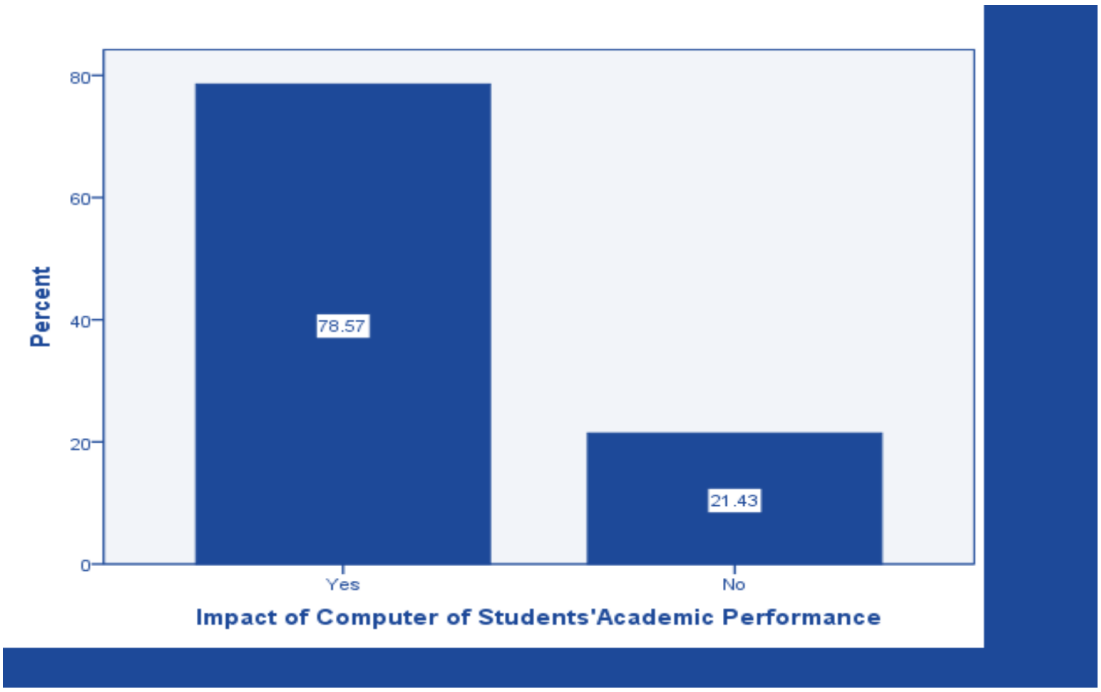

Figure 1: Percentages of science teachers' view on the impact of computer use on the academic performance of students

The wide variation of 57.14% (78.57 – 21.43%) in the believes of the teachers in the potency of computer use in the teaching and learning process at enhancing better academic performance of the students in the science subjects is revealed in the bar chart. The chart also show the high believe (78.57%) of the teachers that if computer is effectively employed in teaching science, students will perform well in the subjects.

Testing Hypotheses

Ho1: There is no significant difference in the use of Computer by the teachers of sciences at the three senior secondary classes.

Table 5: ANOVA of computer use by science teachers in the three senior classes

Variations	SS	df	MS	F	Sig
Between Groups	1.112	2	.556	5.227	.006
Within Groups	14.574	137	.106		
Total	15.686	139			

P < 0.05

Table 5 showed a table significant value of .006 which is less than p-value of 0.05; the null hypothesis is therefore not rejected. This means that there is no significant difference in the use of computer by the teachers of science subjects at the three senior secondary classes.

Ho2: There is no significant difference in the use of computer by the teachers of biology, chemistry, physics and mathematics.

Table 6: ANOVA of computer use by teachers of the various science subjects

Variations	SS	df	MS	F	Sig
Between Groups	1.028	3	.343	3.179	.026
Within Groups	14.658	136	.108		
Total	15.686	139			

P < 0.05

It is evident from table 6 that P (.026) < 0.05 significant level. The null hypothesis is therefore not rejected which implies that there is no significant difference in the use of computer by the teachers of the various science subjects.

Ho3: There is no significant difference in the use of computer in teaching science between male and female teachers of the senior secondary schools.

Table 7: t-test analysis of computer use between male and female science teachers

Variations	N	$\overline{X}$	SD	df	t-cal	Sig
Male	77	1.922	.270	138	1.993	.048
Female	63	1.809	.396			

P < 0.05

From table 7, the t-calculated value was 1.993 giving a significant value of .048 < 0.05 critical level of significant. Therefore, the null hypothesis is not rejected. This shows that there is no significant difference in the use of computer in teaching science between male and female teachers of the senior secondary schools.

Discussion

The result of analysis showed that there was inadequate availability of computers for teaching in the schools. This result seemed confusing, since all willing teachers were given a piece of laptop computer by the state government. Though, it was noted earlier in this paper that all willing teachers were sometimes given a piece of laptop computer by the state government. The inadequacy noticed in this study might be due to possible increase in staff strength after the distribution of the laptops to the interested teachers.

On further oral interview with the teachers, it was gathered that most of the teachers, on the premise that they are ignorant of the use of computer and due to the fact that there was no thorough training on its use, gave out their copy of the laptop to their children who they believe would be able to make good use of them while some of the laptops were stolen where they kept them. No wonder, they claimed not to have computer for teaching. This aligns with the study of Etebu (2010) on ICT availability which revealed that the situation was not encouraging. Moreover, Patil (2010) in his study found that users were not trained to use ICT- based products and services and therefore recommended an ICT training programme to increase the use of ICT products and services.

The finding of the study also revealed that there were adequate building and furniture for computer use but the power supply and computer accessories availability were very low. This aligns with the submission of Walmiki & Ramakrishnegowda (2009) that ICT infrastructures in university libraries lack sufficient hardware, software facilities and do not have adequate internet nodes and bandwidth. Also, Adeleke & Olorunsola (2010) observed that ICT facilities were the major constraints facing libraries in the use of tools, even though Shafi-Ullah & Roberts (2010) submitted that ICT infrastructure is necessary to provide a research culture in higher institutions of learning.

The result of the study showed that the teachers do not use the computers in teaching their subjects even though almost all of the teachers agreed that the use of computer in teaching has the potent to improve the academic performance of students in the science subjects. This was in agreement with the observation of Omotayo, Ajayi & Ayodele (2013) that 70% of the science teachers and 76% of the science students agreed that ICT had highly assisted the Nigerian students in the teaching and learning of science subjects.

The results of hypotheses testing revealed that the use of computer in teaching science do not differ among the teachers irrespective of the class or subject taught or gender. this may be so since the teachers' allocation to the classes were done randomly among the teachers on the basis of their area of specializations.

Conclusion

It can be concluded from the outcome of this study that there is inadequate provision of Computers in the school. Even though there were building and furniture for computer use, the power supply and computer accessories availability were very low. On this basis, the teachers do not use the computers in teaching their subjects despite that fact that the teachers believed that the use of computer could improve the academic performance of students in the science subjects.

The disposition of the teachers to the use of computer in teaching their subject is the same across the classes, subject taught and gender differences.

Recommendations

The following recommendations were suggested based on the outcomes of this study:

1. The government should be mandatory for all science teachers in the secondary school to possess a personal computer for use in carrying out their jobs.
2. Government should organize intensive computer training for the science teachers aimed at using computer in the teaching – learning processes. Emphasis should be laid on note making, setting of test and examination questions, collation of results and internet networking.
3. Government should enact a policy that would compel the science to make use of computer in their daily job performances.

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ICT AND STEAM TEACHER EDUCATION IN DEVELOPING BIOLOGY STUDENTS TEACHERS'LITERACY IN NIGERIA

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Abstract

This paper examined Information, Communication Technology (ICT) and Science Technology, Engineering, Arts And Mathematics (STEAM) teacher education in developing biology students teachers' literacy in Nigeria. It enumerated various definitions of ICT and STEAM and their importance. It also enumerated the most important objectives of teachers' education and the Importance of Integrating ICT and STEAM in teacher Education. The study concluded that integrating ICT and STEAM in Teacher Education in Nigeria will help in developing biology students' teachers' literacy to meet the present global challenges. It was therefore recommended that government should equipped biology laboratories in all institutions offering biology education such as Colleges of Education, National Teacher Training Institutes and Faculties of Education in all the universities with ICT facilities to facilitate the teachers' literacy. so also lecturers in all teacher training schools should include the use of Information and Communication Technology (ICT) as one of the strategies to be employed in teaching and learning of biology concepts and that Student teachers in all the tertiary institutions should develop their literacy skills through the regular use of ICT facilities in order to function effectively and contribute to the national growth and development of their society. It was also recommended that: education policy makers should focus on STEAM education to make learning more of a fun and make learners to be more creative in order to facilitate biology students' teachers' literacy in Nigeria.

Key words: Biology, Biology literacy, ICT, STEAM and Teacher Education

Introduction

Information Communication Technology (ICT) plays prominent role in national development it has ability to develop biology students' teachers' literacy in all ramifications of life. Literacy in this context is the competence or knowledge of students in biology, ICT and STEAM teacher education. Techterms Computer Dictionary (2010) define ICT as technologies that provide access to information through telecommunications. It focuses primarily on communication technologies which involves internet wireless networks and cellphones. According to Bello, Ahmed, Alabi, and Ahmed (2016) ICT is electronic technologies used for receiving, storing, processing and retrieving information. It involves communication and is applied to almost every field of human endeavor. STEAM education is an innovational approach to scientific teaching. It is made up of five subjects which are Science, Technology, Engineering, Arts And Mathematics. According to Feldman (2015) the combination of science and arts in form of STEAM education is essential for producing a creative, scientifically literate and ethically astute and workforce for the 21st century. STEAM approach involves learning through the application of Science, Technology, Engineering, Arts and Mathematics to solve

diverse human problems. STEAM is defined as an educational approach of learning that uses science, technology, engineering, the arts and mathematics as an access points for guiding students inquiry, dialogue and critical thinking (Education closet, 2016 p.1)

According to Olorundare (2014) science is defined as the quest for knowledge generally in the physical earth and biological disciplines. Science and scientific method are significant instruments used in solving man's practical problems. According to Abimbola (2009) science is now seen as a human activity which people engage in daily. This is in support of Omosewo (2008) who submitted that science is the bedrock of development of any nation and should be seen as essential experience for all citizens.

The American Association for the Advancement of Science(AAAS) launched a long-term effort to reform science mathematics and technology education called project 2061.This project emphasize the knowledge and skills that today's students will need as adults in the 21st century with the ultimate aim of helping all Americans to become literate in Science, Mathematics and Technology for rapid development.

According to Gormally, Brickman and Lutz (2012) science educators, scientists, and policy makers agree that development of students' scientific literacy is an important aim of science education. Science is classified into two broad areas: the pure science and the applied science usually referred to as technology. Pure science includes Biology, chemistry and physics. The performances of students in these subjects are the major concern in science education as identified by many science educators among which are Abimbola, Olorundare, Omosewo, Ahmed, Upahi and Yahaya (2011)

If Nigerians are to develop and maintain a democratic republic where the citizens would be knowledgeable enough to intelligently participate in decision making on public issues, then they must be scientifically literate. The focus of this study is the integration of ICT and STEAM in teacher education for the development of biology students' teachers' literacy. Biology as a science subject deals directly with human being. It is the science subject that deals with the study of life. And everyone who needs life needs the knowledge of Biology that is, needs to be literate in Biology. Biology is made up of topics and concepts which would bring about human good health and happiness. Human beings need the knowledge of Biology to maintain good health, safe shelter and environment to be able to pursue their goals in life. (Soyibo Ekpunobi, Akinade, Tureta (2013).

Coll and Taylor, (2009) opined that biology literacy which is a sub-set of science literacy is viewed as a primary goal of biology Education. This is in agreement with Abimbola and Abidoye (2013) who submitted that the goals of biology education are to:

1. Provide basic literacy in biology for functional living.
2. Acquire essential scientific skills and attitudes as a preparation for the technological application of biology.
3. Acquire basic concepts and principles of biology as a preparation for further studies
4. Stimulate and enhance creativity.

According to Miller (2011) biology literacy deals with acquisition of biological attitudes, skills and knowledge that allow people to participate in biological debates and develop problem-solving skill and decision making skills in their everyday lives. Khan (n.d.) identified the following as the most important objectives of teachers' education:

1. Imparting an adequate knowledge of the subject-matter: the objective of teacher education is to develop a good command of the subject matter of the assignment given to him in the colleges

2. Equipping the prospective teachers with necessary pedagogic skills: - the main objective of teacher education is to develop a skill to stimulate experience in the taught, under an artificially created environment, less with material resources and more by the creation of an emotional atmosphere. The teacher should develop a capacity to do, observe interpret and to generalize.
3. Enabling the teacher to acquire understanding of child psychology. – The objective is to understand the child psychology so that the teacher is able to appreciate the difficulties experienced by children so as to bring about new modes and methods of achieving the goals in consonance with the reactions of the children.
4. Developing proper attitudes towards teaching: as a result of which he will be able to maximize the achievements from both the materials and human resources.
5. Developing self-confidence in the teacher: the objectives of teacher education are development of the ability to take care of himself in terms of:
   (a) Adjustment with the physical conditions,
   (b) Healthy adjustment with the social environment
   (c) Adjustment with himself to derive emotional satisfaction with his life.
6. Enabling teachers to make proper use of instructional facilities: The objectives of teacher education is to develop the capacity to extend the resources of the school by means of improvisation of instruction facilities.
7. Enabling teachers to understand the significance of individual differences of child and to take appropriate steps for their optimum development. The objective of teacher education is to know the causes of individual differences as a result of which he will be able to develop the ability to be a child with children, an adult, and a responsible citizen among the community.
8. Development of the ability to give direct satisfaction of parents from the achievement of children in terms of:

   (a) Proper habits of taking care of the body
   (b) Proper altitudes reflected in the behavior of the children at home, in the school, in the streets, at the farms and fields e.t.c
   (c) Progress in the class. The duties of the teacher is very much relevant in nursery, primary, middle, secondary, higher secondary schools. Hence the scope of teacher education is very vast. The duties of the teacher in different stages of education depend on the foundational general education of the teacher. Emphasis is to be on the practical aspects rather than theory. This is the more reasons why ICT and STEAM approach must be integrated into teachers' education to facilitate effective teaching and learning though practical works. So also teacher education is an important means through which students are exposed to the knowledge of STEAM. The knowledge of STEAM will help biology students achieve the goals of biology education through technological application of biology knowledge. It will also help to stimulate and enhance creativity.

Teacher Education or Teacher Training: - Refers to the policies, procedures, and provision designed to equip (prospective) teachers with the knowledge, attitudes behaviors and skills they require to perform their tasks effectively in the classroom, school and wider community. The professionals who engage in this activity are called teacher educators (or in some contexts, teacher trainers) Wikipedia (2018)

Information and Communication Technology (ICT) is an extensional term for Information Technology (IT) which stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals) computers as well as necessary enterprise, software, middle ware, storage and audio-visual systems, which enable users to access, store, transmit and manipulate information.(Information and Communication Technology Wikipedia 2018)

Importance of Integrating ICT and STEAM Teacher Education for the Development of Biology Students Teachers Literacy in Nigeria

Integrating ICT and STEAM in Teacher Education will help in the following ways

1 It will help the prospective teachers to actively involved in teaching and learning processes
2 It will expose the prospective teachers to information beyond their immediate environment and their subject area.
3 It will help the prospective teachers to be literate in their subject area and in ICT and STEAM.
4 It helps to develop citizens that are not inferior to other STEAM literate population of the world.
5 The correct application of Arts components of STEAM will help in development of the political power of the nation.

Akanni (2016) submitted the following as the importance of using ICT and STEAM Education

- ICT is used in enlarging small objects thereby helping the learner to see clearly the details in biology
- It help to slow down time so that events that happen too fast for the human eyes and brain to comprehend can be seen at an understandable speed. It can also be used to speed up time so that event which happen slowly can be viewed and understood in short time
- ICT conveys ideals skillfully, it hastens the understanding of abstraction by presenting situations in concrete terms.
- It serves to provide additional information for the students through online textbooks, reference books, periodicals, journals and newsletters by using internet
- It helps to obtain current information as soon as it is accessible, it enhances knowledge sharing, quality of knowledge, authentic and unique knowledge through internet browsing

Factors that Hinders the Effective Use of ICT and STEAM in Teachers Education

There are some factors which served as barrier to the use of ICT and STEAM in teachers' education some of these barriers as discovered by Duwan (2017) are as the following:

- inadequate ICT infrastructures, lack of effective training background in ICT and the paucity of ICT gadget make it impossible to teach effectively in all the higher institutions of education such as Colleges of Education, National Teachers Training Institute, Faculties of Education in Universities
- insufficient ICT knowledge and skills among lecturers.
- incompetence of lecturers and lack of confidence in using ICT.

Nwagbo and Adam (2012) discovered that biology students are at the low level of biology literacy. Teacher's literacy skills in biology, ICT and STEAM must be properly developed so as to bring about economic, social and political development.

Developing teacher's literacy in biology, ICT and STEAM will help in the following ways:

- It will help in reducing the number of people living with e.g. hereditary diseases such as sickle cell anemia, communicable diseases such as tuberculosis, HIV/AIDS e.t.c
- It will help through the use of biotechnology in improving crop yields
- It will help in population control by using biotechnology through contraception
- It will also help economically in reducing the amount of money that people spend in treating sicknesses and diseases.
- It will also help people to live a quality life.
- It will help to identify ecological problems and to be able to solve them

Conclusion

The study concluded that integrating ICT and STEAM Teacher Education in Nigeria will help in developing teacher's literacy to meet the present global challenges.

Recommendations

It was recommended that:

- Lecturers in all teacher training schools should include the use of Information and Communication Technology as one of the strategies to be employed in teaching and learning.
- Government should equipped laboratories in all institutions such as Colleges of Education, National Teachers Training Institute and Faculties of Education in all the universities with ICT infrastructure such as computers and internet services to facilitate the teachers literacy
- Student teachers in all the tertiary institutions should develop their biology literacy skills through the regular use of ICT facilities in order to function effectively in the society and contribute to the national growth and development.

It was also recommended that:

- educaton policy makers should focus on STEAM education to make learning more of a fun and make learners to be more creative.
- the curriculum developers should incorporate into the curriculum of teacher education programme in Nigeria the teaching of hands-on mind-on approaches that are Arts related to facilitate biology students teachers' literacy in Nigeria.

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IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ON EFFECTIVE TEACHING AND LEARNING PROCESS IN TECHNICAL COLLEGES IN EKITI STATE

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Abstract
This paper examined the impact of Information and Communication Technology, ICT, on effective teaching and learning process in technical colleges in Ekiti State. The paper also explored teachers' related factor affecting effective use of ICT in technical colleges in Ekiti State. It was a descriptive research of a survey type and the population covered all the teachers and students in all he 5 technical colleges in Ekiti State; out of which random sampling technique was used to select 20 teachers and 150 students as the sample size. The data collected through a closed ended questionnaire was analyzed through mean and standard deviation for the research questions and simple linear regression for the formulated hypotesis. It was discovered that there was a significant effect of ICT on effective teaching and learning process in technical colleges in Ekiti State, and that poor planning for the use of technology, teachers' inexperience in using technology as a productivity tool and lack of timely training are teachers' related factors affecting effective use of ICT in technical colleges in Ekiti State. Based on the findings, it was therefore recommended teachers should not neglect ICT facilities in the teaching and learning process and they should be adequately trained and supervised thoroughly so as to achieve the importance of ICT facilities in the teaching and learning process.

Keywords: ICT, Teaching and Leaning, Technical Colleges

Introduction

There is no doubt that technical colleges play an important role in the economic development of any nation. Hence, the need for efficiency and effectiveness among teachers and students in technical colleges thus cannot be overemphasized. Olaitan (2009) opined that higher performance in the educational sector is always contingent on the availability of adequate, capable teachers, good welfare package, availability and proper usage of instructional aids. This implies that availability of adequate, capable teachers and good welfare package without instructional aids that will breed higher connection between the instructor and students and also simplify the teaching and learning process will affect the performance level of teachers and the productivities of students. Instructional aids, part of which is Information and Communication Technology (ICTs), are indispensable in the teaching and learning process in technical colleges.

Technical education gives individuals the skills to live, learn and work as a productive citizen in a global society. Okoro (2009) described technical education as all those experiences whereby an individual learns to carry on successfully any useful occupation. This implies that technical education is that aspect of education that is mainly concerned with the preparation of individuals for skilled performance on task that is geared towards making the learner much more productive through improved performance in either paid employment or in self-employment. Winer (2002) in his contribution opined that technical education is designed to develop

skills, abilities, understanding, attitudes, work habits and appreciation encompassing knowledge and information needed by workers to enter and make progress in employment on a useful and productive basis. It is an integral part of the total education programme and contributes towards the development of good citizens by developing their physical, socio, civic, cultural and economic competencies.

According to the National Policy on Education (NPE), technical education is described as that aspect of education that leads to the acquisition of practical and applied skills as well as basic scientific knowledge. In this sense, it forms a practical segment of education that involves skill acquisition. Therefore, technical education is a subset of vocational education. Olaitan (2009) opined that technical education can be explained in terms of: – training designed to advance an individual's proficiency in relation to his or her present or future occupation, training or re-training which is given in schools or classes under public supervision and control; provision of systematic training experiences which are designed to fit individuals in recognized occupations. Thus, vocational education is that part of total educational system, which offers courses leading to the acquisition of specific skills to enable one to perform certain job. Sometimes, vocational education offers re-training to up-grade workers already in employment.

The teaching and learning of technical subjects demand engagement of students in practical work especially with any of information and communication technology tools. According to Ashrafi and Murtaza (2008), ICT refers to a wide range of computerized technologies that enables communication and the electronic capturing, processing, and transmission of information. These technologies include products and services such as desktop computers, laptops, hand-held devices, wired or wireless intranet, business productivity software, data storage and security, network security etc. With the use of ICT, teachers and students can interact more efficiently and access events and material remote in time (Buhalis, 2003). This implies that with the use of ICT, the time constraint, and distance barrier to accessing relevant information is eliminated or drastically reduced.

The field of education has been affected by the ICTs, which have undoubtedly affected teaching, learning, and research (Yusuf, 2005). Al-Ansari, (2006) submitted that ICTs could enhance the teaching process of technical subjects in several ways; by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher productivities. Corroborating this Dawson and Rakes (2003), observed that ICTs have the potentials to accelerate, enrich and deepen skills, to motivate and engage students, to help relate school experiences to work practices, create economic viability for tomorrow's workers as well as strengthening teaching and helping school change. ICT has an impact not only on what students should learn, but it also plays a major role on how the students should learn.

According to Scrimshaw (2004), ICTs are revolutionizing education by removing distance from education and making knowledge more accessible to all. Technology-enhanced learning will play a crucial role in the development of a lifelong learning culture and has the capacity to empower learners by providing them with multiple pathways that offer choices and channels to meet their education and training needs (Human Resources Development Canada, 1998). It is not surprising therefore to see a growing interest in Technology-Based Learning (TBL) across the world. TBL may be defined as the array of hardware and software used in the teaching and learning systems that include computer-based training systems, multime-dia systems, electronic performance support systems, telecommunications systems, as

well as the Internet with World Wide Web systems.

The rate at which the Internet is being accessed keeps increasing at lightning speed. TBL can enhance teaching and learning; it has the potential to become cost-effective as it offers greater flexibility regarding time and location of training delivery (Furst-Bowe, 1996). Additionally, TBL may facilitate institutional policy regarding access and equity (Lafreniere, 1997). Technology also provides greater flexibility to adapt teaching and learning to meet learners' cognitive and learning styles. Expanding this Imel (2008) opined that ICT changes the characteristics of problems and learning tasks, and hence play an important task as mediator of cognitive development, enhancing the acquisition of generic cognitive competencies as essential for life in our knowledge society. ICTs allow learners to explore and discover rather than merely listen and remember.

Jawarneh, El-Hersh and Khazaleh (2007) and Moreno, Helenius and Jarmo (2001) opined that the use of ICT in passing instruction to students can provide schools with potential access to the world of work outside of the school and allows teachers to design useful learning environments that emphasizes learning in the context of real world activities for technical students. Successful use of ICT in schools can help students to develop skills; both specific to ICT and more generally, that will be useful for them in their future academic and professional lives (OECD 2005). Such students will have the advantage of being familiar with different media common to the modern workplace, and should be able to use these ICT skills to access, compile, synthesize and exchange information effectively.

Numerous research studies provide a long list of factors that can potentially affect the use of technology in colleges. These factors include lack of convenient access to computers, inadequate infrastructure, poor planning for the use of technology (Smerdon, Cronen, Lanahan, Anderson, Iannotti, & Angeles 2000), and teachers' inexperience in using technology as a productivity tool (Hope, 1998). According to some researchers, teachers have the most impact on the quality of technology use in schools and therefore, factors relating to teachers are most frequently cited as influencing technology use in schools. For example, Hardy's (1998) review of studies on teacher attitudes revealed that teacher confidence affects the use of technology more than variables such as access to equipment, administrative support, and time.

Other researchers have noted various important, teacher-related variables that influence the effective adoption or implementation of information technology. For example, whether teachers are positive about technology (Becker & Ravitz, 2000); whether they realize the advantages of integrating technology in their teaching (Scrimshaw, 2004); teachers' beliefs and views on information technologies (Norton, McRobbie, & Cooper, 2000); teachers' resistance to change in general (Jones, 2004) and their willingness to change their long-standing pedagogical practices (Snoeyink & Ertmer, 2001) and classroom role (Hardy, 1998); teachers' confidence to incorporate innovation and their commitment to the innovation (Dawson & Rakes, 2003); teachers ability to integrate technology (Kent & McNergney, 1999); prior negative experiences of using technology as a productivity tool (Snoeyink & Ertmer, 2001) and feelings of intimidation if they sense students know more than them (Fryer, 2003).

Similarly, students complained that the use of ICT facilities provided by the schools couldn't go around the students due to shortage supply. Some other students complained that some teachers are not skilled in using ICT in teaching them. This is why such teachers prefer to stick to the traditional method of teaching. This can be

supported with the view of Adeshina (2007) who stated that for technical subject teachers to grow professionally and remain relevant, they must possess ICT skills. On the basis of the foregoing and with the aim of advancing the frontiers of knowledge, the paper is designed to examine the impact of Information and Communication Technology, ICT, on teaching and learning process in technical colleges in Ekiti State.

Purpose of the Study

The purpose of this study is to examine the impact of Information and Communication Technology on effective teaching and learning process in technical colleges in Ekiti State and also explore teachers' related factor affecting effective use of ICT in technical colleges in Ekiti State.

Research Question

Stemming from the purposes of the study, the following research questions are raised to guide the study:

i. Is there any significant impact of ICT on effective teaching and learning process in technical colleges in Ekiti State?
ii. Are there teachers' related factors affecting effective use of ICT in technical colleges in Ekiti State

Research Hypotheses

The following hypotheses are formulated for the study:

$H_0$1: There is no significant impact of ICT on effective teaching and learning process in technical colleges in Ekiti State.

Methodology

The study adopted a descriptive research design of the survey type and the population covered all the teachers and students in all the 5 technical colleges in Ekiti State. The sample that was determined through random sampling technique consisted of 20 teachers and 150 students across the 5 technical colleges in Ekiti State. The sample consisted of 4 teachers and 30 students from each college; making a total of 170 respondents. To collect the needed data, a close ended questionnaire was used and validity and reliability of the instrument were done accordingly. Validity of the instrument was done by reputable colleagues in the department while Cronbach Alpha was used to ascertain the reliability of the instrument; having administered the questionnaire on a set of respondents outside the sampled ones. The data collected was analyzed through mean and standard deviation and chi-square.

Results and Discussion and Findings

Research Questions

Research Question 1: Is there any significant impact of ICT on effective teaching and learning process in technical colleges in Ekiti State

Table 1: Respondents' Responses on the impact of ICT on Effective Teaching and Learning Process in Technical Colleges in Ekiti State.

S/N	Items	*f*	Mean	Std Deviation	Remarks
1	The introduction of ICT in the teaching and learning process increases students' retention rate	18	3.51	1.457	Agreed
2	ICT has made the learning of technical subject easier for students	33	4.03	1.057	Agreed
3	With ICT, students need little assistance from teachers in workshop activities	41	4.38	1.187	Agreed
4	Learning with ICT has improved academic performance of the students	28	3.64	1.299	Agreed
5	With the introduction of ICT, teaching and learning process is more interesting	30	3.92	1.336	Agreed
6	The use of ICT causes effective teaching and learning	20	3.55	1.296	Agreed

Source: Field Survey

The outcome above revealed that the respondents agreed that the introduction of ICT in the teaching and learning process increases students' retention rate, ICT has made the learning of technical subject easier for students, With ICT, students need little assistance from teachers in workshop activities, learning with ICT has improved academic performance of the students, with the introduction of ICT, teaching and learning process is more interesting, the use of ICT breed effective teaching and learning with mean and standard deviation of 3.51(1.457); 4.03(1.057); 4.38(1.187); 3.64(1.299); 3.92(1.336) and 3.55(1.296) respectively.

Research Question 2: Are there teachers' related factors affecting effective use of ICT in technical colleges in Ekiti State

Table 2: Responses of the respondents on Teachers' Related Factors Affecting Effective Use of ICT in Technical Colleges in Ekiti State

S/N	Items	*f*	Mean	Std Deviation	Remarks
1	lack of convenient access to computers	21	3.61	1.330	Agreed
2	Inadequate infrastructure, poor planning for the use of technology	32	3.82	1.317	Agreed
3	Teachers' inexperience in using technology as a productivity tool	28	3.76	1.452	Agreed
4	Lack of timely training	35	3.87	1.252	Agreed
5	Teachers' resistance to change in general their willingness to change their long-standing pedagogical practices	15	3.54	1.572	Agreed
6	Feelings of intimidation if they sense students know more than them	39	4.02	1.055	Agreed

Source: Field Survey

The discovery above revealed that the respondents agreed that lack of convenient access to computers, inadequate infrastructure, poor planning for the use of technology, teachers' inexperience in using technology as a productivity tool, lack of timely training, teachers' resistance to change in general their willingness to change their long-standing pedagogical practices and feelings of intimidation if they sense students know more than them were the teachers' related factors affecting effective use of ICT in technical colleges in Ekiti State with mean and standard deviation of 3.61(1.330); 3.82(1.317); 3.76(1.452); 3.87(1.252); 3.54(1.572) and 4.02(1.055) respectively.

Testing of Hypotheses

Hypothesis 1: There is no significant impact of ICT on effective teaching and learning process in technical colleges in Ekiti State.

Table 3: Simple Regression Analysis of the Impact of ICT on Effective Teaching and Learning Process in Technical Colleges in Ekiti State

Dependent variable: Teaching and learning in technical colleges

Model	Coefficients	Std Error	R	R^2	F	P.value
Constant	1.785	0.279	0.44	0.18	16.6	0.000
ICT	0.385	0.094				

Source: Authors' Computation

Estimation presented in the table above reported coefficient estimate of 0.385 alongside probability value of 0.000 for internal audit. The result showed that ICT exerts a significant positive effect on effective teaching and learning in technical colleges in Ekiti State, reflecting that effective teaching and learning increases by 0.385 following the usage of ICT facilities. R-square reported stood at 0.18, which implies that about 18% systematic variation in the effective teaching and learning in technical colleges could be explained by the usage of ICT facilities.

Discussion of Findings

The result showed that ICT exerts a significant positive effect on effective teaching and learning in technical colleges in Ekiti State, reflecting that effective teaching and learning increases following the usage of ICT facilities. The consequence of this finding is that ICT facilities are very instrumental to bridge the gap of individual differences and supplying the teaching and learning process in technical college in Ekiti State and beyond. In the same vein, this discovery adduced that the use of ICT facilities in the teaching and learning process help students to be relevant in the world of work. This finding was similar to the findings of Jawarneh, El-Hersh and Khazaleh (2007) and Moreno, Helenius and Jarmo (2001). They submitted that the use of ICT in passing instruction to students can provide schools with potential access to the world of work outside of the school and allows teachers to design a useful learning environment that emphasizes learning in the context of real-world activities for technical students.

It was also discovered that there are teachers' related factors affecting effective use of ICT in technical colleges in Ekiti State. The reveals that the efficiency level of teachers in using ICT facilities to pass instruction to college students is plagued with problems such as that lack of convenient access to computers, inadequate infrastructure, poor planning for the use of technology, teachers' inexperience in using technology as a productivity tool, lack of timely training and teachers' resistance to change in general their willingness to change their long-standing pedagogical practices, but to mention just a few. These findings corroborated the conclusion of Smerdon, Cronen, Lanahan, Anderson, Iannotti and Angeles (2000), Hope (1998), Jones (2004) and Dawson and Rakes, 2003). They confirmed that the aforementioned factors were the relevant teachers-related factors affecting effective use of ICT in technical colleges in Ekiti State.

Conclusion and Recommendation

This paper centered on the impact of ICT on effective teaching and learning in technical colleges in Ekiti State. Based on the findings of this study, it was concluded that there was a significant effect of ICT on effective teaching and learning process in technical colleges in Ekiti State and that there are teachers' related factors such as poor planning for the use of technology, teachers' inexperience in using technology as a productivity tool and lack of timely training and teachers' resistance to change, affecting effective use of ICT in technical colleges in Ekiti State. It was therefore recommended that ministry of education should make available the necessary ICT facilities, teachers are urged not to neglect ICT facilities in the teaching and learning process and also teachers should be adequately trained and supervised thoroughly so as to achieve the importance of ICT facilities in the teaching and learning process.

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EFFECT OF SEX EDUCATION ON KNOWLEDGE, ATTITUDE AND PRACTICE OF SEXUAL RISK BEHAVIOUR AMONG ADOLESCENTS IN ADO-EKITI, NIGERIA.

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Abstract

Sex education was carried out among adolescents in Ado-Ekiti with the aim of improving their knowledge of and attitude to sexual risk behaviour thereby reducing the practice of these behaviour among them.103 secondary school students, selected from two schools in Ado-Ekiti, using simple random sampling, constituted the sample for this study. Pretest-Posttest quasi-experimental nonequivalent groups design was adopted for this study. Questionnaire with reliability coefficient of 0.68 was the instrument for data collection. Frequency counts and percentages were used to analyse the demographic data of the participants while ANCOVA was used to test hypotheses at 0.05 alpha level. Sex education had a significant main effect on adolescents' knowledge, attitude and practice of sexual risk behaviour (effect size=57.7%, 26.7% &13.1% respectively). There was no significant main & interaction effect of gender on attitude & practice of sexual risk behaviour. There was however significant interaction effect of gender on knowledge of adolescents' sexual risk behaviour. Sex education is an effective way of reducing the practice of sexual risk behaviour among adolescents. It is therefore recommended that frequent sex education outreaches should be carried out among adolescents.

Keywords: Adolescents, sex education, knowledge, attitude, practice, sexual risk behaviour.

Introduction

The pattern and prevalence of sexual risk behaviour among Nigerian adolescents is alarming. Many adolescents have been reported to be sexually active thus increasing their risk of getting sexually transmitted diseases. Sexual risk behaviour that have been identified among adolescents include: multiple sexual partnership (John, Okolo and Isichei 2014), early debut of sexual activities (Slap, Lot, Huang, Daniyan, Zink and Succop 2003; Imaledo, Peter-Kio, and Asuquo (2012), low and inconsistent use of condoms (Olaseha, Ajuwon and Onyejekwe, 2004), anal sexual intercourse and mouth to genital contact (Iwuagwu, Olaseha and Ajuwon, 2000)

Many factors have been reported to influence the practice of sexual risk behaviour among adolescents. Buga, Amoko and Ncayiyana (1996) identified poor knowledge of reproductive biology and contraceptives while Amu (2014) identified low perception of risk of contacting sexually transmitted diseases leading to poor attitude to sexual risk behaviour. In addition, Owolabi, Onayade and Ogunsola (2005) & Niyonsenga and Hlaing (2007) also reported that gender differences exist in sexual behaviour among adolescents, with boys being more likely to engage in sexual risk behaviours than girls.

Sexual risk behaviours, if not quickly addressed, could have long lasting implication on the health of the individuals concerned, and the nation at large. According to Centres for Disease Control and Prevention CDC (2018), sexual risk behaviours place adolescents at risk of HIV infection, other sexually transmitted diseases

(STDs) and unintended pregnancy. In addition, Biglan, Brennan and Foster (as cited in Kipping, Campbell, MacArthur & Hickmann, 2012), stated that risk behaviours in adolescence are associated with poor educational attainment, future morbidity and premature mortality

One of the ways to reduce the occurrence of sexual risk behaviour among adolescents is to target these young ones with se education intervention programme so as to improve their knowledge of and attitude to sexual risk behaviour and in turn reduce risky sexual practices among them. Ibrahim, Rampal , Jamil and Zain (2012) reported significant improvement in knowledge, attitude and practice of sexual risk behaviour after a sex education programme among adolescents.

There have been many research reports on the pattern, prevalence and factors associated with sexual risk behaviour among Nigerian adolescents. More effort is however required to educate these adolescents on issues related to sexual risk behaviour so as to reduce the practice among them. Ajuwon (2005) submitted that sexuality education during adolescence is likely to foster positive attitudes and healthy behaviours in adult years.

The purpose of this study was therefore to determine the effect of sex education intervention on knowledge, attitude and practice of sexual risk behaviours among adolescents in Ado-Ekiti, Ekiti State Nigeria.

Hypotheses

1. There is no significant main effect of sex education on knowledge of sexual risk behaviour among adolescents in Ado-Ekiti
2. There is no significant main effect of sex education on attitude to sexual risk behaviour among adolescents in Ado-Ekiti
3. There is no significant main effect of sex education on practice of sexual risk behaviour among adolescents in Ado-Ekiti

Materials and Methods

Study Design and Location

Pretest-posttest, control group, quasi-experimental non equivalent group design using 2x2 factorial matrix was adopted for this study. The study consisted of two treatment groups (experimental and control) and sex (male and female) as the moderating variable. The study was conducted in Ado-Ekiti, the capital of Ekiti State Nigeria.

Study Population and Sampling Procedure

The study consisted of one hundred and three adolescents with age range of 10-14 years. These adolescents were selected from two government owned secondary schools in Ado-Ekiti using purposive sampling procedure. The research design and factorial matrix adopted for this study could only accommodate two schools (one representing experimental and the other control group). However the authorities of one of the schools initially selected using random sampling declined consent hence only the schools where consent was given to carry out the study were selected. Students in Senior Secondary School 1 were purposively selected to constitute the study population for this study and an arm of Senior secondary 1 was randomly selected in each of the two schools and all the students in each of the classes selected constitute the participants for the study.

Data Collection

Researcher developed, validated Questionnaire with 4 sections was the instrument for data collection in this study. The first section was designed to elicit information on: participants' demographic attributes. Second section has 15-items with reliability coefficient of 0.68 and a Yes or No response format was used to test adolescents' knowledge of sexual risk behaviour. The third section was used to assess adolescents attitude to sexual risk behaviour. This has 17 items with a 4 point rating scale of Strongly Disagree (SD),

Disagree (D), Agree (A) and Strongly Agree (SA) and a reliability coefficient of 0.78. The fourth section of the instrument, was used to assess the practice of sexual risk behaviour among the participants. This has 10 items with a reliability coefficient of 0.94 and a 4 point rating scale of 'never', 'once a while', 'once a week' and 'more than once a week'.

Data Analysis

Data generated in this study were analysed using SPSS version 16. Descriptive statistics of frequency counts and percentages were used to describe the demographic attributes of respondents while ANCOVA was used to determine the effect of sex education on knowledge, attitude and practice of sexual risk behaviour among adolescents. All inferences were made at 0.05 alpha level.

Results

Table1: Demographic attributes of participants

Variable		Frequency	(%)
Gender	Male	53	51.5
	Female	50	48.5
Age group	10-14yrs	34	33.0
	15-19yrs	69	67.0
Groups	Experimental	57	55.3
	Control	46	44.7
	Total	103	100.0

Table 1 shows that 53(51.5%) of the participants are male while the rest are female, majority 69(67.0%) are between the ages of 15 and 19 years and 57 (55.3%) of the participants constituted the experimental group while 46 (44.7%) constituted the control group.

Hypothesis 1: There is no significant main effect of treatment on adolescents' knowledge of sexual risk behaviour

Table 2: Analysis of covariance (ANCOVA) of post test scores of adolescents' Knowledge of sexual risk behaviour using pretest scores as covariates

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	881.507[a]	4	220.377	64.023	.000	.723
Intercept	503.310	1	503.310	146.221	.000	.599
preknow	52.002	1	52.002	15.108	.000	.134
treatment	460.754	1	460.754	133.857	.000	.577
gender	.117	1	.117	.034	.854	.000
treatment * gender	15.382	1	15.382	4.469	.037	.044
Error	337.328	98	3.442			
Total	16755.000	103				
Corrected Total	1218.835	102				

a. R Squared = .723 (Adjusted R Squared = .712)

Table 2 shows that treatment had significant main effect on adolescents' knowledge of sexual risk behaviour ($F_{1, 98}$ = 133.857; P<0.05; partial eta squared= 0.577). Therefore hypothesis 1 is rejected. This implies that sex education intervention programme had significant main effect on adolescents' knowledge of sexual risk behaviour. Partial eta squared of 0.577 implies that treatments accounted for 57.7% of the observed variance on participants' knowledge of sexual risk behaviour. This table also shows there was no significant main effect of gender but a significant interaction effect of treatment and gender on participants' knowledge of sexual risk behaviour. Further analysis revealed that the participants in the experimental group displayed better knowledge ($\bar{X}$ =14.486) of sexual risk behaviour than their counterparts in the control group ($\bar{X}$ =9.664) and also that female participants displayed significantly higher knowledge ($\bar{X}$ =12.900) than their male counterparts ($\bar{X}$ =11.698) after the sex education intervention programme.

Hypothesis 2: There is no significant main effect of treatment on adolescents' attitude to sexual risk behaviour

Table 3: Analysis of covariance (ANCOVA) of post test scores of adolescents' Attitude to sexual risk behaviour using pretest scores as covariates

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3380.719[a]	4	845.180	20.142	.000	.451
Intercept	4987.849	1	4987.849	118.868	.000	.548
preatt	381.984	1	381.984	9.103	.003	.085
treatment	1496.655	1	1496.655	35.668	.000	.267
gender	1.437	1	1.437	.034	.854	.000
treatment *gender	24.939	1	24.939	.594	.443	.006
Error	4112.194	98	41.961			
Total	342482.000	103				
Corrected Total	7492.913	102				

a. R Squared = .451 (Adjusted R Squared = .429)

Table 3 shows that treatment had significant main effect on adolescents' attitude to sexual risk behaviour ($F_{1, 98}$ = 35.668; P<0.05; partial eta squared= 0.267). Therefore hypothesis 2 is rejected. This implies that sex education intervention programme had significant main effect on the attitude of adolescents to sexual risk behaviour. Partial eta squared of 0.267 implies that treatments accounted for 26.7% of the observed variance on participants' attitude to sexual risk behaviour. This table also shows there was no significant main and interaction effect of gender on participants' attitude to sexual risk behaviour. Further analysis revealed that the participants in the experimental group displayed better attitude ($\bar{X}$ =60.942) of sexual risk behaviour than their counterparts in the control group ($\bar{X}$ =52.314) and also that that there is a significant difference in participants' attitude to sexual risk behaviour with female participants displaying better attitude ($\bar{X}$ =58.180) than their male counterparts ($\bar{X}$ =55.143) after the sex education intervention programme.

Hypothesis 3: There is no significant main effect of treatment on adolescents' practice of sexual risk behaviour

Table 4: 2x2 analysis of covariance (ANCOVA) of post test scores of adolescents' Practice of sexual risk behaviour with treatment and sex using pretest scores as covariates

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2279.931[a]	4	569.983	48.038	.000	.662
Intercept	902.532	1	902.532	76.066	.000	.437
preprac	1039.919	1	1039.919	87.645	.000	.472
treatment	177.139	1	177.139	14.929	.000	.132
sex	44.041	1	44.041	3.712	.057	.036
treatment * sex	1.721E-5	1	1.721E-5	.000	.999	.000
Error	1162.788	98	11.865			
Total	142900.000	103				
Corrected Total	3442.718	102				

a. R Squared = .662 (Adjusted R Squared = .648)

Table 4 shows that treatment had significant main effect on adolescents' practice of sexual risk behaviour ($F_{1, 98}$ = 177.139; P<0.05; partial eta squared= 0.132). Therefore hypothesis 3 is rejected. This implies that sex education intervention programme had significant main effect on adolescents' practice of sexual risk behaviour. Partial eta squared of 0.132 implies that treatments accounted for 13.2% of the observed variance on participants' adolescents' practice of sexual risk behaviour. This table also shows there was no significant main and interaction effect of gender on participants' practice of sexual risk behaviour. Further analysis revealed that the participants in the experimental group had a significant reduction in the practice of sexual risk behaviour ($\bar{X}$ =2.210) of sexual risk behaviour compared to their counterparts in the control group ($\bar{X}$ =2.608) and female participants displayed a significant reduction in practice ($\bar{X}$ =.936) than their male counterparts ($\bar{X}$ =3.741) after the sex education intervention programme.

Discussion

This study examined the effect of sex education on knowledge, attitude and practice of sexual risk behaviour among adolescents. Similar to the findings of Esere (2008) ; Avachat, Phalke and Phalke (2011) and Ibrahim, Rampal , Jamil & Zain (2012), the present study resulted in a significant improvement in knowledge related to sexual risk behaviour among adolescents. Participants in the experimental group had a higher posttest mean score of knowledge than their counterparts in the control group. This finding supports the assertion that education is an effective tool for bringing about improvement in knowledge in every facet of life. The likely reason for this finding is that educational intervention programmes are often planned and packaged in such a way that recipients of such interventions get exposed to information that is expected to improve their knowledge on the target topics.

With regards to the effect of sex education on attitude to sexual risk behaviour, the findings of this study like that of Peyman and Jangi (2015) shows that sex education resulted in an improvement of attitude towards sex risk behaviour. This is likely because through the sex education programme, participants gained better understanding of the detrimental effects of sexual risk behaviour thereby developing a

better attitude towards avoiding such risky behaviours.

The practice of sexual risk behaviour was not left out in this study. Similar to the findings of Puente et al 2011, female participants in this study reported a significant reduction in the practice of sexual risk behaviour. Similarly, participants in the experimental group like those reported by Esere (2008), had significant reduction in practice of sexual risk behaviour after the intervention programme than those in the control group. The significant reduction in the practice of sexual risk behaviour reported among participants in this study was likely to be as a result of improvement in knowledge and attitude towards avoiding sexual risk behaviour brought about by the sex education intervention. Knowledge is power and it is an essential ingredient for developing a positive attitude towards the practice of healthy behaviour (Sharifzadeh, Moodi and Zendehdel,2010).

The findings of this study that gender differences exist in knowledge, attitude and practice of sexual risk behaviour after the sex education programme, is in line with that of Ibrahim, Rampal , Jamil and Zain (2012) who reported better knowledge of sexual risk behaviour after sex education programme among their female participants. The likely reason for this finding is that girls often tend to be more easily motivated than boys and since one of the objectives of the intervention programme is to motivate the adolescents to acquire better knowledge and attitude and adopt healthier sexuality then this might be the reason behind the finding.

Conclusion

Based on the findings of this study, it can be concluded that sex education intervention programme improves adolescents' knowledge, attitude and practice of sexual risk behaviour among adolescents.

Recommendations

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

1. School authorities should frequently organise sex education programmes among their students.
2. Health education teachers should use all available avenues to emphasize the importance of healthy sexuality among students
3. Parents should make it a point of duty to frequently give sex education talks to their children and wards. This will go a long way at reducing the practice of sexual risk behaviour among adolescents.
4. Health related Government agencies, Non Governmental Organizations and other concerned agencies should intensify efforts on sex education among in-school adolescents.

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USE OF ELECTRONIC AND PRINT MEDIA IN THE TEACHING AND LEARNING OF SCIENCE

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Abstract

Teaching and learning media are different kinds of media used to explain content to learners so that learning can more be effective. This paper therefore examined the use of electronic and print media in the teaching and learning of science. This paper discussed the concept of electronic and print media, their uses in the teaching and learning of science, advantages and the challenges faced in the use of these media in the teaching and learning of science. In view of these, it was recommended that Government should allocate special budget provision to provide Media material and gadgets to the schools both at elementary and secondary level, the teachers or schools should be provided opportunity of in-service training for media use in the teaching and learning of science, there should be more emphasis on the practical training for prospective school teachers education institution, Media technology resource center should be established in teacher training institutions and there should be public and private partnership in the procurement of electronic and print media for effective teaching and learning of science.

Keywords: Media, Electronic Media, Print Media, Teaching, Learning and Science

Introduction

Science is an organized body of knowledge which is in form of concepts, laws, theories and generalizations. Science is the study of nature and natural phenomena in order to discover their principles and laws (Urevbu, 2001). Science is of immense importance because of its ability to shed light on so many natural phenomenan and it plays a central role in the world's current technological development.

Media are teaching and learning tools (Adekola, 2008) . Media are everything that can be used to stimulate thoughts, feelings, concerns and abilities or skills of learners so as to facilitate the process of learning (Agbamuche, 2015). This definition is quite broad and includes in-depth understanding of the source, the environment, human beings and the method used for the purpose of learning and teaching. Therefore, media are tools that can channel messages, stimulate the mind, feelings, and the willingness of the students so as to encourage the creation of learning process in the learners

Media are integral part of our daily life and has also plays a dominant role in the process of education. It has a great impact in shaping the lives of our future generation. Media could be a film clip, a song we hear on the radio, podcast of a lecture or newspaper article. Students can also create their own media. For example, student video projects can be a powerful learning experience. The use of media to enhance teaching and learning complements traditional approaches to learning. Effective instruction builds bridges between students' knowledge and the learning objectives of the science subjects. Using media engages students, aids their retention of knowledge, motivates

interest in the subject matter, and illustrates the relevance of many concepts (Yakubu, 2003).

Media can be used in almost any discipline to enhance learning, both in class, and also for out-of-class or out-of-school assignments. Short films and television clips, written articles, and blog postings can be viewed to reinforce concepts and spark discussion (Yakubu, 2003). People learn abstract, new, and novel concepts easier when they are presented in both verbal and visual form. Visual media make concepts more accessible to a person than text media and help with later recall. Why do students remember everything that is on television and forget what we lecture? – because visual media help students retain concepts and ideas. The crucial role that technology plays for creating learning environments that extend the possibilities of one-way communication media, such as movies, documentaries, television shows and music into new areas that require interactive learning like visualizations and student-created content can not be over emphasised.

Many media sources (feature films, music videos, visualizations, news stories) have very high production quality capable of showcasing complex ideas in a short period of time. Media help to develop quantitative reasoning, Learn more about this technique using the Teaching Quantitative Reasoning with the News module, it also media offers both cognitive and affective experiences (Adekola 2008). It can provoke discussion, an assessment of one's values, and an assessment of self if the scenes have strong emotional content, the use of media sources help connect learners with events that are culturally relevant. As a result, a positive consequence of utilizing media is that instructors must keep their materials and examples up-to-date, news stories can be used to connect theories taught in the classroom with real world events and policies, popular media (films, music, YouTube) are familiar medium to students that helps gain attention and maintain student interest in the theories and concepts under discussion. Students can see theories and concepts in action.

In more than a figurative sense, theories and concepts leap from the screen, students can develop their analytical skills by analyzing media using the theories and concepts they are studying. The use of media in the classroom enables students to see concepts and new examples when they are watching television, listening to music, or are at the movies with friends and students can experience worlds beyond their own, especially if the media is sharply different from their local environment.

Without communication, an individual could never become a human being. Without media, an individual could never become part of modern society. As children grow up, they come into contact with other social groups. The child of today comes into contact with groups other than those in school.

The learning process is a communication process and takes place in a system, the learning media occupies an important position as one of the components of the learning system. Without the media, communications will not occur and the process of learning as a process of communication will not be able to take place optimally. Media allows the teacher to facilitate the transfer of knowledge to learners.

Teaching and Learning Media

The terms 'teaching' and 'learning' are associated with the introduction of knowledge which is accomplished by using certain symbols. When learners speak, read or observe things he/she use symbols, which represent specific information to give meaning to those things he/she is observing. (Jacobs, M., Gawe, N. & Vakalisa, N.C.G, 2002). Teaching-learning media can be seen as different kinds of media used to introduce

(explain, elucidate, etc.) the learning content to the learners, so that the learning that takes place by the learners can be effective (Vreken, 2000).

A teaching-learning medium can be defined as an object the teacher uses, or given to the learners to use, in other to achieve specific teaching and learning outcomes. It is not only apparatus or pictures, but many other types of learning experience (Jacobs, ***et*** *al.,* 2002). Teaching-learning media can therefore be defined as any medium a teacher uses to present a lesson effectively. Media is classified into different types, such as visual, audio, computer based, live biota, excursions, etc. Generally, all the types of media can be classified into two namely:

Electronic Media and Print Media.

Electronic Media

Electronic Media are information or data that are created, distributed and accessed using a form of electronics, electromechanical energy or any equipment used in electronic communications. The common equipment we use on a day to day basis to access Electronic Media is our television, radio, computer, cell phones and other devices transporting information to and from us by means of electronic involvement (Adekola, 2008).

Electronic media are media that use electronics or electromechanical energy for the end user (audience) to access the content (Mehlenbacher, 2000). The primary electronic media sources familiar to the general public are video recordings, audio recordings, multimedia presentations, slide presentations, CD-ROM and online content. Most new media are in the form of digital media. However, electronic media may be in either analog electronic data or digital electronic data format. Any equipment used in the electronic communication process (e.g. television, radio, telephone, desktop computer, game console, handheld devices) may also be considered as electronic media.

Use of Electronic Media in Teaching and Learning of Science

Electronic media can be used in almost any discipline to enhance learning, both in class and also for out of class assignment. The use of some of these media in the teaching and learning of science are discussed as bellow;

Television

Television is a medium in the electronic media. It has enormous strength to attract both literates and illiterates and has equal strength in effective communication (Zia, 2002). Television has great influence on society. Such a powerful medium is being used in teaching and learning of science. Symptoms of diseases like HIV/AIDS and Ebola and ways of preventing the spread of such diseases can be disseminated to the general public with the aid of television. Erosion and pollution – types, effects/ consequences and measures of control/ways of prevention can be taught to large audience at a time through television. Also causes, effects and ways of controlling hazard both natural and artificial/domestic can be passed across to the general public through television.Programmes on science education can be telecasted or relayed on different channels through satellite television. Some television channels like National Geography channel and Discovery channels are dedicated to science education programmes where issues on health, natural phenomena, wildlife, life in extreme climate and medicines, environment, agriculture,etc are relayed (Jaffer, 2003).

Radio

Radio is a component of electronic media and it has maintained a very good positive influence in the teaching and learning of science (Sulaiman, 2013). It has a high covering range reaching the public everywhere. Besides providing information, preserving art and culture, it is also playing a very important role in imparting knowledge to farmers on agriculture, and in health sector, it reaches the society at large on health issue like roll back malarial, immunization, etc.

Radio is a scientific device that functions as an effective auditory instrument for communication. It also plays an important role in education. It does not only informs, but also inspires human being for learning more and more. It does not only includes values and virtues, but also creates attitudes, interests and appreciation of human life. It can cover a very wide area at the same time.

Radio plays a significant part in expansion as well as qualitative improvement of education. There are some inaccessible areas in our country where expansion of education has faced difficulties. To a large numbers of socially disadvantaged children education is neither meaningful nor interesting.

Radio had been used in education for a period of more than 80 years (Sulaiman, 2013). It has since that time been used in many various ways. It's uses comprise school broadcasting, informal general education, social action programming and adult basic education and literacy. Radio schools are used to connect children in secluded forms leads in the out back together with a teacher sited many hundred miles away. Distance teaching universities frequently employ radio for its advertising and enrolment value, as well as for teaching radio have been used lengthily as an educational medium.

E-Learning

The use of electronic media in teaching and learning of science has led to the concept of E-learning (Woessman, 2004). E-learning refers to the use of various kinds of electronic media and information and communication technologies (ICTs) in education. E-learning is an inclusive terminology for all forms of educational technology that electronically or technologically support teaching and learning. Sometimes, e-learning could be termed technology-enhanced learning (TEL), computer-based training (CBT), internet-based training (IBT), web-based training (WBT), virtual education, and digital educational collaboration or distance/open education (Sulaimen & Eyadat, 2008). E-learning includes numerous types of media that deliver text, audio, images, animation, and streaming video, and includes technology applications and processes such as audio or video tape, satellite TV, CD-ROM, and computer-based learning, as well as local intranet/extranet and web-based learning. Information and communication systems, whether free-standing or based on either local networks or the Internet in networked learning, underlie many e-learning processes. E-Learning can promote efficient teaching using computer-based learning, web-based learning and virtual classrooms. Students can learn through the Internet, intranet, extranet, satellite broadcast and interactive TV (Sulaiman et-al, 2008).

Teleconferencing

Teleconferencing refers to interactive electronic communication among people located at two or more different places. Teleconferencing is used in both formal and non-formal learning contexts to facilitate teacher-learner and learner-learner discussions, as well as to access experts and other resource persons remotely. In open and distance learning, teleconferencing is a useful tool for providing direct instruction and learner support, minimizing learner isolation (Rao, 2002). There are four types of teleconferencing based on the nature and extent of interactivity and the sophistication of the technology:

i. audioconferencing
ii. audio-graphic conferencing
iii. videoconferencing
iv. Web-based conferencing.

Audio conferencing involves the live (real-time) exchange of voice messages over a telephone network. When low-bandwidth text and still images such as graphs, diagrams or pictures can also be exchanged along with voice messages, then this type of conferencing is called audio-graphic. Non-moving visuals are added using a computer keyboard or by drawing/writing on a

graphics tablet or whiteboard. Video conferencing allows the exchange not just of voice and graphics but also of moving images. Videoconferencing technology does not use telephone lines but either a satellite link or television network (broadcast/cable). Web-based conferencing, as the name implies, involves the transmission of text, and graphic, audio and visual media via the Internet; it requires the use of a computer with a browser and communication can be both synchronous and asynchronous.

Advantages of Electronic Media

Electronic media have the following advantages;

1. It is an advanced form of media in the teaching and learning of science.
2. It can be reached faster and can be made or relayed live.
3. It brings about innovation in the teaching and learning of science as it involves the use of motion pictures and animations in the learning activities.
4. It makes provision for varieties sources of information as people can surf through different channels and sites.
5. Distance education programs are conducted through online media which has proved to be quite beneficial to people who seldom have the opportunity to have interactive classes.

Print Media

Print Media include newspapers, magazines, books and other textual documents. Newspapers, magazines and books are the three most important representatives of the printed media (Vavla, 2009). They are all widely used by teachers and students altogether in their daily activities, but when it comes to using them within the classroom environment, the situation becomes a bit complicated. This is mainly due to the amount of time teachers need to prepare and adapt articles taken from newspapers and magazines into their classrooms. But, if the usage of articles in the classroom is compared with that of a video for example, the amount of time and tools needed to organize such activities are fewer. No television set is required, no electricity needed and the cost of purchase of items such as a newspaper or a magazine is rather low. What is more, newspapers, magazines and books are now easily accessed and as such students themselves can contribute in the collection of these materials that will later on be used in their teaching and learning activities.

Use of Print Media in Teaching and Learning of Science

Print media can be used in almost any discipline to enhance learning, both in class and also for out of class assignment. The use of print media in the teaching and learning of science are discussed as bellow;

Newspapers

Newspapers bring to students real life situations and can be easily used as authentic materials. Newspapers engage students in interesting and enjoyable activities and they also encourage them to further reading. Recent advancement in science and technology, space science, climate change, satellite, atmospheric science can be discovered in newspapers. Most newspapers are linguistically up-to-date and provide valuable linguistic data` (Tafani, 2004).

Newspapers serve as a motivating medium in encouraging and stimulating students to read further and to engage themselves in the activities organized. They report real-life events that are of actual importance and emotional value to the students, and this arouses their curiosity. Students learn through reading, and reading about interesting new things, undoubtedly helps motivation (Sanderson, 2002). The newspaper is used to stimulate and motivate students to actively participate in the classroom and to succeed in their studies.

Magazines

Science magazines are publications containing science articles. It can be used by science teachers to teach relevant topics in

science. Using science magazine in teaching and learning of science expose the teacher and the learners to update inscientific research and discoveries (Vavla, 2009). The importance of science magazines in teaching and learning of science cannot be over emphasized as it exposes the learner to findings and facts about science of nature, engineering, bioscience nutrition, biotechnology, etc. Magazines are much more colorful than newspapers and they offer many opportunities to the teachers to organize photograph activities that could stimulate verbal and/or written stories. They could be used to introduce coloured means of transport, fables and short stories and other stimulating activities as well.

Books

Books are playing vital roles in teaching and learning of science (Tafani, 2004). Science books with good colour separations, clear diagrams, images and pictures enhance teaching and learning of science and also motivate learners to read. Clear illustration with diagrams aids comprehension of science concepts and it helps the learners to discover knowledge themselves. Books are crucial in modern life as well as it is a driving force not only in education, but also business, law, science, medicine and entertainment (Beckert, 1992).

Advantage of Print Media in Teaching and Learning of Science

The advantages of print media are;

i. There is choice of reading time
ii. It is a much affordable form of media
iii. It can be used anywhere.

Challegenges of Media in Teaching and Learning of Science

Despite the importance of media in the teaching and learning of science, it faces the following challenges;

1. Inadequate infrastructure including computer hardware and software high, and bandwidth/access etc.
2. Lack of skilled manpower, to manage available systems.
3. Resistance to change from traditional pedagogical methods to more innovative technology based teaching and learning methods, by both students and academics;
4. The overall educational system is underfunded; therefore, available funds are used to solve more urgent and important survival needs by the institutions;
5. The over-dependence of educational institutions on government for everything has limited institutions' ability to collaborate with the private sector or seek alternative funding sources for e-educational initiatives.
6. Ineffective coordination of all the various ICT for e-education initiatives.
7. Some instructional media"s technological implementation process is time consuming.
8. Implementation process involves a lot of money, strength, and time. Need most of the schools to have enough resources to adapt new technology.
9. The introduction of untested media resources for instruction pose serious problem to their uses in the teaching and learning of science due to their unexpected break down in the process of using them.
10. Emergence of a large and often contrasting huge variety of media resources for instruction in Medical education. This development creates confusion in the development and use media resources.
13. Inadequate training facilities for e-education at the tertiary level.

Conclusion

Educational aids in form of electronic media and print media can cover various areas in science, ranging from wild life, marine life, human physiology, health education and all branches of science; and it can be made readily available to learners in form of charts,

books, magazines, newspapers, CDs, DVDs, or copied on storage devices so as to be viewed on televisions or computer screens to effectively and efficiently convey knowledge to the learners.

Recommendations

Keeping in view the importance and impact of media on teaching and learning, the following recommendations were made:

1. Government should allocate special budget provision to provide Media/instruction material and gadgets to the schools both at elementary and secondary levels.
2. The teachers should be provided opportunity of in-service training for media use in classrooms.
3. Teachers education institutions should emphasis more on the practical training for prospective teachers in addition to theory courses i.e. teaching methods, instructional technology etc.
4. Media/Instructional technology resource center should be established in teacher training institutions.
5. There should be public and private partnership in the procurement of electronic and print media for the effective teaching and learning of science,

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INFLUENCE OF GENDER AND SCHOOL LOCATION ON STUDENTS' MOTIVATION, ATTITUDE AND ACHIEVEMENT IN MATHEMATICS IN OYO EAST LOCAL GOVERNMENT AREA, OYO STATE.

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Abstract

This research investigated the influence of gender and school location on students' motivation, attitude and achievement in Mathematics. The study was adopted ex post facto design. One hundred and ten (110) Senior Secondary School II students participated in the study out of which 61 were males and 49 were females. Three instruments (MSI, r = 0.87, AS, r = 0.76 and MAT, r= 0.78) were validated and used in the study. The formulated hypotheses were tested using independent t-test. The results showed that there was significant difference between urban and rural students' academic achievement in Mathematics ($t_{(108)}=9.25$; $p<0.05$) but there was no significant difference between rural and urban students' their attitude and motivation towards Mathematics. Based on these results, it is recommended that all stake holders in education should ensure that students are highly motivated by providing necessary materials, enabling environment and adequate reward system.

Keywords: Gender, School Location, Motivation, Attitude, Achievement.

Introduction

Schools across Nigeria are experiencing ever increasing pressure to raise students' achievement. In order to meet the growing demand of students' achievement, educators at all levels have created and implemented strategic plans that focus on adult controlled variables such as professional development and the purchasing of computer based learning programme. However, perhaps the most significant factor in determining student achievement is simply student motivation (Yara, 2009 Jason, 2010).

Motivation is one of the most widely studied areas in the field of psychology and its implications, in the field of education is apparent. Psychologists have established two major concepts in regards to motivation as both extrinsic and intrinsic (Ogunwuyi, 2000).

Human beings are said to be extrinsically or intrinsically motivated. Intrinsic motivation is the tendency to engage in tasks because one finds them interesting, challenging, involving a satisfying delight and satisfaction in doing such tasks. Extrinsic motivation is the tendency to engage in tasks because of task-unrelated factor such, as promise of rewards and punishment dictates from superiors, surveillance and complications with peer (Onuka & Durowoju, 2011). Intrinsic motivation is seen as internal reward such as joy, self-fulfillment. It is said to be derived internally in the job itself while extrinsic motivation based on is the incentive or reward and punishment that a person may attract after the job has been completed (Kairo, 2010) reported that;

Students' motivation has to do with stimulating someone with the aim of making him to participate in a particular cause of

action. Onuka and Durowoju (2011) viewed students' motivation as the reason for their involvement or non-involvement in academic achieyemen4. Although, students may be equally motivated to perform a task, though, the source of their motivation could differ. Therefore, it is pertinent to stress the issue of motivation of students in Mathematics education and its impacts on students' academic performance.

School location has also been viewed as one factor that affects students' academic achievement (Akpan, 2001). Over the past two decades, researches have indicated that the educational aspirations of students who study in the rural areas lag behind than those of their urban counterparts (Josiah, 2012)

Related findings from other studies have further indicated that students from schools located in rural area place less value on academics (Stern, 1994). The study of Lev, Nelson and Beltyukova (2010) investigated 2,355 students from 21 rural high schools in 21 states. The study asked students to indicate the importance of 21 attributes relating to their personal goals after high school. The finding of the study revealed that they placed more importance on personal qualities like being dependable and having ability to get along with others than academic achievement such as proficiency n both English Language skills and Mathematics skills. It follows then, that lower educational aspirations and less importance placed on academic by students in rural schools could lead to poor academic achievement in physics than their urban counterparts.

Attitude of student to mathematics as a factor could be viewed as the totality of an individual's inclination towards object, institutions or ideas. Attitude could be learnt or formed and acquired from member of family, leader and peer group. The learner acquires from the teacher's disposition to form attitude towards learning which could positively or negatively affect performance. Teachers are role models to students because as they act, so do the students demonstrate and perfect such act or behaviour. It is very clear that the way and manner teachers handled the teaching of Mathematics as a subject, behave and interact with the students as Mathematics teachers could produce major effect on students' achievement.

Literature has also indicated that teachers' attitude and students' attitude have exerted some influence on the academic achievements of students. For instance Yara (2009) reported that teachers' attitude towards science have strong relationship with students science achievement as well as the students' attitude towards science. Onuka and Durowoju (2011) showed that teachers attitude towards science is a potent predictor of students' academic achievement in science and attitude towards learning.

The issue of gender disparity in Mathematics education in terms of access to education, participation and performance is a big problem. In a study carried out by Oyegoke (2015), effects of innovative peer mastery learning strategy and gender were investigated on the pupils' achievement in mathematics. The study showed that effects of mastering learning strategy was significant on pupils achievement in mathematics, $F(1,107) = 49.503$, mean score of innovative mastery learning strategy group was higher than that of the conventional group. Also, gender has a significant effect on pupils' achievement in Mathematics $F(1,107) = \overline{23}.561$; $P < 0.05$ in favour of female pupils. Farooq and Shah (2008) investigated 10th grade students' attitude towards Mathematics using 379 male and 306 female students selected from ten private and public schools. The result of the study showed that male and female students of 10th grade of the secondary schools of Lahore have same measure of attitude towards Mathematics. It implies gender differential inconsequential on the students' attitude towards Mathematics in Pakistan.

In addition, Oyegoke (2017) examined the effects of innovative mastery learning strategy and gender on the pupils' attitude in Mathematics using 112 primary five pupils as sample. The study used clustering and simple random sampling techniques. The findings of the study showed that gender has a significant effect on pupils' attitude to Mathematics $F(1,107) = 20.951$; $P<0.05$ in favour of male pupils.

According to Agwagah (2013), there is still low access to education by females, low participation and poor performance of girls especially in Mathematics and science. She lamented that the participation of girls in science mathematics and technology is pathetic. In another study, Kairo (2010) reported that the inequality in education is reflected in lower enrolment rate, higher dropout rates and performance among girls in schools. The study stated that inequality is also found in curricular choices are offered at secondary and tertiary levels where for instance, enrolment rates are lower for females in science technology and mathematics than for males, and curricular choice are offered by traditional and cultural expectations. Boys have been reported to perform more than girls in secondary school mathematics are reference. The present study examined the area of motivation in the content of domain of school mathematics need to examine the relationship that exists between the school locations, gender and attitude and academic achievement in mathematics.

Hypotheses

This study tested the following hypotheses:

1. There is no significant influence of school location on students' achievement in Mathematics.
2. There is no significant influence location on students' attitude towards Mathematics.
3. There is no significant influence of school location on students' motivation in Mathematics.
4. There is no significant influence of gender on students' achievement in Mathematics
5. There is no significant influence of gender on students' attitude towards Mathematics.
6. There is no significant influence of gender on students' motivation in Mathematics.

Methodology

This study adopted e post facto design of survey research type. Stratified random sampling technique was used in the selection of the sample for the study (rural and urban schools) in the Oyo East Local Government. A total of one hundred and ten (110) SS one students comprised (61) males and (49) females were randomly selected from 4 senior secondary schools in Oyo East Local Government Oyo State. 65 students were sampled from urban area while 45 students were sampled from the rural area. The sample size was 110 senior secondary school students.

The following instruments were used for data collection. Motivational Scale Instrument (MSI), Attitudinal Scale (AS) and Mathematics Achievement Test (MAT). To determine the reliability of the instruments, the instruments were administered on fifty students who were not part of the sample for the study. Through Cronbach alpha reliability method, the reliabilities coefficients of MSI and AS were ascertained. They were found to be 0.87 and 0.76 respectively. The reliability coefficient of MAT was established using KR_{20} and it was found to be 0.78. After the administration of the instrument to the respondents, 100% return rate was achieved.

Results

1. There is no significant influence of school location on students' achievement in Mathematics.

Table 1: Summary of t-test analysis showing difference between urban and rural students in the academic achievement in Mathematics.

Achievement in Mathematics	N	Mean	S.D	Df	t-value	Sig	Remark
Urban	65	30.31	3.71	108	9.25	.000	significant
Rural	45	21.20	6.49				

Table 1 shows that there is a significant difference between Students' achievement in schools located in urban and rural areas in the achievement in mathematic ($t_{(108)}$= 9.25; p<O.05). The mean scores show that urban students had higher Mathematics achievement mean score (30.31) than the rural students (21.2).

2. There is no significant influence of school location on students' attitude towards Mathematics.

Table 2: Summary of t-test analysis showing difference between urban and rural students in their attitude towards Mathematics.

Attitude to Mathematics	N	Mean	S.D	Df	t-value	Sig	Remark
Urban	65	33.20	3.69	108	0.68	.497	Not significant
Rural	45	32.71	3.69				

Table 2 shows that there is no significant difference between urban and rural students in their attitude towards mathematics $t_{(108)}$= 0.68; p > 0.05.

3. There is no significant difference between school location students' motivation towards Mathematics.

Table 3: Summary of t-test analysis showing difference between urban and rural students in their motivation towards Mathema-tics.

Motivation	N	Mean	S.D	df	t-value	Sig	Remark
Urban	65	25.16	4.81	108	1.52	.131	Not significant
Rural	45	24.00	3.75				

Table 3 shows that there is no significant difference between urban and rural students in their motivation towards mathematics ($t_{(108)}$=1.52; p>0.05).This implies that students in urban and rural areas had the same motivation towards Mathematics.

4. There is no significant difference between the achievement of male and female students' in Mathematics.

Table 4: Summary of t-test analysis between male and female students achievement in Mathematics

Achievement	N	Mean	S.D	df	T value	Sig	Remark
Male	61	25.42	3.60	108	-1.33	.186	Not significant
Female	49	27.15	7.33				

Table 4 shows that there was no significant difference between male and female students in their achievement in mathematic ($t_{(108)}$= -1.33; p > 0.05).

5. There is no significant difference between students' gender and their attitude towards Mathematics.

Table 5: Summary of t-test analysis showing difference between male and female students in their attitude towards Mathematics

Attitude	N	Mean	S.D	df	t-value	Sig	Remark
Male	61	33.00	3.73	108	0.05	.957	Not significant
Female	49	32.96	3.66				

Table 5 shows that there is no significant difference between male and female students in their attitude towards mathematics ($t_{(108)}$= -0.05; p > 0.05).

6. There is no significant difference between students' gender and motivation towards Mathematics.

Table 6: Summary of t-test analysis showing difference between male and female students in their motivation towards Mathematics

Motivation	N	Mean	S.D	df	t-value	Sig	Remark
Male	61	25.70	3.88	108	-2.96	.004	significant
Female	49	23.51	3.88				

Table 6 shows that there is a significant difference between male and female students in their motivation towards Mathematics ($t_{(108)}$= -2.96; p < 0.05). The mean scores show that male students had higher mean score (25.70) in motivation in Mathematics than the female students (23.51) and it was statistically significant.

Summary of Findings

1. There was significant difference between achievement in Mathematics of students in the urban area and those in the rural area.
2. There was no significant difference between attitude towards Mathematics of students in the urban area and those in the rural area.
3. There was no significant difference between motivation towards Mathematics of students in the urban area and those in the rural area.
4. There was no significant difference between male and female students' achievement in mathematics.

5. There was no significant difference between male and female students' attitude towards Mathematics.
6. There was significant difference between male and female students' motivation towards Mathematics.

Discussion

The findings of this study showed that school location influence students' achievement in Mathematics with the students in urban area having the higher academic performance in Mathematics than students in the rural area. This could be as a result of the fact that majority of teachers prefers staying in the urban area to rural area. This drift could affect the quality of teachers in the urban area having better quality than those in the rural area. However, the findings of the study showed that school location did not influence the attitude and motivation of students towards Mathematics. This could be attributed to the fact that attitude and motivation are personal attributes that could be engendered within or outside the students. Students in urban and rural areas could have same disposition towards Mathematics irrespective of the teachers that taught me. In the same vein, they could be intrinsically motivated towards Mathematics without the effort of the Mathematics teachers. The result of this finding agrees with the studies of Akpan (2001) and Josiah (2012) that established that school location affects students' academic achievement. The result of study also showed that students in rural schools performed worse in Mathematics than their counterparts in urban area. This finding supports Stern(1994).

In addition, the result showed that students' gender did not influence their achievement in and attitude towards Mathematics. It implies that male and female students have the same achievement in Mathematics. The finding is in tandem with the finding of the study of Josiah (2012) which showed no disparity between male and female achievement in physics. Also, the attitude of the student towards Mathematics is the same irrespective of their gender. The finding of this study is not agreement with the studies of Oyegoke (2015) and Oyegoke (2017) that discovered gender parity in the achievement and attitudes of pupils towards Mathematics in Oyo metropolis. However, this study showed that there was significant difference between motivation of male and female students towards Mathematics. Male students were more motivated than their female counterparts. This finding is in consonance with the results of the studies of Jason (2010), Josiah (2012) and Onuka and Durowoju (2011).

Conclusion

From the findings of this study, one can state that school location plays a significant role in students' achievement in Mathematic and gender plays a significant role in students' motivation towards Mathematics and this makes this present study a worthwhile venture. However, when examining the attitude and motivation of students towards Mathematics, school is not a factor to be considered. Gender is not a factor that can improve or impede students' achievement in Mathematics and attitude towards Mathematics. The findings of this study have meaningful implications for principals of secondary schools, learners, parents, educational planners, educational evaluators and other stakeholders in education. Therefore, teachers should be evenly distributed among rural and urban schools. Students irrespective of their gender should be motivated and given the same level of encouragement towards learning of Mathematics.

Recommendations

Based on the findings of the study the following recommendations were made:

1. All students irrespective of his or her gender should be given the same level of encouragement and attention for better cognitive achievement in mathematics.

2. All stakeholders in education should ensure that students are highly motivated by providing necessary materials, enabling environment and adequate reward system.
3. There should be equal distribution among rural and urban areas.
4. Mathematics teachers in rural and urban areas should be given equal chance to attend seminars, workshop and in service training in order to improve their teaching skills.

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EFFECTS OF SELF-REGULATORY STRATEGY ON SENIOR SECONDARY SCHOOL STUDENTS' PRACTICAL SKILLS IN BIOLOGY IN OYO STATE NIGERIA.

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Abstract

The research concerns itself with the effects of self-regulatory strategy on senior secondary school students' practical skills in Biology in Oyo state Nigeria. The moderating effects of mental ability and learning style were also examined. The study adopted quasi-experimental of pretest, post-test, control group research design.The following research instruments were used for the study Biology Practical Skills Rating Scale (BPSRS),Student Mental Ability Test (SMAT), Student Learning Styles Questionnaire (SLSQ) ,Teachers' Instructional Guide on Self-regulatory Strategy (TIGSRS).Teachers' Instructional Guide on the Conventional Strategy (TIGCS), Evaluation Sheet for Assessing Teachers' Performance on Self-regulatory Strategy on pollination and reproduction in plants (ESATPSRS).and Conventional Strategy on pollination and reproduction in plants (ESATPCS).Three null hypotheses were tested at 0.05 alpha level. Data was analysed using ANCOVA. There was a significant effect of self-regulatory strategy on students' practical skills in biology ($F_{12,278)}$ = 7. 95; P<0.05, Partial N^2 = 0.05). It was recommended that Curriculum planners and developers in science courses for secondary school should emphasize on the need to continuously use innovative strategy such as Self-regulatory Strategy to enhance science based instruction.

Keywords: Self-regulatory Strategy, Conventional strategy, Student Mental Ability, learning style and students' practical skills in biology

Introduction

Biology is an important subject among the core science subjects taught at senior secondary school level in Nigeria. Biology as a subject occupies a unique position in the School curriculum. Biology is introduced to students at secondary school level as a preparatory ground for human development where career abilities are groomed (NERDC, 2013). The importance of Biology in the industrialization and other sector of the economy cannot be overemphasized. As a matter of fact, it is a prerequisite for pursuing a number of careers in sciences which include medicine, pharmacy, biochemistry, botany, nursing, zoology among others.

The learning of Biology provides an individual with useful information in solving everyday life challenges. Studies have shown that the knowledge of Biology contributes towards the socio-economic development of a country (Ogundiwin, 2013). The goals of teaching Biology as documented by the National Policy on Education (NERDC, 2013) are highlighted as follows:

- Acquisition of manipulative skills to enable students carry out experiments and projects in Biology.
- Acquisition of scientific skills and processes such as observation, classification, and interpretation among others.

- Acquisition of scientific attitudes for problem solving such as curiosity, scepticism, open mindedness, and objectivity among others.
- Ability to apply biological principles in everyday life.
- Provision of foundation for future professions such as Medicine, Nursing, Botany, Zoology, and Agriculture among others

Awareness of nature of things around them (NERDC, 2013).

However, practical skills is an essential part of Biology education. It gives students the necessary skills for higher education and employment, deepens their knowledge of scientific ideas and enables them to engage in the processes of biology. Practical skills is formative as it helps the students to understand science and how the scientific ideas are developed (Watts, 2013). To achieve the goals of biology education, it is imperative that an attempt is made to balance emphasis on both theory and experiments. Experiments in biology illustrate the fact that biology is not a theoretical abstraction as it describes the real world around us. Authors and researchers have identified some factors that are responsible for poor performance in Biology and other related sciences. These factors may cut across all levels of education where Biology is offered. The identified factors include; textbook and laboratory based reasons (Ivowi, 2000), misconceptions of concepts identified (Olagunju and Abiona, 2004; D'Avanzo, 2008), large class size (Olagunju, 2005), and insufficient practical skills (Danmole, 2012).

Self-regulatory strategy is an active and systematic process during which learners specify the aims for their own learning and then try to regulate, control and supervise their cognition, motivation and behaviour (Koivuniemi, Panadero, Malmberg and Järvelä 2016). Self-regulatory strategy is the process by which students take charge of their own learning, monitoring their behaviour and progress and making adjustments along the way. It's the transformation of thought into purposeful action. Students with higher levels of self-regulation are more likely to succeed academically than students with low self-regulation Dignath and Buttner (2008), Rimkaufman*et al.*, (2009). Zimmerman (2001) cognizes self-regulatory learning as a self-controlled process via that learners convert their mental abilities to practical skills related to them homework. Pintrich (2000) stated that students with self-regulation strategy are more motivated in terms of academic success and learn better than other students.

Self-regulatory strategy is the necessary instruments for students' success and have a close relationship with their self-efficacy and the academic development. Self-regulatory strategy, an intervention in which students learn to monitor their own behaviours, offers students methods to manage and take control of their own behaviours (Briesch and Chafouleaus, 2009; DuPaul*et al.*, 2012). Self-regulatory strategy offers many benefits for students in that it provides students with a more accurate picture of the behaviours or progress; provides students with immediate feedback, and facilitates better communication between teacher and student due to students recognizing their progress.

Mental ability is defined as students' ability to handle quantitative information (Ogunwuyi, 2009). Onabanjo (2007) found a very high relationship with students' mental ability and performance in science related courses. Aina (2006) reported a causal linkage between mental ability and achievement in senior secondary physics. Mental ability has also been found to influence learning of students in science (Olagunju and Chukwuka, 2008; Raimi, 2003). Olatoye and Aderogba (2011) determined the role of students' verbal and numerical abilities on performance of senior secondary school science students in aptitude tests. Two hundred senior secondary school science

students participated in the study using three validated research instruments to collect data and regression analysis tool for data analysis. Findings revealed an existence of strong correlation between students' mental ability and overall students' performance.

Learning style is another variable that may affect students' learning outcomes in school subjects. It is known that learning process varies among learners due to the presence of biological and psychological differences (Locke, 2008). Learning styles refers to the concept that individuals differ in regard to what mode of instruction or study is most effective for them (Pashler, McDaniel, and Rohrer, 2009). Connerr (2008) stated that we each have a unique and individual style of learning, thinking and communicating, it's desirable that we interact differently with information. Society needs all kinds of thinkers, with each expressing different mental strengths. Proponents of learning-style assessment contend that optimal instruction requires diagnosing students' learning style and tailoring instruction accordingly. Learner's experience of learning is not the same. One learner might describe the learning experience in biology as the retention of knowledge by dint of memorisation and repetition, while another might describe it as interpreting meanings and trying to understand reality. The style of learning and the motive for learning rests within the learner and in most cases relates to past experiences. Students learn best by seeing the value and importance of the information presented in the classroom. If the students are not interested in the material presented, they will not learn it. In order to achieve the ultimate goal of student learning it is important to use a combination of teaching methods and to make the classroom environment as stimulating and interactive as possible.

Given the conflicting result on the influence of learning style on learning outcomes, there is therefore need to carry out more research to affirm the conflicting claims. Again, most of previous studies made use of learning style as independent variable but in this study it was used as moderator variable. In an attempt to enhance Biology students' learning outcomes and their mental ability and learning style, this study therefore determined the effects of Collaborative Project-Based learning and Self-regulatory Strategies on of senior secondary school students' Practical skills in Biology in Oyo State Nigeria.

Statement of the Problem

The poor handling of the concepts by teachers who adopt the teacher-centred teaching methods aggravated the problem. Some candidates' weaknesses also include their inability to; draw according to specification and size; classify organisms; understand what observable difference means; spell technical words correctly; relate the differences in a tabular form together; march structures with functions correctly; draw guidelines to touch the label on the diagram; and label correctly. Efforts to address this problem have led scholars to embark on intervention programmes such as trying efficacy of teaching strategies such as advance organizers, reciprocal teaching and role play among others. Despite these intervention, the attitude of students to biology has not satisfactorily improved, thereby fuelling suspicion that other factors could be responsible. Among such factors are students' learning styles and mental ability which this study investigated.

The presents study therefore adopted Self-regulatory strategies taking into consideration the students' mental ability and learning style and their effects on students' Practical skills in Biology in Oyo state.

Hypotheses

This study tested the following hypotheses at $p<.05$ level of significance.

Ho_1: There is no significant effect of self-regulatory strategy on students' Practical skills in Biology

Ho_2: There is no significant effect of mental ability on student Practical skills in Biology

Ho_3: There is no significant effect of learning style on students Practical skills in Biology

Methodology

The study adopted the quasi experiment pre-test, post-test, control group research design

Participant of the Study

Two Local Government Areas were randomly selected from the eleven local government areas within Ibadan, Oyo state. Two schools were purposively selected from each local government Area understudy, two schools each for the experimental group and two schools for the control group. Intact classes was used for this study in which all students were purposively selected because this study adopts a pretest-posttest control group quasi-experimental design. A total of four purposively selected schools were used for the study. The criteria for the purposive selection of the schools are as follows:-

Evidence of the school having good and standardized Biology laboratory

Presence of qualified Biology teachers

Evidence of having Biology textbooks

Readiness of teaching staff of the school and students to participate in the study

The school being a co-educational school

Research Instruments

Biology Practical Skills Rating Scale (BPSRS) was adopted from Awolere (2015) by the researcher to investigate students' practical task based on direct observation during their laboratory activities. The biology practical skills rating scale (BPSRS) was used to determine students' ability to manipulate, observe, record, label, classify and draw in practical class. It consist of six point continuum that ranged from zero (0) for total inability to exhibit the skills (Very Poor), to five (5) at the extreme for full exhibition of the skills (Excellent). The face validity of SBPRS was done by showing the items to three science educators with bias in Biology to determine its suitability in term of clarity of ideas, language of presentation, class levels, coverage, relevance, and adaptation to the study. Also reliability coefficient of 0.812 was obtained using Cronbach alpha measure. Also Students Mental Ability Test (SMAT) was adopted from OTIS-LENON (1967) mental ability test used by Aina (2006). The instrument was a 40-item multiple choice with 4 option. This instrument measured the mental ability of the learners. Kuder-Richardson formula 20 (KR 20) was used for the reliability test and coefficient of 0.821 was obtained. In addition Student Learning Style Questionnaire (SLSQ) of 40 items students scale adopted from O'Brien (1985) to measure the learning styles of selected students was used. All choices correspond to the four sensory modalities which are measured by VARK (visual, aural/auditory, read/write, and kinesthetic). There were two sections; section A sought for demographic data of students, while section B consisted of 40 items which students responded to by expressing their level of agreement. The reliability of the instrument was determined by using Cronbach coefficient which was found to be 0.89

Research Procedure

The students in experimental and control group were administered mental ability test and the learning style questionnaire in order to categorise them according to their mental ability and Learning style group. This was followed by the administration of: Biology Practical Skills Rating Scale (BPSRS) and from this pre-test was obtained. Immediately after eight weeks of treatment period, this same instrument was administered to the students in their classrooms under the same conditions. The research assistances of the participating classes in each school administered the test under the guidance of the researcher.

Methods of Data Analysis

The data collected were analysed using inferential statistics of Analysis of Covariance (ANCOVA) to determine the significant main and interaction effects with the pre-test scores as the covariates to test the hypotheses. The estimated marginal mean (EMM) of different groups was used to detect the magnitude and direction of differences.

Results

H_o1: There is no significant effect of self-regulatory strategy on students' practical skills in Biology

Table 2: Analysis of Covariance (ANCOVA) of Post-Practical skills by Treatment, Learning style and Mental ability

Source	Sum of Squares	df	Mean square	F	Sig.	Partial Eta Squared
Corrected Model	2036.859	24	84.869	8.175	0.000	0.414
Intercept	3404.280	1	3404.280	327.922	0.000	0.541
Pre practical skills	908.337	1	908.337	87.497	0.000	0.239
Treatment	164.986	1	164.986	7.946	0.000*	0.054
Learning style	8.436	3	2.812	0.271	0.846	0.003
Mental ability	1.949	1	1.949	0.188	0.665	0.001
Error	2886.019	278	10.381			
Total	121292.000	303				
Corrected Total	4922.878	302				

R Squared = 0.41 (Adjusted R Squared = 0.36) *denotes significant p <0.05

Table 2 shows that there is a significant effect of self-regulatory strategy on students' practical skills in biology ($F_{(1,278)}$ = 7. 95; P<0.05, Partial N ^{2} = 0.05). The effect is 5.0%. This implies that 5.0% variation in students, practical skills in biology was due to the significant effect of treatment. Hence, hypothesis 1 was rejected. To determine the magnitude of the significant effect in the treatment group, the estimated marginal means of the treatment group were carried out and the result is presented in Table 3.

Table 3: Estimated Marginal Means for Post-Practical Skills by Treatment and Control group

Treatment	Mean	Std. Error
Self –regulatory Strategy(SRS)	19.80	0.40
Conventional Strategy(CS)	17.88	0.59

Table 3 indicates the senior secondary school students taught with self –regulatory strategy (SRS) treatment group (19.80), while the Conventional Strategy (CS) Control group (17.88) had the adjusted post-practical skills mean score in Biology. This order is represented as SRS>CS. In order to explore what caused this significant effect.

H_o2: There is no significant effect of learning style on students' practical skills in Biology

Table 2 indicates that there is no significant effect of learning style on students' practical skills in Biology ($F_{(3,278)}$ =0.27, P>0.05; Partial n^2 =0.00). Thus, hypothesis 2 was not rejected. This means that learning style had no effect on senior secondary school students' practical skills in Biology.

H_o3: There is no significant effect of mental ability on students' practical skills in Biology

Table 2 shows that there is no significant effect of mental ability on students' practical skills in Biology ($F_{(1,278)}$ =0.19, P>0.05; Partial n^2 =0.00). Thus, hypothesis 3 was

not rejected. This means that mental ability had no effect on senior secondary school students' practical skills in Biology.

Discussion of Findings

The findings of the study revealed that there is a significant effect of self-regulatory strategy on students' practical skills in Biology: students in the Self-regulatory treatment group had higher post mean score while students in the control group had the lower adjusted post mean scores in Biology Practical Skill Rating Scale (BPSRS). Possible reason for this may be because of the active involvement of students in their learning process, which is the basis of assumption of constructivism learning theory on which Self-regulatory Strategy is based. Jegede and Ayeni. (2013) advocated for practical focused approaches in the instruction of Biology.

Self-regulatory learning strategy as used in this study had the highest positive effect on students' practical skill. Students in the Self-regulatory learning group improved in their practical skills more than control groups most likely because they were more engaged in learning process by taking charge of their own learning. Biology practical is centred more on the psychomotor domain than cognitive domain of Bloom's taxonomy, therefore strategy that involves learners participation would help to improve mastery of such skills. It is not surprising therefore to see that Self-regulatory learning group had the higher adjusted post-test mean score. The result also lends credence to the claims of Sams (2010), Nguyen (2012), Jason (2012), Brame (2013) and Miles (2015). These researchers have established that whenever there is peer collaboration, students always enjoy support from each other which is not always available whenever the lesson is teacher dominated. So, when there is peer assistance and support in a practical lesson, mastery of skills are likely to be more than when it is teacher mediated. From the findings of this study, it may therefore be reasonable to conclude that Self-regulatory learning strategy particularly has the tendency to improve student mastery of practical skill.

The result of the study also showed that learning style had no significance effect on students' practical skill in Biology. This may be as a result of the strategy been student centred which help them to construct their own learning and control their learning behaviour. It may also be due to the help provided by the students with good learning style to the student with poor learning style since each student has the opportunity to collaborate with each other in learning at their own pace. However the study contradict the finding of Deborah, Pamela and Bradford (2005) whose found learning style had effect on academic performance.

The findings also showed no significance difference of mental ability on students' practical skill. This may be as a result of liberty by the students to monitor their own behaviours, manage and take control of their own behaviours which allow self-pacing, an important fact to enable learners to learn according to their individual pace and that will insure both groups of students to perceive information equally. This in agreement with the findings of Ogunleye (2015), Grace and Raheem (2011) that when students in low mental ability control their learning and seek help from high mental ability it improves their performance. However the finding disagree with work of Onabanjo (2007) and Morribend (2004) that mental ability had significant effect on students' academic performance in Biology.

Conclusion

The result of the study had shown the Self-regulatory Strategies is more effective in enhancing students' level of practical skill in Biology than the Conventional Strategy. When secondary school students are exposed to strategies where experience/ explorations are hands on, mind on, structured and are guided by the teacher, it fosters the scientific knowledge and skills of

students better than conventional strategy. Self-regulatory Strategies produced better practical skill in Biology concepts than the conventional method. This means that the usual inability to cover the voluminous Biology topic/ contents in the stipulated time and the usual poor Biology practical skill resulting from insufficient practical resources which often lead to poor performance in Biology could be effectively tackled through the application of Self-regulatory Strategy. The study also showed that learning carried out with students largely in charge of their learning can lead to greater practical skill of students in Biology. Furthermore it showed that mental ability and learning style had no effect on students' practical skill in Biology which may due to the ability of students to take charge of their learning and behaviour in classroom situation.

Recommendations

Based on the findings of this study the following recommendation are made

· The Government and other Stakeholders in Education should collaborate with bodies such as science teachers association of Nigeria (STAN), Nigeria Union of Teachers (NUT) and so on to organize in –service training for biology and other subject teachers to acquire necessary and adequate knowledge need in the practice of instructional strategies such as self-regulatory strategy.

· Biology teachers must endeavour to match instructional strategies with the manner in which students receive and process information.

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SENIOR SECONDARY SCHOOL CHEMISTRY STUDENTS' RATINGS OF THE CHALLENGES ENCOUNTERED IN LABORATORY CLASSES IN EKITI STATE

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Abstract

This research focused on the challenges facing Chemistry laboratory classes in senior secondary schools in Ado Ekiti. 204 Chemistry students from secondary schools in Ekiti state were randomly selected from 9 secondary schools. Questionnaire was distributed to elicit information on the challenges facing chemistry practical classes. The challenges, after careful examination of the questionnaire were grouped into three; lack of Chemistry laboratory/inadequate laboratory materials, irregular practical classes and poor teaching method. It was concluded that the problems facing senior secondary school Chemistry laboratory classes fall under the above groups. It was recommended that school proprietors and owners should ensure that Chemistry laboratories are adequately stocked, laboratory classes should be consistently carried out in the term, and Chemistry teachers are to be dynamic in the way and approach they teach in the laboratory.

Keywords: challenges, Chemistry students, practical classes

Introduction

Chemistry is a branch of science that deals with chemical concepts as well as their properties and due to this nature, can easily be understood with the feel of practical class. There are lots of benefits that come from engaging students in laboratory activities (Croker, Andersson, Lush, Prince and Gomez 2010). Observations and experience revealed that practical class develops the students' scientific process skills, it provides students the exposure to real experiments and observations and it also provides concrete learning to the learner. It suffices to say that practical classes not only will enhance teaching and learning of Chemistry, it will develop the learners' interest which will positively affect the attitude and values of the learner (George 2017). Omiko (2015) observed the use of laboratory in science teaching; he stated that practical classes make the students/learners to learn about the nature of science and technology. Tatli and Ayas (2013) stated that laboratory work is an indispensable element in understanding chemical concepts. These connotes that adequate practical classes are needed for proper dissemination of chemical concepts in secondary school.

As important as practical classes are to Chemistry teaching and learning, there are many challenges that secondary school Chemistry students encounter in their practical classes. The need for Chemistry laboratory and laboratory facilities to be updated has been stressed in Nigerian secondary schools. However, researchers have found shortage in the number of laboratories in Nigerian secondary school (Adegoke 2017*)*. He also stated that many schools do not have the required laboratory facilities and science teachers were unable to conduct practical classes as they should.

Tatli and Ayas (2013) stated that most of the practical hours involve only the teachers demonstrating the experiments. This implies that students do not really have time to carry out practical classes themselves, which will

eventually leave the learners to struggle with understanding the concept taught. Emendu and Okoye (2015) highlighted that the secondary schools have inadequate classroom, they lack laboratory, no enough equipment, the environment is not conducive, poor power supply and no water, few qualified Chemistry teachers in schools, no laboratory assistants and attendants, all these makes the staff and students not to be happy. Practical class increases inquisitiveness on the part of the learner while the teacher will enjoy his/her teaching. When there are little or no practical activities, the chemical concept will become difficult, to understand by the learners and, to instruct by the teacher.

George (2017) revealed that the level of laboratory facilities is still far too poor to adequately cater for Chemistry teaching. It is in the light of all these assertions that the researcher sought to look into the challenges as rated by senior secondary school students in Ado Ekiti.

Statement of the Problem

From observations, it was discovered that most secondary schools in Nigeria do not have same number of laboratories. Some schools have three laboratories, some two and some have just one laboratory. It implies that some schools are not exposed to adequate laboratory/practical activities in the core science subjects. Some schools also might not have enough guides as regards the number of laboratories that a secondary school must have. Also it was discovered that practical classes are not consistent while Chemistry students are not accustomed with practical activities in school.

Science students, specifically Chemistry students in secondary schools are not satisfied with the way practical classes are carried out. Chemistry being a course that involves the use of chemicals, which are thrown away at the end of the experiment and are not recyclable, encounter the difficulties related to practical class the most when compared to other science subjects. This condition dispossesses the Chemistry students of the benefits of carrying out experiments, leading to struggling to understand the concept, with consequences of chemistry students losing interest in the subject. This has prompted the researcher to look at the challenges that secondary school Chemistry students feel are prominent, so that solutions can be proffered through researches.

Purpose of this study

The main purpose of this study is to examine the challenges encountered by Chemistry students in their practical classes. This study tends to determine the prominent challenges encountered by senior secondary school Chemistry students in their practical classes. Also to find out how prominent the challenges are so as to place these challenges in order of priorities.

Research Questions

The following questions are raised to guide this study;

1. What are the imminent challenges that are encountered by Chemistry students in their practical classes?
2. What are the ratings of these challenges encountered by Chemistry students in their practical classes?

Methodology

The research adopted a descriptive survey research design. The population of the study consists of all chemistry students from public secondary schools in Ado Ekiti. A sample of 204 participants was used for the study. This study adopted a multi stage sampling techniques in selecting the participants. There are three senatorial districts in Ekiti state; Ekiti south, Ekiti north and Ekiti central. Firstly, one local government was randomly selected from each of the senatorial district. Secondly, three (3) secondary schools were randomly selected from the selected Local Governments and thirdly, twenty four (24) students were randomly selected from each school. These students were SS1 and SS2 students having

an age range of 12 to 19years with a mean of 14.5. Out of 216 copies of the questionnaire given out to the respondents for data collection, only 204 were returned making a success of 94.4% of the study while the attrition rate is just 5.6%.

Questionnaire adapted by the researcher was used for the data collection. Data obtained were analysed using frequency count and mean. The numeric values assigned to the different scaling items are as follows; SA =1, A = 2, D = 3 and SD = 4. Therefore, the mean for these values was determined by $X = 1+2+3+4 = 2.5$

The cut-off point for mean is 2.5. This implies that any of the response that has a mean score below 2.5 is accepted, while the response with mean score of 2.5 and above is rejected. Also the response was ranked using the mean score. The lower the mean score, the higher the ranking as regards challenges.

Results

Table 1: Descriptive Statistics of mean and grand mean of responses on lack of chemistry laboratory/ inadequ-ate laboratory materials.

N	Minimum	Maximum	Mean ($\overline{X}$)	Std. Deviation	Grand Mean (X)
204	1.00	4.00	1.5441	.79594	
204	1.00	4.00	1.8382	.70067	
204	1.00	4.00	1.7353	.96670	1.7206
204	1.00	4.00	1.8088	.88095	
204	1.00	4.00	1.6765	.90059	

The results on table 1 above, indicated that the chemistry students in the senior secondary schools agree that lack of chemistry laboratory/inadequate laboratory materials is a major challenge facing the practical classes in Ado Ekiti, with a grand mean score of 1.7206 which is below the cut-off mark of 2.5, hence it was accepted that lack of chemistry laboratory/inadequate laboratory materials is one of the major challenges encountered by chemistry students.

Table 2: Descriptive Statistics of mean and grand mean of responses on irregular practical classes

N	**Minimum**	**Maximum**	**Mean ($\overline{X}$)**	**Std. Deviation**	**Grand Mean (X)**
204	1.00	4.00	2.0735	.99233	
204	1.00	4.00	2.1176	.96535	
204	1.00	4.00	2.0147	1.08040	1.9500
204	1.00	4.00	1.5735	.84776	
204	1.00	4.00	1.9706	.76829	

Table 2 revealed that chemistry students in the senior secondary schools agree that irregular practical classes is a major challenge facing the practical classes in Ado Ekiti, with a grand mean score of 1.9500 which is also below the cut-off mark of 2.5, hence it was accepted that irregular classes is also one of the major challenges encountered by chemistry students.

Table 3: Descriptive Statistics of mean and grand mean of responses on poor teaching method

N	Minimum	Maximum	Mean ($\bar{X}$)	Std. Deviation	Grand Mean ($\bar{X}$)
204	1.00	4.00	1.9559	1.00884	
204	1.00	4.00	2.0882	1.13696	
204	1.00	4.00	1.7647	1.06143	
204	1.00	4.00	2.0735	.86502	1.9265
204	1.00	4.00	1.6765	.77729	
204	1.00	4.00	2.0294	1.07324	
204	1.00	4.00	1.8971	1.00452	

Table 3 showed chemistry students in the senior secondary schools agree that poor teaching method is a major challenge facing the practical classes in Ado Ekiti, with a grand mean score of 1.9265 which is below the cut-off mark of 2.5, hence it was accepted that one of the major problem encountering by chemistry students in Ekiti state is poor teaching method.

Table 4: The ranking of challenges faced by chemistry students in their practical classes.

S/N	Challenges facing chemistry students in their practical classes	Grand Mean	Ranking
1.	Lack of chemistry laboratory/inadequate laboratory materials	1.7206	1st
2.	Poor teaching method	1.9265	2nd
3.	Irregular practical classes	1.9500	3rd

Table 4 above revealed the ranking of the challenges facing the practical classes with respect to their grand means. Lack of chemistry laboratory/inadequate laboratory materials was ranked highest in the order of challenges facing chemistry practical classes because it has the lowest grand mean of 1.7206. Poor teaching method was rated second because it has a grand mean of 1.9265 which is lower than the grand mean of Irregular practical classes with a grand mean of 1.9500.

Discussion

The findings revealed that the highest and greatest challenge chemistry students encounter is the lack of chemistry laboratory/inadequate laboratory resources and materials. This study corroborates the findings of Tatli and Ayas (2013) who stated that many schools lack chemistry laboratory and chemistry laboratory materials. This study also aligns with George (2017) who establish that that many secondary school owned by the government do not have laboratory materials. Most secondary schools in Ekiti state do not have chemistry laboratory, they make use of general science laboratory for chemistry, physics, biology, agriculture and basic science. The Findings of the study also reveals that challenges relating to poor teaching method is a major one that needs to be attended to. This study support Kristen, Malinda, Monica and Kendra (2017) who also found out that the creativity of chemistry teachers in teaching in the laboratory goes a long way in making practical class interesting for students. It was also revealed in the course of the study that many schools do not carry out regular practical classes needed for chemistry. George (2017) stated most of secondary schools perform less than ten practical classes while very few performed more than 10 practical classes.

Conclusion and Recommendations

It can be concluded that challenges encountered by secondary school chemistry students can be grouped into (i) lack of

physical laboratory/inadequate laboratory facilities, (ii) poor teachers' quality and teaching method and (iii) irregular practical classes. Results from the findings revealed that many secondary schools do not have chemistry laboratory in Ekiti state, while those that have chemistry laboratory do not have the facilities. It was also revealed that most secondary school chemistry teachers are stereotyped in their approach to teaching practical class.

The findings of the study also revealed that many secondary in Ekiti state do not have a chemistry laboratory, most schools have a central laboratory for the science subjects.

Therefore, it was recommended that every secondary schools in Ekiti state and Nigeria should focus on equipping their laboratories. The quality of their laboratory will determine the quality of their preparation for external examinations. Also it was recommended that secondary school teachers, specifically, chemistry teachers should update themselves regularly with the digital resources available for effective teaching. The use of online and virtual laboratory should be introduced into chemistry teaching, so as to help in schools where laboratories aren't adequate or available. Every secondary schools in Ekiti state and Nigeria should make available a laboratory for every science subject. The idea of a central laboratory for all courses should be put aside and focus on providing and equipping each laboratory for each subject.

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INFLUENCE OF STUDENTS' ATTITUDE TOWARDS MATHEMATICS IN ONDO STATE SECONDARY SCHOOLS

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Abstract

The purpose of this study was to examine the relationship between students' attitude and their performance in Mathematics Ability test. The difference between the performance of students in rural and urban areas was also investigated. The study adopted the descriptive research of the survey type. A total of 751 Senior Secondary School Two (SSII) students constituted the population of the study, which was drawn from 12 schools using multi-stage sampling technique. Simple random sampling technique was used to select Ondo State out of 36 states in Nigeria. The Local Government Areas were selected from each of the three Senatorial Districts of Ondo State. The selection of schools was made up of four schools .Two rural and Two urban schools were selected from three Local Government Areas of each of the Senatorial District, i.e one rural and one urban school in each of the chosen Local Government Area for selection of students used for the study This gave a total of 12sample schools from each Senatorial District.. Two research instruments tagged '' Students' Attitude Questionnaire'' (SAQ) which was self-designed and'' Mathematics Ability Test'' (MAT) were adopted and used for the study. To ensure validity of the instruments, face and content validity were used, Also, a test-retest method of reliability was used to ensure reliability of the instrument involving frequency counts, percentages, mean, t-test, and pearson product moment correlation. The data collected were analysed using both descriptive and inferential statistics. From the result, it was revealed that there was significant relationship between students' attitude towards Mathematics Ability Test and students academics performance. The result showed that there was a significant difference in the performance of students from rural and urban areas in Mathematics Ability Test which was in favour of students from urban areas. From the result, it was revealed that students' attitude towards Mathematics was significant factor in academic performance of Secondary School Students. The study recommended that students in the rural areas should put more effort on their performance in Mathematics in order to meet up with the students in urban areas.

Keywords*:* Achievement test, attitude, performance, social-economic, students.

Introduction

Mathematics is one of the key subjects both in primary and secondary school levels of education in Nigeria. Mathematics involves finding solution to problems. The fact remain that, nearly everybody in the society must have relatively good knowledge of Mathematics which dictates the level of accuracy of a decision before the solution is sought. Despite the significance and influence, it is a subject that most feared by some students at every level of education. The negative attitude of some students in the class towards Mathematics is not encouraging. Eshun, (2000) defines attitudes as a mental and neutral state of readiness organized through experiences exerting a directive or dynamic influence upon the individuals' response to all objects and situations with which it is related.

It can be inferred from the above definitions that attitudes are learnt from diverse situations. For instance, one can internalise the attitudes of those among whom he lives and from other public sources and institutions such as the mass media and education. Eshun (2000) explains attitude toward mathematics as an inclination to an aspect of mathematics that an individual acquires through his/her beliefs and experiences but which could be changed.

Attitudes matter most towards students' academics as it determines students' performance. Adesoji (2000) and Alausa (2000) opined that the more the positive attitude, the more the students perform in any subject. The subject must be embraced by restructuring the negative attitude, lack of steadiness and mode of thinking that the subject is too difficult which lead to handling of the subject with levity hand by some students. It is the concern of this study to investigate the influence of students' attitude towards Mathematics in Secondary Schools.

Motivation has been found to affect attitude by causing students to have more positive attitude and confidence in themselves (Ellis, 2010). Two null hypotheses were generated and tested at 0.05 level of significance.

1. There is no significant difference in attitude of students from rural and urban areas towards mathematics ability test.
2. There is no significant difference between students' performance In the rural and urban areas on mathematics ability test.

Research Methodology

The study adopted the descriptive research of the survey type. The population of the study consisted of 14,400 Senior Secondary School Two (SSII) students from the 306 public secondary schools in Ondo- State as at the time of this study, the source is Ondo State Ministry of Education. A total of 751Senior Secondary School Two (SSSII) students were selected from the population made up of twelve schools in the three senatorial district of Ondo State. Two instruments were used to carried out the study. Students' Attitude Questionnaire (SAQ) was self-developed which elicited information on students' attitude and socio-demographic information while Mathematics ability Test (MAT) was adopted from West African Examination Council past Mathematics questions .The Mathematics test (MAT) consisted of 50 objective questions which was administered on students to determine students' performance. The questionnaire (SAQ) was in two parts. Section A consisted of the students' class, sex, and school location, while the second part elicited information on students' attitude towards mathematics ability test .It consisted of 30 items on students' study skills, socio-economic status, classroom environment and attitude of students towards mathematics. The 30 items were modified Likert type scale involving a four alternative response format of Strongly Agree (SA), Agree (A), Disagree(D) and Strongly Disagree (SD).The scoring was 4,3,2, and 1 for positive negative statements and reverse for the negative statements. The hypotheses were tested using both descriptive and inferential statistics involving frequency counts, percentages, mean, t-test and Pearson Product Moment Correlation. All the postulated hypotheses were tested at 0.05 level of significance.

Results and Discussion.

Hypothesis 1: There is no significant difference in the attitude of students from rural and urban students towards mathematics achievement test.

In testing the hypothesis, mean scores of rural and urban students on attitudes towards Mathematics were computed and subjected to t-test statistical analysis at 0.05 level. The result is presented in Table 1

Table 1: t-test analysis of attitude of students from rural and urban areas in Mathematics Ability Test .

Group	N	Mean	SD	df	t-cal	t-table
Rural	378	77.70	7.79	749	3.517*	1.960
Urban	373	80.21	11.47			

***P<0.05 (Significant Result)**

Table 1 showed the t-calculated to be 3.517> table value of 1.960.The null hypothesis was therefore rejected, Hence, there was a significant difference in the attitude of students from rural and urban towards Mathematics Ability Test. This implied that there was significant difference in the attitude of students from rural and urban areas towards Mathematics Ability Test. It then showed that students in the urban areas performed better than students in the rural areas.

Hypothesis 2: There is no significant difference between the performance of students from rural and urban areas in Mathematics Ability Test.

The mean scores of students on Mathematics Test were computed and compared for statistical significance based on school location (Rural and Urban) using t-test at 0.05 level. The result was presented in Table 2.

Table 2: t-test of students' performance from rural and urban areas on Mathematics Achievement Test.

Group	N	Mean	SD	Df	t_{cal}	t_{table}
Rural	378	20.86	11.49	749	2.811	1.960
Urban	373	23.31	12.417			

***P<0.05 (Significant Result)**

Table 2 showed the t_{cal} (2.811) was greater than t_{table} (1.960) at 0.05 level of significance. The null hypothesis was rejected. This implied that there was a significant difference between the performance of students in rural and urban areas in Mathematics Ability Test.

Discussion

The result of the study revealed that there was significant difference in the attitude of rural and urban students towards Mathematics. It was found that students from urban schools had more positive attitude towards Mathematics Ability Test than their rural counterparts.

The study revealed that there was significant difference in the attitude of students from rural and urban areas towards Mathematics Ability Test. Students' unfavourable disposition towards Mathematics may affect their willingness to learn the subject. The findings agreed with submission of Hannula Maijala and Pehkononen (2004) that attitudinal variables influence students' performance and participation in Mathematics. They stressed that learning of Mathematics is influenced by the student's mathematical-related beliefs, especially self-confidence. Also, the finding agrees with Ellis (2010) who found that attitude had effect on students' achievement.

The finding revealed that there was significant difference between the performance of students in rural and urban areas in Mathematics. This indicated that students from urban schools had higher achievement mean score in Mathematics Ability Test than their rural counterparts.

Findings of the study showed that the urban students performed more than the students in the rural areas in Mathematics. The finding corroborates the submission of Sarah (2005) that location of schools, teachers' attitude and beliefs, teaching load, lesson planning and class size had direct influence on the performance of students in Mathematics.

Conclusion and Recommendations

The study concluded that students' attitude towards Mathematics was a important factor in academic performance of Secondary School students in Mathematics. The findings of the study showed that students' in urban areas exhibited more favourable attitude towards Mathematics than their rural counterparts .Therefore, there is need to ensure that competent and qualified Mathematics teachers are posted to both rural and urban school so as to bridge the gap.

The finding of this study revealed that there was significant difference between the performance of students in rural and urban areas in Mathematics. This indicated that students from urban schools had higher achievement mean score in Mathematics Achievement Test than their rural counterparts. The finding corroborates the submission of Sarah (2005) that location of schools, teachers' students' attitude and beliefs had direct effects on the performance of students in Mathematics. The study concluded that students' attitude towards Mathematics was a significant factor in academic performance of Senior Secondary School students in Mathematics. Students in urban schools exhibited more favourable attitude towards Mathematics than their rural counterparts. Performance of students in Mathematics Achievement Test varied by school location.

Based on findings of this study, the following recommendations were made(i)The Students should be encouraged to develop positive attitude towards Mathematics right from the tender age. (ii) Students in the rural areas should strive hard so as to improve on Mathematics and to meet up with the students in the urban areas.

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STUDENTS' VERBAL ABILITY AND CONTENTS OF ESSAY WRITING IN FRENCH LANGUAGE

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Abstract

This study investigates the effects of student's verbal ability on the contents of essay writing in French at the Junior Secondary School level in Ekiti State. The purpose was to find the extent to which verbal ability would determine the content of students essay writing in French language. The study was a three group pretest-posttest quasi experimental research design. Population for the study consisted of 2,319 students of French Language in all the 184 Public Secondary Schools in Ekiti State. The sample consisted of 240 Junior Secondary School Two students, selected from six schools using Multistage Sampling Technique. Two research instruments were used for data collection. They are, French Verbal Ability Test (FVAT) and French Essay Writing Achievement Test (FEWAT). The data collected were analyzed using ANOVA and ANCOVA. It was discovered through statistical analysis of this study that there was a significant difference between students' verbal ability and the content of their French Essay writing in experimental and control groups before treatment, but there was no significant difference between students' verbal ability and the content of their French Essay writing in experimental and control groups after treatment. Based on these findings, it is recommended that other variables should be researched into since verbal ability has no significant effect on the content of students essay writing in French after treatment. The study concludes that verbal ability has no effect on French essay writing.

Key-words: Verbal ability, Content, Essay writing, French.

Introduction

French language is an international language and the mother tongue in France. It is spoken in many other countries of the world; as mother tongue or official language, Adeojo (2012) asserts that it is one of the principal languages of diplomacy in many international organizations. It is among the three most important languages of the internet. The language is one of the major languages of debate at the United Nations. A good command of French language could be a passport to social and economic advancement. French language could be very important to Nigeria, being a country surrounded by francophone countries (in the northern, north-eastern, eastern and western parts are: Niger Republic, Chad, Cameroon and Benin Republic respectively).

French language, like several other languages is a vehicle for communication that can be used to convey wishes and commands, to tell the truths and to tell lies, to influence the hearers and to vent someone's emotion. It can be used to formulate ideas and to communicate thoughts. It is obviously a vital tool for communication that forges friendship, cultural ties and economic relationship. It is one of the key factors in competitiveness in any advanced industrial society and in an increasingly interdependent world. The knowledge of French language is very much

indispensable, as the advent of the internet has changed the world and millions of people across the globe are now sharing common interest and are able to communicate with each other to exchange ideas. Language gives one confidence in dealing with other people. In fact, the learning of another person's language such as French improves one's understanding of his own language. When we cannot speak a language, we feel like an outsider, cut off and unwelcomed, but on beginning to learn to speak a language, such feelings disappear.

French language could be very important to Nigerians, because it is not only a viable linguistic visa that would enable more qualified Nigerians to have better and easier access to job and business opportunities in French-speaking countries, but it could also equip many more qualified Nigerian professionals to satisfy the French proficiency requirement for jobs in French companies located in Nigeria. It could also make for suitability for employment in international organizations. These business opportunities and job placement within and outside Nigeria could make great impact on the economic development and international rating of the country. As at today, the available data of the results of Junior Secondary School students from Ekiti State Ministry of Education revealed that many of the students are performing poorly in their French essay writing. Aside this, examiners complain that many Junior Secondary School students write little and incoherent content in their essays and in most cases, they may not even attempt the essay writing questions at all. Scholars and researchers have been advancing various reasons for such ugly situations. Perhaps it is as a result of lack of vocabularies to express themselves in the language or the level of their verbal ability which ought to serve as ingredients for essay writing.

Literature Review

Verbal Ability

Verbal ability is the ability to analyze information and solve problems using language-based reasoning. It is also known as verbal intelligence. It involves ability to examine something carefully so as to know what it is made up of or to understand it better. It is the ability to listen to a story and state its main ideas. It is also about externalizing what has been internalized. Verbal ability should be very important in all aspects of school work, more importantly, as writing in language is a task that requires language-based reasoning. Even the more abstract courses such as mathematics and physics require verbal ability because most concepts are either introduced orally by the teacher or introduced in written form in a textbook.

According to Richard and Rogers (1986), Verbal ability test is a test of intelligence that can be used to predict learners' achievement in language skills. Verbal task may involve concepts such as: Concrete or abstract ideas and internalized language based reasoning. It involves skills such as:

- Ability to listen to and recall spoken information
- Understanding the meaning of written or spoken information
- Solving language based problems of literary, logical or social type
- Understanding the relationships between language concepts and performing language comparison.
- Ability to perform complex language based analysis.

Elements of verbal ability test includes: word power, sentence arrangement, word arrangement and substitution of elements, logical selections of appropriate words. Verbal ability could be tested through reading comprehension, logical reasoning, verbal questioning, sentence re-arrangement, sentence correction, paragra-ph completion, verbal-based reasoning and

critical reasoning. A lot of grammar, vocabulary and fill-in-the-gaps are involved in verbal ability questions. All of which seems to be a very good precursor to essay writing. But presently at the elementary level, students seems not to be so much exposed to these variables before they are requested to write essays (composition). This study seeks to find the effects of verbal ability on the content of students essay writing in French Language.

Essay Writing in French Language

An *essay* could simply be described as a piece of *writing* that is written to convince someone of something. It includes several components to drive in the point. It is all about presenting an argument and using evidences to back it up.

There are about four types of essay writing in French language generally. They are: expository, descriptive, narrative and argumentative essays. Candidates who write good essays in language according to Fakeye (2001), perform better in other aspects of the subject while, Adegbile and Alabi (2007) suggest that L2 writer's verbal ability should predict their performance in writing task. Richard and Rogers (1986) also find a correlation between general intelligence and academic endeavour, particularly that verbal ability as a test of intelligence can be used to predict learners' performance in language skills. In a similar study, Bell and Perfitti (1994) observes some correlation between verbal ability and language performance. Olaboopo (1999) also notes significant interaction effects of treatment and verbal ability on the variation in students' scores in English composition.

On the contrary, Iyagba (1993) finds no significant difference in the performance of student with various verbal ability groups in English composition achievement, but discovers a significant difference in the attitude of students belonging to various ability groups. Based on the variations of findings, in English Language, there is the need for further investigations on the effect of this verbal ability on the content of students essay writing in French language. This is because a correlation has been found between students' ability to write good essay and their performance in other aspect of language as Ellis (1992), Adegbile and Alabi (2007) formed consensus of opinion on the need for effective essay writing in Nigerian secondary schools.

To improve on verbal ability in language according to Munoz-Sandoval, Cummins, Alvarodo and Ruef (2005), the learner needs to do a lot of reading because of the para-jumbles, para-completion and sentence completion involved. Learners need to devote time to learn different words, their meanings and usage in sentences which could be done through the use of internet and bilingual dictionaries. Practicing and implementing what has been learnt will boost the learners' confidence. Paragraph forming and para-jumbled questions are parts of verbal ability questions. They consist of a group of sentences that have been jumbled up. The goal in these types of sentences is to re-arrange the sentences in the original sequence. In para-jumbled questions, one will be given a paragraph made of four to five sentences whose original sequence has been changed. Students have a few minutes to figure out what that original sequence was. Anyone who applies his mind to the given sentences and spends sufficient time arranging the sentences can get the sequence. Constant practice may enhance one's confidence in dealing with such questions. Verbal ability is worth mastering because a person with passion and communication skills is a delight for everyone else. A person with great passion but poor communication skills is confusing to everyone else.

A good understanding of basic French grammar coupled with adequate exercises on the different types of common errors will help a learner to answer verbal ability questions. During essay writing practice, it is

important not to worry too much about one's accuracy initially; it is better to answer questions, make mistakes and learn. Students need to read a lot in order to gain expertise and be well versed in using the right words. It is not possible to memorize all the new words learnt, as it will be very difficult and time consuming. The best way is to practice these words in everyday conversation. This could be a smart way to learn the words as well as know their meaning.

Content of French Essay Writing

There are four important components in French essay writing, they are; content, mechanical accuracy, organization and expression. The focus of this study is content. It refers to what is written inside the essay, the writers own ideas which will definitely include ideas that is not his own, it is the way it is used, added to, adapted and modified that makes the ideas or arguments the author's own and original.. It is this ideas of the writer, fashioned into a coherent set of argument and presented in the order that will make the most sense to the reader we call content. Content is the writer's own voice that should be heard. It forms the basis of the essay. It is the writer's ideas that needed to be heard but he must be careful not to cultivate an overly idiosyncratic (individual) style, because complex issues must be expressed with clarity. The content of an essay is all about presenting an argument and using evidences to back it up. Even though the writer will use materials that does not belong to him, it is the way such materials are added to, adapted or modified that makes the materials or arguments his own. Normally, organization of the content of an essay should be; introduction, body and conclusion.

The content of an essay must reflect and develop the topic. Key words in the topic must be singled out and elaborated upon. Introduction is the commencement aspect of the content which must be interesting, because if a writer fails to write an interesting introduction, the reader loses interest in what he is writing about. Each paragraph is expected to commence with a topic sentence which will be explained further in subsequent sentences of the paragraph. Any idea raised in any paragraph will need clarification and proof. If this is not done, an impression of a superficial collection without any depth of thought will be created. Conclusion is both a summary and a generalization which restates the topic, thus, laying additional emphasis on what has been written.

After each draft of the essay, it should be read carefully and critically. One could ask himself the following questions, is there a significant idea not included? Is there any need to expand some of the points chosen? Are some of the points, after due consideration, not really relevant? Are the points too long-winded or repetitive? If so, it could be cut out or reduced. Does the link between some of the main points need more emphasis? An essay writer must ask himself these questions, in order to ensure that each point is presented in a logical and coherent order. A writer must understand early enough the things that could make his essay to be classified as good, satisfactory or unsatisfactory, so that he will be sure of the type of essay he is trying to write.

The content of a good French essay according to Motunrayo, Nnenna, Yakubu (2005) is clearly structured to include an introduction which clearly yet subtly defines the topic of the essay and prepares the reader for the course of the argument. Having logically linked paragraphs with topic sentences, a clear and concise conclusion that is soundly based on the argument, it should be written in a fluent and appropriate style, grammatically correct and one that uses good vocabulary. It should also respect formal conventions. And to make it a satisfactory essay, it should be adequately structured, written in acceptable academic French language, contains few errors of grammar and uses appropriate vocabulary.

An unsatisfactory content in an essay could easily be identified through incomplete or incoherent introduction which will contain few interesting idea, shows a poor grasp of topic, has no logical structure i.e. the paragraphs do not clearly develop the points; conclusion is not soundly based on the argument. It contains many errors of grammar and structure and it is written in an inappropriate style or unsuitable vocabulary and does not respect the formal conventions.

Statement of the Problem

Presently, it appears many junior secondary school students seem to show little or no interest in written work of French Language. This may be as a result of their deficiency in verbal ability, which could be noticed in their unintelligible communications, wrong spellings and lack of appropriate vocabularies to express their ideas. All these may have some effects on the content of students' French essay writing. Also, it seems that students prefer the oral aspect of the language at the Junior Secondary School level and detest the essay writing aspect. And where they write, it seems they prefer the 'fill-in-the-gap' type. The question is, what will be students' performance in verbal ability and content of Essay Writing before and after the experiment? Two hypotheses were formulated.

1. There is no significant difference between high and low verbal ability level students' in experimental and control groups on the content of French Essay writing before treatment.
2. There is no significant difference between high and low verbal ability level students' in experimental and control groups on the content of French Essay writing after treatment.

Methodology

The study was a pretest-posttest quasi experimental research design. Population for the study consisted of 2,319 students of French Language in all the 184 public Secondary Schools in Ekiti State, Nigeria as at 2013. The sample consisted of 240 Secondary School class two students, selected from six schools in Ekiti State using Multistage Sampling Technique. The first stage was the division of the population into rural and urban schools using Stratified Sampling Technique. The second stage was the selection of three schools that are offering French Language from each of the stratum, using Purposive Sampling Technique. The third stage was the selection of twenty boys and twenty girls from each of the selected schools using Proportional Random Sampling Technique, making a total of two hundred and forty students from all the schools. Two research instruments were used for data collection. They are, French Verbal Ability Test (FVAT) and French Essay Writing Achievement Test (FEWAT). Instruments were personally administered to the respondents with the help of research assistants. The researcher was assisted by research assistants in retrieving the test scripts on the spot after completion, in order to ensure high percentage return of the scripts. The answer scripts were personally scored by the researcher based on the prepared marking scheme.

Pretest was conducted in all the selected schools before the experiment. The study involved twelve experimental teaching sessions of a minimum of forty minutes per session. The duration of the teaching was two lessons per week for six weeks. After the six weeks experiment, post test was conducted for both experimental and control groups. A teaching package was used to teach the two experimental groups for six weeks, during which, the control group continued with their normal classroom work without interruption. After the six weeks experiment, a post test was conducted for all the groups. The responses of the subjects in the two tests were scored and subjected to statistical analysis of t-test, Standard Deviation, ANOVA and ANCOVA.

Results

Hypothesis 1

There is no significant difference between high and low verbal ability level students' in experimental and control groups on the content of French Essay writing before treatment.

Mean scores of students in content aspect of French essay writing in experimental and control groups before treatment were compared for statistical significance on the basis of their ability level using Analysis of Variance (ANOVA) at 0.05 level of significance. The result is shown in Table 1

Table 1: 2x3 ANOVA summary of students' content in French Essay writing by verbal ability and treatment.

Source	SS	Df	MS	Fcal	Ftable
Corrected Model	155.484	5	31.097	5.644	2.21
Verbal Ability	89.842	1	89.842	16.307*	3.84
Group	36.281	2	18.140	3.293*	3.00
Verbal Ability * Group	29.508	2	19.754	3.586*	3.00
Error	1289.178	234	5.509		
Corrected Total	1444.663	239			
Total	3377.000	240			

***P<0.05**

Table 1 shows that Fcal (19.754) is greater than Ftable (3.586) at 0.05 level of significance. The null hypothesis is rejected. This implies that there is significant difference between students' verbal ability and the content of their French Essay writing in experimental and control groups before treatment. Similarly, the main effect of verbal ability (F=16.307, P<0.05) and treatment (F=18.140, P<0.05) on students' content in French Essay writing is statistically significant at 0.05 level in each case.

There is no significant difference between high and low verbal ability level students' in experimental and control groups on content of French Essay writing after treatment.

Mean scores of students' content in French Essay writing in experimental and control groups after treatment were compared for statistical significance using Analysis of Covariance (ANCOVA) at 0.05 level on the basis of their verbal ability levels. The result is presented in table 2.

Hypothesis 2

Table 2: 2x3 ANCOVA of students' content in French Essay writing after treatment by verbal ability after treatment.

Source	SS	Df	MS	Fcal	Ftable
Corrected Model	446.498	6	74.416	21.262	2.10
Covariate (Pretest)	84.758	1	84.758	24.217	3.84
Verbal Ability	1.736	1	1.736	0.496	3.84
Group	286.022	2	143.011	40.861	3.00
Verbal Ability * Group	16.275	2	8.137	2.325	3.00
Error	815.486	233	3.500		
Corrected Total	1261.983	239			
Total	6140.000	240			

P>0.05

Table 2 shows that there is no significant difference between students' verbal ability and the content of their French essay writing in experimental and control groups after treatment (F=2.325, P>0.05) the null hypothesis is not rejected. Similarly, the main effect of verbal ability on students' content in French Essay writing after treatment was statistically not significant (F=0.496, P>0.05). However treatment had significant effect on students' content in French Essay writing at 0.05 level (F=40.861, P<0.05).

Discussion of Findings

The study revealed that there was a significat difference between students' verbal ability and the content of their French Essay writing in experimental and control groups before treatment but there was no significant difference between students' verbal ability and the content of their French essay writing in experimental and control groups after treatment. This is an indication that other variables are responsible for the significant difference found in the pretest. This finding is in support of the findings of Iyagba (1993) who finds no significant difference in the performance of students with various verbal ability groups in written composition, suggesting that essay writing has to be learnt and practiced every time. He explains that essay should be an on-going process which must be learnt more each time since the content of one's essay do not necessarily depend on the level of one's verbal ability.

Conclusion

The study concludes that verbal ability has no significant effect on the content of students essay writing in French Language. Other variables should be responsible for the significant difference found in the pretest conducted before the experiment.

Recommendations

The researcher recommends that future researchers could find the effects of other variables, such as teacher's method of teaching and scope of students reading on the content of students essay writing in French.

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SUSTAINABLE DEVELOPMENT GOALS IN NIGERIA: ROLE OF CHEMISTRY TEACHER EDUCATION.

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Abstract

This paper examined the role of chemistry and teacher education as a tool in achieving sustainable development. Issues that were regarded as being responsible for teaching were highlighted. This paper employs secondary sources of data from reports, journals and findings of other researchers. Effects of the role of chemistry and teacher education in combating pollution and enhance qualitative teaching in chemistry are stated. This paper recommended that teachers should explore the use of improvised materials from within their locality to ensure good performance, and that teacher education sector be monitored so as to ensure the turnout of good and qualified teachers to teach chemistry, hence attain sustainable development of the country.

Keywords: Sustainable Development Goals, Chemistry Teacher Education.

Introduction

The importance of education to the human race cannot be over emphasized. It is considered to be a very important tool for attaining national goals. Education provides learners with skills needed for survival. Science, a veritable instrument for national development is described by Okoro (2013) as a systematic investigation of nature with a view to understudy and use it to serve human needs. Central to this, is chemistry which has been the cornerstone of science, technology and industry. It is central in the drive of global sustainable economic development. Chemistry and its related field is the economic driver of highly-developed industrial society (Bradley, 2005; Ware, 2001). According to Emendu (2014), chemistry plays a major role in food industry, medicine, textile industry and transportation.

Chemistry is the bedrock for other science subjects because of its relevance in transforming the economy. It is the vehicle through which chemical knowledge reach the people in need of capacities and potential for development. Chemistry is very important in the area of technology, manufacturing, inventions, designing of tools and equipment, evaluation of new processes and adoption of these processes help in the production of goods and services for the benefit of mankind (Henry, 2010). Chemistry education has a great potential for improving the level of general education skills among students, it gives room for participatory learning. (Mareike, Franz & Ingo,2012). Chemistry education is useful in the area of food processing, modern technology, and operation of chemical industries, forestry, agriculture, petroleum, pharmaceutical industry, cosmetics, and textiles and brewing. Chemistry is also very important in the process of turning raw materials to useful products for the economy in terms of social and political well being of the citizen (Okeinimen, 2007). Therefore, chemistry education in Nigeria will be relevant to the teachers who serve as intermediary in the teaching and learning

process, and will help to inculcate in their students the knowledge needed in chemistry teaching.

Teachers at all levels of the educational system are very important in the overall development of any nation. According to the National Policy on Education (FRN, 2013), the aim of teacher education is to:

- Produce highly motivated, conscientious and efficient classroom teachers for all levels of education system.
- Encourage the spirit of enquiring and creativity in teachers
- Help teachers to fit into social life of the community and society at large and to enhance their commitment to National goals.
- Provide teachers with the intellectual and professional background adequate for their assignment and to make them adapt to any changing situation in the country.
- Enhance teacher's commitment to the teaching profession.

Chemistry is one of the core science subjects offered by senior secondary school science students together with other science subjects such as physics, biology and mathematics. The objectives of teaching chemistry as a subject are stated below:

1. To enable students develop interest in chemistry as a subject.
2. To make students acquire knowledge in basic theory, practical knowledge and skills.
3. To foster development of interest in science, technology and mathematics.
4. Acquiring basic STM knowledge and skills.
5. Development of reasonable level of competence in application of ICT that will engender entrepreneurial skills.
6. Application of skills to meet societal needs of creating employments and wealth.
7. Positioning to take advantage of many career opportunities offered by chemistry.
8. To show chemistry and its links with industry, everyday life and activities and hazards. (FME, 2009).

From the objectives of teaching chemistry, it was discovered that some of the objectives are related to some of the sustainable development goals which can contribute to the development of the society. The sustainable development goals are 17 in number and are stated as follow: 1. No Poverty; 2.Zero Hunger; 3.Good Health; 4. Quality Education; 5. Gender Equality; 6. Clean Water and Sanitation; 7.Affordable and Clean Energy; 8. Decent Work and Economic Growth; 9. Industry, Innovation and Infrastructure; 10.Reduced Inequality; 11. Sustainable Cities and Communities; 12. Responsible Consumption and Production; 13.Climate Action; 14. Life below Water; 15.Life on Land; 16. Peace, Justice and Strong Institution; 17.Partnership to Achieve the Goals.

To achieve these goals through chemistry teacher education, the problems associated with teaching and learning of chemistry need to be addressed. These problems include the following:

(i) Lack of regular power supply and proper infrastructures.
(ii) Lack of proper funding and mismanagement. This has affected the teaching and learning of chemistry in the area of purchasing apparatus, chemicals/reagents for practical, and building of standard chemistry laboratory, these affect the teaching and learning of chemistry.
(iii) Unavailability of functional chemistry laboratories which, makes it difficult for students to understand what they are being taught in theory. This of course will consequently affect their performance in the subject.

(iv) Inadequate manpower- The number of qualified chemistry teachers available to teach the subject is low. This has given room for unqualified teachers (those who do not have the requisite qualifications) to teach the subject. This again will have an adverse effect on the performance of the students.

Attaining Sustainable Development: The Role of Teacher Education

Education**,** according to UNESCO (2000),is the process of developing human ability and behaviors, it is an organized and sustained instruction designed to communicate a combination of knowledge, skills, and understanding value for all activities of life. Teacher education refers to the professional education of teachers towards attainment of attitudes, skills and knowledge considered desirable so as to make them efficient in their work in accordance with the need of the society at any point in time (Osuji, 2009).

Teacher education policies and procedures are designed to equip prospective teachers with the knowledge, attitude, behavior and the skills they need to perform their tasks more effectively in the classroom, school and in the society. This include training from certified teacher training institutions, support during the early years of teaching and retraining of teachers during the course of their career. This is to ensure that teachers meet up with the trend in the teaching profession. This should be done on a continuous basis to make them competent. According to Okemakinde, Adewuyi and Alabi (2013), for National development to be attained, there is need to give priority to teacher education. The professional and adequate manpower training for the education sector cannot be successful without competent teachers to handle the training program so as to ensure that students are independent and not dependent on the government for white-collar jobs after graduation; this will assist in reducing the poverty level of the society.

The quality of teacher education program in Nigeria has not been innovative enough in relation to instructional methods and teaching methods put in place during the course of training of prospective teachers. The content of the curriculum is regulated by the board in charge of teacher education training in Nigeria, which is the National Commission for Colleges of Education (NCCE). This body ensures that the quality assurance and evaluation of both teachers' in-training and in-service teacher education programs are carried out properly. One of the ways to ensure proper training for prospective teachers is in the area of teaching practice; the program that exposes student-teachers to what they are expected to meet when they are in the teaching profession. Teaching practice exposes teachers – in- training to the nitty-gritty of teaching. Therefore in order to achieve the sustainable development goals in Nigeria, teacher education should be given top priority.

Chemistry Education: The Path to Sustainable Development.

Chemistry as a subject taught in Nigerian secondary schools could play a major role in the attainment of sustainable development goals (SDGs) depending on how it is being taught by the teacher. Chemistry can be described as an important subject in the achievement and implementation of SDGs. An aspect where chemistry has contributed to the SDGs is in the area of GOAL 13 (climate Action) in combating this goal; green chemistry has played a vital role. Green chemistry takes place when there is a design of chemical products and processes to reduce the use and generation of hazardous substance (Anastas & Kirchoff, 2012). Green chemistry contribute to sustainable development in the aspect of renewable energy sources, reducing or eradicating pollution of the environment through clean alternatives, and the use of products derived from renewable/recycled materials. Green chemistry makes use of chemical innovation to meet environmental

and economic goals of the society (Anastas & Eghbali 2010). Green chemistry provides solution to dangers caused by pollution of the environment through burning of fossil fuels, destruction of n tropical forests, all of which lead to global warming [green house effect] in which the Ozone layer is depleted by chlorofluorocarbons (CFCs) which leads to skin cancer and cataracts. Chemistry education can help to reduce the effects of all these through teaching and learning about carbon emission.

Jeon (2018) is of the view that green chemistry prevents pollution; improve the yield and efficacy of chemical products through manufacture and use of chemicals, all these in line with the objectives of teaching chemistry showing its links with everyday life, industry and health. Teacher education policies and procedures are designed to equip prospective teachers with the knowledge, attitude, behavior and the skills they need to perform their tasks more effectively in the classroom, school and in the society. One of the challenges of chemistry education according to Grassian, Meyer, Abruna, Coates Achenie & Alkson (2007), is the need to educate future chemists to contribute to a more sustainable society. This led to the incorporation of sustainability into chemical education as one of the highest priorities of sustainable chemistry (VanRoon 2001) so as to improve the contribution of chemical education to sustainability in areas such as environmental chemistry, medicinal chemistry ,polymer chemistry and enzyme chemistry. Sustainable development could be enhanced through thr teaching of chemistry across different disciplines through chemistry teacher education, since one of the objectives of chemistry curriculum is to make use of different career opportunities provided by chemistry (such as production of vaccines, drugs in medicinal chemistry); all these will lead to the attainments of sustainable development goals.

For chemistry education to contribute to sustainable development of the nation Nigeria there is need for quality control and professionalism in the Nigerian education system. This can be through evaluation and assessment of individual qualities or characteristics of students (teachers – in-training) and focus on program that suits each intending teacher such that they will be trained in line with their ability which will assist them in teaching when they become certified teachers. Also there is need to assess students' misconceptions about chemistry as being abstract, not easy to comprehend and difficult to learn; when all these are addressed, students will be encouraged to go into teaching of chemistry. There should be provision of good laboratory and materials for practical for students and chemistry teachers should be encouraged by sponsoring them seminars and workshops in order to keep them abreast of the current trend and development in teaching.. This in turn will enhance their teaching and students' performance in chemistry.

To ensure quality chemistry teacher education, the chemistry curriculum has to be reviewed regularly to be in line with current trend in teaching and learning of chemistry. There should be improved welfare package for teachers; this will serve as a boost to their morale.

Conclusion

This paper discussed the role of chemistry and chemistry education in achieving sustainable development goals in Nigeria, status of chemistry education, challenges and problems confronting teacher education. Chemistry plays a vital role in the quest for national development; it unveils the effects of pollution on the environment and how to curb them.

Recommendations

Based on the roles of chemistry in attaining sustainable development, this paper recommends that:

1. There should be increase in the funding of teacher education so as to encourage students to go into the teaching profession.
2. There is need for Teachers Registration Council of Nigeria (TRCN) to be more proactive and ensure the code of ethics and standards of teaching profession is strictly adhered to.
3. Government needs to be more committed to the welfare of teachers through improved conditions of service, regular payment of salaries and allowance as well as prompt promotions backed with financial rewards.
4. Chemistry teachers should explore improvisation of local materials in their locality in the absence of instructional materials for teaching.
5. Chemistry teaching at all levels should be practical oriented, this will ensure better performance, and thereby sustainable development will take place.

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INFLUENCE OF TEACHERS' CHARACTERISTICS ON EFFECTIVE TEACHING AND LEARNING OF AGRICULTURAL SCIENCE IN ASA L.G.A., KWARA STATE

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Abstract

Education being a very important tool for individual and national development cannot be neglected and undermined. This study was conducted to determine the influence of teachers' characteristics (teacher's qualification, experience etc) on effective teaching and learning of Agricultural science. The design adopted was a descriptive design of the survey type. A sample of 100 students was randomly selected from 10 schools in Asa, Kwara State. The instrument used was a structured questionnaire divided into five sections. Frequency count was used to answer the research questions, while Analysis of Variance (ANOVA) was used to test the hypotheses. The findings of the research showed that teachers qualification, teaching experience, method of teaching and their attitude all have significant influence on effective teaching and learning of Agricultural Science. Based on the findings, it was recommended that during delivery of instruction, teachers should use a variety of teaching methods/equipment; Teaching and learning materials and ICT tools including computers should be made readily available in schools by the authorities and teachers should endeavor to attend workshops and seminars to improve on their teaching skills and effectiveness.

Introduction

Nigeria as a nation is struggling to be self-sufficient in all facets of life and also in the race to change her status, from developing country to a developed one. For us to achieve this, science and technology need to be better developed. Adu & Tadu, (2015) stated that there have been various efforts by government in improving the scientific and technological development of the nation. In the process of improving science and technology, more emphasis was laid on science education. Olorundare (2014) as cited by Adeniyi (2014) found that Science education is responsible for discovering, developing and evaluating methods and strategies to be used in teaching science.

Agricultural science is one of the core vocational curricular subjects taught at both junior and senior secondary schools in Nigeria. Egbule in Modebelu (2013) defined agricultural science as a process of training learners in the process of Agricultural productivity as well as the techniques for the teaching the subject, it is a subject taught in secondary schools as a means of self-reliance and preparation for further studies.

Attainment of goals and objectives of Agricultural science depends on the effectiveness of teaching and learning. Waliki and Usman (2009) described teaching as a systematic, rational and organized process of transmitting knowledge, skills etc. in accordance with professional principle. Naturally, the outcome of teaching is learning. Learning is an overt product of teaching which the major function of the teacher is. Effective teaching will definitely give rise to effective learning of Agricultural science. A teacher affects eternity, he can never tell where his influence stops.

The education axiom that when a learner has not learnt that the teacher has not taught is true and directly relates to the concept of teaching and learning as a process of

inculcation. The responsibility of imparting knowledge revolves around the teacher who plans, organizes and implements the teaching-learning process. The term teachers' characteristics can be referred to as qualities that can be measured with test or derived from their academic or professorial records. Wakili & Usman (2009) opined that every Agricultural science teacher must be effective, liberally educated, current in the subject matter and its pedagogy, aware of what is expected of teachers and schools, skilled and conscientious in planning, preparing for, carrying out instruction, respectful towards students and concerned about their welfare, activity involved in faculty, professional and community affairs. Wirth and Perkins (2013) indicated that teacher's attitude and characteristics contribute significantly to students' attention in the classroom.

Okureme (2003) posited that an effective science teacher should be a master of subject taught, as well as grounded in methods of teaching and be able to relate science concepts to real life situations. Huang & Moon (2009) stated that teacher's qualification accounted for approximately 40 to 60 percent of the variance in average of students' performance. Hardy & Smith (2006) also revealed that some studies in which students taught by certified teachers consistently outscored those taught by uncertified ones and posited that a poorly trained teacher will likely produce a poor doctor, engineer, agriculturist and fellow teachers and the likes. Olaleye (2011) also observed that teacher's attitude is a good predictor of students' performance particularly in science subjects. Springfield & Teddle (1991) opined that more experienced teachers are considered to be more concentrated on the most appropriate way to teach a particular topic to students who differ in their abilities, prior knowledge and backgrounds.

Statement of the Problem

The ultimate reason for teaching and learning is to achieve good academic performance by students at both internal and external examinations, but in recent times, most educationists especially in the field of science education are becoming worried about the unsatisfactory and poor academic performance of students.

Several researches have been carried out in teaching and how it affect students' performance but few on teachers who are the drivers to their success, hence the researcher's interest in the area. A growing body of evidence suggests that teachers' characteristics towards the teaching-learning process can make a great difference in students' achievement.

This study was in part driven by the fact that classroom practices which contribute to effective teaching are influenced by teachers' characteristics; such as their experience, qualification, motivation, gender, attitude, teaching method amongst others, in other words equipping teachers with pedagogical and professional training would not be enough to establish a positive, learnable, and teachable classroom climate. As primary recipients of instruction, the literature is clear that students' view of teachers' characteristics are appropriate for evaluating student-instructor interactions.

According to the literature, most of the studies investigated teachers' effectiveness on students' achievement while some studies were conducted on students' attitude towards their teachers. So far few studies has been conducted on the influence of teachers' characteristics on the effective teaching and learning of Agricultural science, hence necessitated the researcher's interest to investigate it.

Purpose of the Study

The main purpose of this study is to investigate the influence of teachers' characteristics on effective teaching and

learning of Agricultural science in Asa Local Government Area of kwara state. Specifically, the study intends to investigate:

a) The influence of Teacher's experience on the teaching and learning of Agricultural science.
b) The influence of Teacher's attitude on the effective teaching and learning of Agricultural science.
c) Influence of Teacher's method of teaching on the effective teaching and learning of Agricultural science.

Research Questions

a) Does teachers' experience have any significant influence on the effective teaching and learning of Agricultural science?
b) What is the influence of teachers' attitude on the effective teaching and learning of Agricultural science?
c) Does teachers' method of teaching have any significant influence on the effective teaching and learning of Agricultural science?

Research Hypotheses

Ho_1: Teachers' teaching experience does not have any significant influence on the effective teaching and learning of Agricultural science.

Ho_2: Teachers' attitude does not have any significant influence on the effective teaching and learning of Agricultural science.

Ho_3: Teachers' method of teaching does not have any significant influence on the effective teaching and learning of Agricultural science.

Data Analysis and Results

Analysis of Research Questions

Research Question 1

Does teachers' experience have any significant influence on effective teaching and learning of Agricultural science?

Table 1: Effectiveness of Teachers Teaching Experience in Teaching and Learning of Agricultural Science

S/N	STATEMENT	A (%)	D (%)	Mean
1	Teachers' years of teaching experience have significant influence on effective teaching and learning of Agricultural Science	86	14	3.32
2	Teachers' who attend conferences, in-service training, etc. perform better in classroom	85	15	3.30
3	Teachers' effectiveness in making difficult subject seem simpler have significant influence on their teaching experience	67	33	2.97
	Grand Mean			**3.14**

A= Agreed
D= Disagreed

Table 1 showed the significance of teachers experience in teaching and learning of Agricultural Science in Asa Local Government, Kwara State, where in item 3 which seeks to determine whether Teachers' effectiveness in making difficult subject seems simpler has significant influence on their teaching experience. A mean score of 2.97 was obtained which is greater than the standard mean score of 2.50. Hence, teachers' teaching experience has significant influence on effective teaching and learning of Agricultural Science.

Research Question 2

Does Teachers attitude have any significant influence on the effective teaching and learning of Agricultural science?

Table 2: Effectiveness of Teachers' Attitude in Teaching and Learning of Agricultural Science

S/N	STATEMENT	A (%)	D (%)	Mean
1	Teachers' lateness to class have significance influence on students' performance in Agricultural Science	65	35	2.90
2	Teachers' who are nice and friendly to students have significant influence on students' performance	90	10	3.41
3	Teachers' emotional stability have significant influence on effective teaching and learning of Agricultural Science	89	11	3.30
4	Teachers' health status have significant influence on effective teaching and learning of Agricultural Science	81	19	3.10
	Grand Mean			**3.09**

A= Agreed
D= Disagreed

Table 2 showed the significance of teacher's attitude on effective teaching and learning of Agricultural Science where item 3 which seeks to know whether Teachers' who are nice and friendly to students have significant influence on students' performance. A mean score of 3.41 was obtained which is greater than the standard mean of 2.50. Hence, teachers' attitude has significant influence on the effective teaching and learning of Agricultural Science.

Research Question 3

Does Teachers method of teaching have any significant influence on the effective teaching and learning of Agricultural science?

Table 3: Effectiveness of Teachers' Method of Teaching in Teaching and Learning of Agricultural Science

S/N	Statement	A (%)	D (%)	Mean
1	Teachers' use of varied forms of teaching method makes learning easy	82	18	3.14
2	Teachers' use of textbooks and instructional material have significant influence on effective teaching and learning of Agricultural Science	82	18	3.24
3	Teachers' use of assignment sometimes have influence on effective teaching and learning of Agricultural Science	78	22	3.09
4	Teachers' clarification of difficult terms/concepts have significant influence on effective teaching and learning of Agricultural Science	66	34	2.81
	Grand Mean			**3.08**

A= Agreed
D= Disagreed

Table 3 showed the significance of teachers' method of teaching on effective teaching and learning of Agricultural Science where item 2 which seeks to determine whether teachers' use of textbooks and instructional material have significant influence on effective teaching and learning. A mean score of 3.24 was obtained which is greater than the standard mean score of 2.50. Hence, teacher's method of teaching has significant influence on effective teaching and learning of Agricultural science.

Hypotheses Testing

Based on research questions 1-3, the following research hypotheses were formulated. The results related to the four hypotheses earlier formulated in this study are shown in the table below. All hypotheses were tested at 0.05level of significance.

Hypotheses One

H_{01}: Teachers' teaching experience does not have any significant influence on the effective teaching and learning of Agricultural science.

Table 4: ANOVA showing the influence of Teachers' experience on effective teaching and learning of Agriculture Science

Variables	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	6.38	10	0.64	1.5	0.15
Within Groups	37.73	89	0.42	1	
Total	44.11	99			

From Table 4, it can be deduced that there is no significant difference between teachers' experience and effective teaching and learning of Agricultural science with a significant value of 0.15 which is greater than the alpha value of 0.05, thus the hypotheses is not rejected.

Hypotheses Two

H_{02}: Teachers' attitude does not have any significant influence on the effective teaching and learning of Agricultural science.

Table 5: ANOVA showing the influence of Teachers' attitude on effective teaching and learning of Agricultural Science

Variables	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	8.87	11	0.81	2.01	0.03
Within Groups	35.24	88	0.40		
Total	44.11	99			

From table 5, it can be deduced that there is significant difference between teacher's attitude and effective teaching and learning of Agricultural science with a significant value of 0.03 which is lesser than the alpha value of 0.05, hence the hypotheses is rejected.

Hypothesis Three

H_{03}: Teachers' method of teaching does not have any significant influence on the effective teaching and learning of Agricultural science.

Table 6: ANOVA showing the difference between Teachers' method of teaching and effective teaching and learning of Agricultural Science

Variables	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	5.44	11	0.49	1.13	0.35
Within Groups	38.67	88	0.44		
Total	44.11	99			

From table 6, it can be deduced that there is no significant difference between teacher's method of teaching and effective teaching and learning of Agricultural science with a significant value of 0.35 which is greater than the alpha value of 0.05, hence the hypothesis is not rejected.

Discussion

The significant influence of teachers' teaching experience on teaching and learning of Agricultural science was examined in research question one. Result also shows that teachers' teaching experience has significant influence on effective teaching and learning of Agricultural Science. These findings agree with Gibons, Kimmel & O'shea (1997) who reported that students taught by more experienced teachers achieve at a higher level, because of teachers mastery of content and acquired classroom management skills to deal with different classroom situations.

The other way is to describe effectiveness in terms of professional competency. Moreover, experience, positive attitudes toward teaching, job satisfaction, etc., have resulted in effective teaching Garba (2004) affirmed that comprehensive teacher competencies are "verbal communication," "knowledge of subject matter," "interaction with students and student motivation in the classroom situation," to create an environment which will develop the "students' ability," "salable skills," and provide them with "necessary information" which will enable students to solve their present and future life problems.

The influence of teachers' attitude on the effective teaching and learning of Agricultural science was examined in research question two. It was also summated that there is significant difference between teachers' attitude and effective teaching and learning of Agricultural Science since the significant value is lesser than the alpha value. This finding agreed with Adesoji and Olatunbosun (2008) which found that the basic factors of good teaching are democratic behavior by teachers, use of the primarily concerned knowledge and skills, readiness of a teacher and the student, learning by solving of Agricultural problems, motivation to learn more about a given topic, well organized structure, feedback as a basis for continued improvement in performance, and discovery teaching and learning. Okureme (2003) reported that the variables of effective teaching behaviors are productive teaching techniques, organized structured classroom management, positive interpersonal relations, and professional responsibilities.

The significant influence of teachers' method of teaching on the effective teaching and learning of Agricultural science was examined in research question three. The findings of the study revealed that teachers' method of teaching have significant influence on effective teaching and learning of Agricultural Science since it shows from item 2 that teachers use of instructional material to give instruction has the highest mean score therefore it shows the effective use of instructional. The findings agreed with

Ayodele (2006) who further concluded that students react differently to different teaching methods, and that the selection of the proper method is critical to the learning style of those being served by the instruction. There is an assumption that students learn with different styles, at different speeds, different levels of prior knowledge and different environments when the subject matter is given by way of a variety of teaching strategies.

Conclusion

In conclusion, the study indicated that teachers' teaching experience and teachers' method of teaching have significant influence on effective teaching and learning of Agricultural Science .However, it was also summated that there is significant influence between teachers' attitude and effective teaching and learning of Agricultural Science.

Recommendations

It is therefore recommended that:

1. During delivery of instruction, teachers should use a variety of teaching method/tools.
2. Teachers should endeavor to attend conferences, workshops and seminars to improve on their teaching skills and effectiveness. This will make them more experienced.
3. Teaching and learning materials and tools including computers and other resources should be made available in schools for effective teaching and learning to take place.

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INFLUENCE OF SOCIAL MEDIA ADDICTION ON SECONDARY SCHOOL STUDENTS' STUDY HABIT IN SCIENCE IN NIGERIAN

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Abstract

The study investigated the influence of Social Media Addiction (SMA) on secondary school students' study habit in Science in Nigeria. The study employed a descriptive research design of survey type in carrying out the investigation. The sample for the study was 3000 Senior Secondary School students selected from 60 schools in Nigeria. 10 schools were selected for each of the six geo-political regions in Nigeria using simple random sampling technique. 50 students were selected from science classes in each of the schools. The instrument used for the study was a 20 item Questionnaire on Students' Social Media Usage and Study Habit (QSSMUSH). The instrument was subjected to face and content validity. The reliability of the instrument was carried out on 50 students outside the selected sample. Data generated form the 50 students were subjected to Pearson's Moment Product Correlation and the result obtain for the reliability coefficient was 0.87 at 0.05 level of significance. The instrument was administered on the 3000 sampled students and the data collected were analyzed using descriptive statistics for the research questions and inferential statistics for the hypothesis. The results of the analysis showed that the use of social media among secondary school students in Nigeria influences their study habit negatively. Based on the findings, it was recommended that teachers and parents should always monitor and regulate the use of social media among the students. Also, educative online assignment should be given to the students so as to minimize the time students spend socializing on social media network platforms.

Keywords: Social Media, Addiction, Learning, Students, Study Habit.

Introduction

Social media activities have become so rampant among secondary school students in Nigeria. Every student in secondary schools is busy surfing the net, chatting with friends online, watching videos and performing other social networking activities most hours of the day and night (Ngonso, 2019). Researcher's experience and investigation across some secondary schools showed that most of the students have formed the habit of not performing the take home tasks given to them by their teachers. Some do sleep off during the class teaching and some are not active members of the class. Their participations in academic activities are been downgraded daily. The study habit of the students is being influenced by this disheartening situation (Agwi and Ogwueleka, 2018).

Some of the several social media networking platforms embarked upon by the school age bracket include: Facebook, Whatsapp, Twitter, Imo, Telegram, Instagram, Messenger (Mageto, 2017; Ngonso, 2019). The number of hours spent each day on these social media networking platforms by the students surfing the net, engaging themselves in chatting and socializing on different social network sites indicate how addicted they are to the platforms. As a result of the addiction, little or no time is left for academic study (Mageto, 2017; Ngonso, 2019).

The study of science subjects requires perfect concentration by a serious minded student. This cannot be compromised with the use of social media. Engaging in social networking activities like texting, chatting, viewing

events and communicating with friends especially during class or at the time of personal study would definitely serve as a distraction and deprive the student of the perfect assimilation expected of a science student (Lenhart, Parcell, smith and Zickuhr, 2010; Ngonso, 2019).

Students' Study habit must be characterized by concentration and assimilation. This is measured by certain parameters among which are: study rate, the depth of contents covered, the extent of the materials visited and the level interaction with other co-students. Time spent in study must reflect in the learning outcomes.

Statement of the problem

Social media networking and surfing the net has become an every time activity among secondary school students in Nigeria. They are so addicted to it to the point that little or no time is left for other essential and mandatory activities in the life of secondary school students. Most of the students engage themselves in surfing the net, chatting with online friends, listening to music, watching videos and playing online games all through the day and even in the night. This act might have an influence on the study habit of the students. This study is out therefore, to investigate the influence of social media addiction on students study habit in science subjects.

Research questions

The following questions were raised to guide the study

1. What percentage of students sampled are using of social media network platforms?
2. What is the attitude of secondary school students towards the use of social media network platforms?
3. What is the attitude of secondary school students towards their study?

Research Hypothesis

The following research hypothesis was formulated and analysed.

(B) There is no significant relationship between social media addiction and study habit of secondary school students.

Methodology

The study adopted a descriptive research design. The sample used for the study was 3000 Senior Secondary School three students selected from the six geo-political regions in Nigeria. Simple random sampling technique was adopted in the selection of 10 schools and 50 science students from each of the geo-political region. The instruments used for the study was a self-constructed questionnaire with 20 items titled "Questionnaire on Students' Social Media Usage and Study Habit" (QSSMUSH). The instrument was in two sections. Section A was on the attitude of students towards the use of social media platform while section B focused on the students' study habit. Each item in the questionnaire was rated 1mark giving a maximum of 20 marks per respondent. The instrument was subjected to face and content validity. The reliability of the instrument was carried out on 50 students outside the selected sample. . Data generated form the 50 students were subjected to Pearson's Moment Product Correlation and the result obtain for the reliability coefficient was 0.87 at 0.05 level of significance. The instrument was administered on the 3000 sampled students across the schools sampled by the help of research assistants. The instrument was retrieved from the respondents and the data collected were collated and analyzed with descriptive statistics for the research questions while inferential statistics was used in analyzing the hypothesis.

Results

Descriptive analysis

Research Questions

Q1. What percentage of students sampled are using of Social Media Network platforms?

Table 1: Frequency count and percentage analysis of students using of Social Media Network platforms

Social Media Platform	N	%
Facebook	2910	97.0
WhatsApp	3000	100.0
Twitter	1960	65.3
Messenger	3000	100.0
Duo	1620	54.0
Others	1100	36.7

Table 1 showed that 97.0% of the students were using Facebook for social media activities, while 100.0% uses WhatsApp and Messenger for social media networks. 65.3% uses Twitter, while 54.0% of the students uses Duo, and 36.7% of the students uses other social media networks.

Q2. What is the attitude of students towards the use of social media network platforms?

Table 2: Percentage analysis of students' attitude towards the use of social media platforms

Items	**Yes**	
	N	**%**
I have constant access to the internet	3000	100.0
I use more than one social network platform	2560	85.3
I use social media networks everyday	3000	100.0
I use social media networks both in the day and night	2440	81.3
I love to play online games often	2300	76.7
I enjoy watching videos on my social media devices	2910	97.0
I am happy and satisfied when surfing the net	3000	100.0
I have more than 200 social media online friends	2120	70.7
I don't feel tired when am on social media	3000	100.0
My social media device is always with me anywhere I go	2960	98.7

Table 2 showed that 100.0% of the students have constant access to the net and use the social media networks every day. 100.0 are always happy and never feel tired using social media networks. 85.3% uses more than one social media network platforms while 81.3% uses the social media networks both day and night. 76,7% loves to play games on the social media network while, 97,0% enjoys watching videos on their social media devices. 70.7% of the students have above 200 social media online friends while 98.7% always go to places with their social media devices.

Q3. What is the attitude of students towards their study?

Table 3: Percentage analysis of students' attitude towards their study

Attitude	**Yes**	
	N	**%**
I don't normally have enough time to study my books	2940	98.0
I don't have text books to study from	2660	88.7
I don't always study at home	2870	95.7
I can't study in the night	2930	97.7
The school is not conducive for personal study	1980	66.0
Our subject notes are always too voluminous to read	1820	60.7
I always study with my friends	740	24.7
I always abandon any difficult aspect of my subjects	1790	59.7
I don't like going to my teachers for further clarifications on what he/she had taught us	2280	76.0
I always have many corrections to make in any assignment I do	1990	66.3

Table 3 showed that 98.0% of the students sampled do not have enough time for study, 88.7% don't have the required textbooks for their subjects, 95.7% don't enjoy studying at home, and 97.7% don't study at night while 66.0% don't find school premises conducive for personal study. The table further showed that 60.7% of the students believed that the subject notes given to them are too voluminous while only 24.7% use to consult or study with other students and 59.7% of the students always abandon the difficult aspects of their subjects. 76.0% of the students don't like consulting their teachers for further clarifications on difficult areas and 66.3% of them always have a lot of corrections to be made on any assignment given to them due to wrong presentations.

Hypothesis testing

Ho1: There is no significant relationship between social media addiction and study habit of secondary school students.

Table 4: Analysis of the relationship between social media addiction and study habit of secondary school students.

Variable		**Social Media Addiction**	**Study Habit**
Social Media Addiction	Pearson Correlation	1	0.229
	Sig (2 tailed)		0.000*
	N	3000	3000
	Pearson	0.229	1
Correlation		0.000*	
Study Habit	Sig (2 tailed)	3000	3000
	N		

* **P > 0.05**

Table 4 revealed that p-value (0.000) is less the α value (0.05). Therefore, the hypothesis was rejected. There was a significant relationship between the social media addiction among students and their study habits. Use of social media by secondary school students affects their study habits negatively.

Discussion

The findings of the study revealed that secondary school students uses different types of social media Facebook, WhatsApp, Messenger, Twiter, Duo and other social media network platforms for chatting and socialization. The finding was in agreement with Kamau (2017) and Ngonso (2019) who both discovered that students use several social media networks to surf the net and chat with friends.

The findings further showed that students have constant access to the net and use the social media networks every day. They always spend most of their day and night time on social media network activities like playing games, watching videos and chatting with friends. This was in agreement with Babu, (2015) and Mageto (2017) who both agreed that students use social media everywhere and every time.

The findings of the study also revealed that students sampled don't have enough time for study either at school or at home, they can't study either in the day time or in the night. This might be due to their addiction on the use of social media platforms. Social activities had taken all their time both day and night, therefore, there is no time left for personal academic study. This finding corresponds with the findings of Raymond & Afua, (2016) as well as Agwi & Ogwueleka (2018) who observed that time spent on social media can negatively affect students' academic activities.

The findings of the study further revealed that there was a significant relationship between the social media addiction and study habits of secondary school students. The use of social media platforms by secondary school students affects their study habits negatively. They were so addicted to social media at the expense of their academic study. This study was in agreement with the study of Raymond & Afua, (2016) as well as Mageto (2017) who both asserted that students' access to social media platforms have become a great distraction and negatively affects their study habit.

Conclusion and Recommendations

It was concluded from the study that secondary school students use social media platforms most often and it turned to addiction on their part. The social media addiction among the students influences their study habit negatively.

Based on the findings, it was recommended that teachers and parents should always monitor and regulate the use of social media among the students. Also, educative online assignment should be given to the students so as to minimize the time students spend socializing on social media network platforms.

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GENDER INTEREST IN STUDYING PHYSICS IN EKITI STATE TERTIARY INSTITUTIONS

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Abstract

The study examined the gender interest in studying Physics in Ekiti State Tertiary Institutions. The purpose of the study is to find out the way number of students that are showing interest in studying Physics at higher institution level in Ekiti State. The study employed a descriptive survey design. A sample of eighty (80) respondents was reached. It comprised students offering physics in Ekiti state higher institutions of learning. Purposeful sampling technique was used in selecting the higher institutions that constitute the sample. The results showed that: that there was significant difference between the male and female students' interests in studying Physics in Ekiti state Tertiary institutions; there was significant difference between the urban area institutions and sub-urban area institutions students' interests in studying Physics and there was significant difference between the federal institutions and state institutions students' interest towards studying Physics. Based on the findings of the results it is therefore recommended that: lecturers of physics should teach the subject in a livelier and stimulating manner that would attract more students, particularly the female students to study physics.

Introduction

Physics, according to Britannical Dictionary (2020) is a branch of science that deals with the structure of matter and the interactions between the fundamental constituents of the observable universe. More broadly, it is the general analysis of nature, conducted in order to understand how the universe behaves. Physics is one of the oldest academic disciplines, perhaps the oldest through its inclusion of astronomy. Over the last two millennia, physics was a part of natural philosophy along with chemistry, certain branches of mathematics, and biology, but during the scientific revolution in the 16th century, the natural sciences emerged as unique research programmes in their own right.

It is of obvious fact that the study of physics cannot be effectively carried out without an empirical analysis of some of the factors that do impede the study of the course. One of these is interest. The term 'interest' usually refers to preference to engage in some types of activities rather than others. An interest may be regarded as a highly specific type of attitude: When we are interested in a particular phenomenon or activity, we are favorably inclined to attend to it and give time to it.

Several researchers have identified a number of factors affecting students' interest towards science in general which included gender, personality traits, structural variables, and curriculum variables. Of these, the most significant is gender. Overseas Development Institute(2008) defines the term gender as —the array of socially constructed roles and relationships, personality traits, attitudes, forms of behaviour, values, relative power and influence that society ascribes to the two sexes on a differential basis.

Studies completed in the last three decades have shown that girls and boys have different interests and attitudes toward studying

science and different perceptions of scientists' science careers. Many studies have reported that males have more positive interest toward science than females(Francis and Greer, 2009; Walper et al.,2013) while others found no statistically significant gender differences (Jones et al., 2000; Menis, 2003; Sjoberg, 2003, 2000a,b; Selim and Shrigley, 2003 Weinburgh, 2005; Baran,2016).

Statement of the Problems

The way number of students that are showing interest in studying Physics at Tertiary institutions level is reducing day to day is a worrisome situation to well meaningful Nigerians. The apathy both male and female students have for studying physics related courses in the universities, polytechnics and colleges of education leave much to be desired. One wonders where this nation is heading to in the scientific worlds. It is crystal clear the physics is one of the bedrocks of science.

If this menace is not quickly arrested things may get out of hands. There is urgent need for stakeholders in education sector to look into the interest of students in studying physics in Tertiary institution of learning. Thus, this study is poised to cross-examine the gender interest in studying physics in Ekiti State Tertiary institutions.

Purpose of the Study

The general objective of this study was to investigate gender interest in studying Physics in Ekiti State Tertiary Institutions. Also, it specifically intended to:

1. find out the difference between the male and female students' interests in studying Physics in Ekiti State Tertiary Institutions;
2. examine the difference between the male and female students' attitudes towards studying Physics in Ekiti State Tertiary Institutions;
3. identify the difference between the federal institution and state institution students' attitudes towards studying Physics and
4. ascertain the causes of disparity between the urban area institution and sub-urbanarea institution students' interests in studying Physics.

Research Hypotheses

The following hypotheses were formulated:

1. There is no significant difference between the male and female students' interests in studying Physics in Ekiti State Tertiary Institutions.
2. There is no significant difference between the male and female students' attitudes towards studying Physics in Ekiti State Tertiary Institutions.
3. There is no significant difference between the federal institutions and state institutions students' interest in studying Physics.

Significance of the Study

The result of study helped the lecturers to understand fully the importance of gender interest in studying physics in Tertiary institutions. Apart from this, the result of the study equally helped the curriculum planners in designing lecturer education curriculum to consider the interest of students in teaching and learning of physics in higher institutions. Similarly, the result of this study helped the students to know the several opportunities and benefits available for them in studying physics in different Tertiary institutions.

Research Design

The study employed a descriptive survey design .A descriptive survey design was used due to the fact that it enabled information to be obtained from a representative sample of a targeted population in order to describe situations as they exist.

Population, Sample and Sampling Technique

The targeted population for this study consisted of students in Ekiti state tertiary institutions, Nigeria. A sample of eighty (80) respondents was reached. It comprised students offering physics in Ekiti state tertiary institutions of learning. Purposeful

sampling technique was used in selecting the tertiary institutions that constituted the sample.

Data Analysis

T-test was used in analyzing the data collected.

Testing of Hypothesis

Hypothesis 1: There is no significant difference between the male and female students' interests in studying Physics in Ekiti state Tertiary institutions.

Table 1: A t-test Analysis comparing the male and female students' interests in studying Physics in Ekiti state Tertiary institutions.

Group	N	X	S.D	df	Calculated value	Critical value
Male	40	34.49	3.96	78	5.25	1.96
Female	40	33.39	2.95			

Significant at 0.05 probability level

The data in table1 shows that the calculated t-value of +5.25 is higher than the critical value 1.96 on the basis of this, the difference is statistically significant. Hence, the null hypothesis which states that there is no significant difference between the male and female students' interests in studying Physics in Ekiti state Tertiary institutions was rejected (t-5.25, 78df).

Hypothesis 2: "There is no significant difference between the urban area and sub-urban area institutions students' interests in studying Physics."

Table 2: A t-test Analysis comparing urban area institutions and sub-urban area institutions students' interests in studying Physics.

Variable	N	X	S.D	df	calculated value	Critical value
Urban	38	30.83	3.05	78	3.16	1.96
Sub-urban	42	27.99	4.98			

Significant at 0.05 probability level

The data in table 2 indicates that the calculated t-value of 3.16 is higher than the critical value 1.96. On the basis of this the difference is statistically significant. Hence, the null hypothesis which states that "there is no significant difference between the urban area institutions and sub-urban area institutions students' interests in studying Physics was rejected (t = 3.16, 78 df).

Hypothesis 3: "There is no significant difference between the federal institutions and state institutions students' interest towards studying Physics."

Table 5: A t-test Analysis comparing the federal institutions and state institutions students' attitudes towards studying Physics.

Variable	N	X	S.D	df	calculated value	Critical value
Federal	35	27.07	3.11	78	3.35	1.96
State	45	24.99	4.27			

Significant at 0.05 probability level

The data in table 5 indicates that the calculated t-value of 3.35 is Tertiary than the critical t-values of 1.96. On the basis of this the difference is statistically significant. Hence, the null hypothesis which states that "there is no significant difference between

the federal institutions and state institutions students' interest towards studying Physics" was rejected (t = 3.35, 78df). This implies that there is difference on the basis of school attended in students' attitudes towards studying Physics.

Discussion of Results

The foregoing shows the analysis of data collected for this study. As indicated in the findings, students have difference interests towards studying physics in their various institutions. The testing of the first hypothesis showed that there was significant difference between male and female students' interest towards studying of Physics which contradicted earlier findings of Jones et al., 2000; Menis, 2003; Sjoberg, 2003, 2000; Selim and Shrigley, 2003; Weinburgh, 2005; Baran,2016 which revealed that there was no statistically significant gender differences between male and female.

Males responded with a statistically higher degree of good interest and attitudes toward studying physics. These finding could indicate that males were more receptive to physics than females which confirmed previous findings of Francis and Greer (2009); Walper et al (2013) that reported that males have more positive interest toward science than females.

Summary

This study aimed at investigating the gender interest in studying physics in Ekiti state tertiary institutions. It was discovered from the findings of the study: there was significant difference between the male and female students' interests in studying Physics in Ekiti state tertiary institutions in favour of male students. Equally, there was significant difference between the federal institutions and state institutions students' interest towards studying Physics in favour federal institution.

Conclusion

Learning interest in Physics is an important element to study Physics which has been considered as being a difficult course for most students. Following from the results and discussion above, the fact that the male students even have good better interest in Physics than their female counterparts towards studying physics was reflected in their responses to the research questionnaire. This suggests that the male students are more intellectual endowed in term of difficult or calculating courses than their female counterparts in tertiary institutions.

It may therefore be concluded that physics is gender sensitive as we were made to believe over ages from the past research works. The low female students' enrolment in physics therefore may be traceable to students' interest in one course or the other, which may be the focus of another investigation.

Recommendations

Based on the findings of the results it is therefore recommended that:

(i) Lecturers of physics should teach the course in a more lively and stimulating manner that would attract more students, particularly the female students to study physics;
(ii) In order to achieve (i) above, physics lecturers should always use relevant instructional materials to make their lessons not only meaningful but also participatory;
(iii) Physics lecturers should endeavour to encourage the students generally, and the female ones in particular to show interest in the study of physics through pieces of advice, emphasizing the importance and the advantages of geography to mankind and
(iv) Government through the ministry of education should ensure the provision of adequate and up-to-date instructional materials to facilitate the teaching of physics in schools in general and physics practical in particular

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PROMOTING SECONDARY SCHOOL STUDENTS' LEARNING OF SOCCER SKILLS THROUGH SCIENCE PROCESS SKILLS

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Abstract

Science is important to the world today and also to the future. However, the use of different skills in teaching and learning of Sport can help learners to take responsibility for their learning. Soccer is among the most thoroughly researched areas in sport education which often includes among other things, the physiological demands on players as well as skill acquisition and interventions to maintain such skills. Consequently, enhancing players' skill which can be tactical, technical and physical requires thinking procedures which is available by science process skills. Therefore, this study suggests science process skills acquisition by these future soccer players to develop effective mental attitude and aptitude during training. This is a quasi-experimental study that made use of Science Process Skills Assessment Procedure (SPSAP) to check for the impact of science process skills on soccer players. The study involves the Eight (8) public secondary schools in Ikere local government area of Ekiti State. Four (4) of the schools were randomly selected and their football team was also considered as the main sample of the study while the first eleven (11) of each school formed the subjects of the study. In all, forty-four (44) junior secondary school students participated in the study. The four (4) schools were randomly assigned to two experimental and two control groups. Pre-test was administered and the experimental groups were trained with the aid of science process skills while the control groups were trained based on traditional football training sessions for eleven (11) weeks. Thereafter, the two (2) groups were made to engage in football competitions and the posttest was administered. The three (3) research hypotheses generated for the study were tested using T-test statistics to determine whether there is a significant difference between the means of the groups in acquisition and demonstration of science process skills while ANOVA statistics were used to compare variation in the mean scores obtained and the source of variation where exists. The result of data collected on the pre and posttest basis revealed significant differences in the mean scores of the groups, also those in the treatment group performed better in practice. It was therefore recommended that schools and clubs soccer teams should adopt the use of science process skills to enhance soccer skills acquisition in Nigeria.

Keywords: Science, Sport, Soccer, skills, Attitude, Education

Introduction

Science is an important part of human activity and it will continue to advance and affect human life through discoveries, innovations, and inventions. Moreover, science is everywhere and it helps us to keep our environment changing for a better future and to live cleverly with the changes that take place within ourselves and our environment. Furthermore, science holds our lives together and explains everything from why what goes up must come down, to why we need oxygen to live.

However, like any human endeavor, science affect changes that evolve in sports over time by the provision of better kit made with loftier materials, better information about nutrition and training, and improvements in

records generation as well as analysis that can help in pushing the limits of athletic fitness. Globally, according to Ahmadi (2010) and Woods (2011) sports form a vital part of the society's culture, and participating in sports is an important aspect of every child's development that has many benefits such as social co-existence, community development, financial gains, and international unity.

Moreover, sports improve the health status of participants and as well foster the acquisition and development of fundamental skills that are important in real works of life. Sports are platforms to encourage participants to develop life skills that are useful universally (Woods, 2011). These skills were classified by Obanya (2014) as hard skills, such as; self-expression, logical reasoning, computational, manipulative and conceptual while, soft skills are, character formation, intra-personal, life-long and perseverance, and go-getting skills which involves, creative thinking, ideational fluency, opportunity seizing, experiential learning, and idea-to-product skills.

Similarly, sports bring about the development of self-image and confidence although, with the numerous benefits of sports, it also has some negative effects which can be avoided more often than not by skills. However, the impact of science on learning and teaching of sports suggests further considerations of its effects on players' learning of soccer skills. The sport of soccer also known as football according to Nelson (2020) is considered to be the world's most popular sport. Soccer is played by two teams of eleven players on a large grass field with a goal post at each end. The object of the game is to get the soccer ball into the opposing team's goal post. However, the key to soccer is that, except for the goalkeeper, players cannot touch the ball with their hands, but they can only kick, knee, or head the ball to advance it or as well score a goal.

Soccer is played at all levels throughout the world from small children leagues to professional and international teams. Soccer is one of the most-watched events in the world, and perhaps the most famous soccer tournament is the World Cup which takes place every four years in a competition among countries all over the world. Soccer game is interesting and competitive, and so popular because it only takes a ball and a flat open area to play. Also, children throughout the world will make up fields and goal posts just about anywhere and start playing the game. Soccer according to Mack (2011) is a great form of exercise that teaches the development of teamwork, physical and social skills and also, a good test of dexterity and a great way to learn balance. Therefore, many people consider soccer at its highest level to be so beautiful as to be practically an art with skills at which great players and great soccer teams work the ball, strategize, and flow as one can be an awesome thing to watch. Soccer is the biggest global sport and it is a fast-growing multibillion-dollar industry (Park & Huh, 2017). Soccer is a well-researched area in sport education according to Mitchel, Oslin and Griffin (2013), and mostly it is to focus on physiological demands of players in the course of training even at contests, as well as the acquisition of associated skills with interventions to sustain the skills. Players spend most of their time in practice to improve skills because the acquisition of soccer skills is central to the spectators' pleasure and the attainment of expertise in the game (Williams & Hodges, 2005). However, soccer skills according to Al-Asadi and Bin Umar (2016) could be technical, tactical, and physical which as such will require scientific thinking to develop.

Scientific thinking and decision making consist of the science process skills which improves learning at any rate (Yumuşak, 2016). Also, they are set of broadly transferable abilities that are essentially practiced to understand how scientists investigate and answer their questions about

nature. However, Santos and David (2017) claim that science process skills are tools that scientists use to do science and could also be useful in training children to develop their talent and be relevant in a world of uncertainty. Similarly, Mandor (2002) posits that science process skills have an added quality of contributing to the learners' abilities to explore their environment, answer questions, and solving challenging problems.

Science process skills range from basic to complex and it has been classified by scholars (Padilla, 2011; Zeidan & Jayosi, 2015; Ekon & Eni, 2015) as basic science process skills which includes observation, communication, classification, measuring, inferring and prediction while integrated science process skills are controlling of variables, operational definition, hypothesizing and testing, data gathering, and Interpretation, experimenting and Modelling. However, when students are encouraged to use science process skills, they are indirectly developing skills that they will use in the future in every area of their lives. Therefore, this study investigated the possible impact of science process skills on learning of soccer skills among secondary school students in Ikere local government area of Ekiti State.

Research Hypotheses

HO_1. There is no significant difference between the mean scores of the treatment groups during practice.

HO_2. There is no significant difference between the mean scores of the control groups during practice.

HO_3. There is no significant difference between the mean scores of the treatment and control groups during practice.

Research Design

This is a quasi-experimental study that employed Science Process Skills Assessment Procedure (SPSAP) to check for the impact of science process skills on soccer players.

Research Instrument

The instrument is a seven steps cycle of practice which involves;

Step 1: Instruction on skill acquisition

Step 2: Identification/description of science process skills

Step 3: Demonstration of skills (basic science process skills)

Step 4: Record of findings

Step 5: Review of findings

Step 6: Analysis of findings

Step 7: Feedback/Instructions

The six (6) basic science process skills; observation, communication, classification, measuring, inferring, and prediction were used in this study as the pre-requisite for integrated science process skills. The instrument was adapted from Chabalengula, Mumba, Hunter and Wilson (2009) with its scoring from 0 to 3 where 0 = not applicable, 1 = cannot demonstrate but needs more instruction and practice, 2 = demonstrate but with limited proficiency and so needs more practice, and 3 = proficient performance. In other words, every participant can score as low as 0 and as high as 18 at every rating. The instrument was subjected to content validity with the help of experts in the field of measurement and evaluation. The reliability of the procedure was determined by trial testing of the instrument on a non-participating football team from a school within Ikere local government area of Ekiti State. It has a reliability coefficient of 0.85, which is consistent for the study.

Population and sample

Participants were chosen from the Eight (8) public secondary schools in Ikere local government area of Ekiti State. Four of the schools were randomly selected and their football teams were also considered as the main sample of the study while the first eleven (11) of each school formed the subjects of the study. In all, forty-four (44) junior secondary school students participated in the study. The four (4)

schools were randomly assigned to two experimental and two control groups while the Pre-test was administered. The experimental groups were trained with the aid of science process skills while the control groups were trained based on traditional football training session for eleven (11) weeks. Thereafter, the two (2) groups were made to engage in football competitions and the posttest was administered.

Results of Findings

HO_1. There is no significant difference between the mean scores of the treatment groups during practice

Table 1: Independent T-test statistics of pre-test and posttest mean scores of treatment groups during practice

Group	N	Mean	SD	Df	t-Cal.	t-Crit.	P
A	11	12.42	2.98	23	2.042	0.980	0.000 (p<0.05) Sig
B	11	13.19	3.54				
Total	22						

Table 1 revealed that the mean difference of 13.19 and 12.42 shows a significant difference between the mean scores of the treatment groups during practice. It was further confirmed by (t-Cal = 2.042 > t-Crit =0.980), (p<0.05), and so concluded that there was a significant difference between the mean scores of the experimental groups during practice.

HO_2. There is no significant difference between the mean scores of the control groups during practice.

Table 2: Independent T-test statistics of pre-test and posttest mean scores of control groups during practice

Group	N	Mean	SD	df	t-Cal.	t-Crit.	P
A	11	9.84	1.189	21	1.853	0.980	0.001 (p<0.05) Sig.
B	11	10.71	1.260				
Total	22						

Table 2 revealed that the mean difference of 10.71 and 9.84 shows a significant difference between the mean scores of the control groups during practice. It was further confirmed by (t-Cal= 1.853 > t-Crit =0.980), (p<0.05), and so concluded that, there was a significant difference between the mean scores of the control groups during practice.

HO_3. There is no significant difference between the mean scores of the treatment and control groups during practice.

Table 3: Analysis of variance showing the mean scores of the treatment and control groups during practice

Group	N	Mean	SD	Sum of Square	df	Mean Square	F	P
Experimental	22	33.09	1.688	1977.841	1	1977.841	465.137	0.000 Sig.
Control	22	19.68	2.378	178.591	42	4.252		
Total	**44**			**2156.432**	43			

Table 3 presents the analysis of variance statistics showing the mean difference between the experimental group (2.37), the control group (1.68). It was further confirmed by ($F(1, 42) = 465.137$, $P=0.000 < 0.05$). Consequently, there was a significant difference between the mean scores of the experimental and control groups during practice.

Discussion

Results of the independent T-test statistics show a significant difference between the means of the experimental groups, and between the means of the control groups during the practice of soccer skills. Also, the analysis of variance revealed a significant difference between the mean scores of the treatment and control groups during the practice of soccer skills. However, the outcome of this research confirms the ability of science process skills to improve the learning of skills to be relevant in the twenty-first century (Santos & David, 2017).

More so, the game of soccer is an opportunity to exhibit transferable skills like the science process skills which includes observation, communication, classification, measuring, inferring and prediction while integrated science process skills are controlling of variables, operational definition, hypothesizing and testing, data gathering and Interpretation, experimenting, and Modelling (Padilla, 2011; Zeidan & Jayosi, 2015; Ekon & Eni, 2015).

Science process skills improve learning and as well give opportunities to be actively involved in learning. More so, Safaah, Muslim, and Liliawati (2017), claims that activities that are designed with science process skills seems to be reliable, repeatable, and meaningful. Therefore, this research further confirms the submission of Yumuşak (2016) that science process skills are based on scientific thinking and decision making which is capable of improving learning at any rate.

Conclusions

This study aligns with many benefits that soccer players can gain in their active involvement in the game. Moreover, training with science process skills enhances the players' attitude, and aptitude in such a way that they develop self-confidence and improved social skills in training to have control of soccer events. It was concluded that players in the treatment group performed better in practice.

Recommendation

Based on the findings, it was therefore recommended that schools and clubs soccer teams should adopt the use of science process skills to train prospective soccer players in order to enhance soccer skills acquisition in Nigeria. More so, science process skills can be combined with school curricular to stimulate learners' talent in order to be relevant in a dynamic world.

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THE EFFECT OF ADVANCE ORGANISERS ON SENIOR SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE IN READING COMPREHENSION AND ITS COUNSELLING IMPLICATIONS.

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Abstract
This paper examined the effect of advance organisers on senior secondary school students' academic performance in reading comprehension and its counselling implications. The purpose was to find if students exposed to advance organisers perform better in reading comprehension than those not exposed and what could be its counselling implications. The study adopted the quasi-experimental research design in which there was no randomization. The sample consisted of 116 Senior Secondary School 2 students randomly selected through stratified random sampling technique from Ekiti State, Nigeria. An instrument titled 'Achievement Test in Reading Comprehension' (ATRC) was used as pretest and posttest to collect data on students' level of mastery and performance in reading comprehension. The instrument was validated through the test re-test method and using Pearson's Product Moment Correlation analysis, a coefficient of 0.78 was obtained. The data collected were analysed using the mean and t-test statistics. The results showed that advance organizer was significantly effective in teaching reading comprehension but not when urban and rural settings were compared. By counselling implication, this shows that advance organizer is a leveler which could be used to enhance performance in reading comprehension in rural areas where students' background and psychological makeup may easily affect their performance. Based on the findings, some recommendations were made.

Keywords: Counselling Implications, Advance organizer, Reading Comprehension, Academic Performance, Location.

Introduction
The English Language is of great importance in Nigeria in that it is the language of official transactions and of learning in secondary and tertiary institutions. This is warranted by the fact that Nigeria is a multi-ethnic and multicultural nation and the English language plays the role of a unifying factor in terms of communication (Amuseghan and Omoogun, 2015). This explains the reason it has become a requirement to pass the subject at credit level in order to have a place in admission into the university to study any course.

However, performance of Senior Secondary School students in English Language has not been encouraging for many years in Nigeria (Sa'ad and Usman, 2014; Akinnaso, 2018). Many reasons have been adduced, which include the background of the learners, inappropriate methodology of teaching, lack of textbooks, lack of instructional materials as well as the inadequate ability of teachers (Asinyanbola, 2010).

Many of the times, even when the students understand the answers to questions, they find it difficult to express themselves in writing. They have poor control of sentences and their writings are full of wrong tenses.

The question may, therefore, be asked if this performance can be divulged from their poor reading skills. This is because reading is so important in the development of language and literacy in education especially from second language learners (Tierney, 2012).

Reading involves thinking and the background of students has a lot to do with reading comprehension. Floyd and Carrell in Iqbal, Noor, Muhabat and Kazemian (2015) asserted that students who have lack of cultural knowledge about the target language may have difficulty except by being taught explicitly the cultural knowledge of target language. Moreover, Kulo, Onchera and Indembukhani (2014) found in their study that background knowledge had significant influence on reading comprehension and that it is necessary to give instruction to learners to activate background knowledge in all areas (language, contents, formal) before embarking on the reading process.

In Nigeria English language is a second language which is used for teaching and learning in schools and by this reason, the background of the students cannot but have influence on their reading comprehension. This is because they do not have the cultural knowledge of the English Language. Moreover, many of them especially in Ekiti State reside and school in rural areas, most of which lack the organizational structure and institutions that are similar to the home base of the English Language. This in itself could have some psychological impact on the learners who may ordinarily find it far-fetched relating with the cultural knowledge of the language. This may also make some of them believe that it would be difficult for them to easily comprehend reading material or even do well in English Language.

The reasons for the poor performance of students in the English Language in Nigeria has partially been put at the doorstep of inappropriate methodology of teaching (Sa'ad and Usman, 2014). Most of the time, the conventional chalk and talk method has been adopted in teaching the language. That is why it is important to use advance organizers in the teaching of English Language. Advance organisers may provide the necessary schemata needed to activate background knowledge and enhance reading comprehension (Teacherthompsonblog, 2016).

One would, therefore, wonder if advance organisers enhance the reading comprehension of Senior Secondary School Students, if advance organisers enhance the reading comprehension of students in rural areas, and what would be the counselling implications of the effect of advance organisers on the performance of Senior Secondary School Students in reading comprehension. These constitute the focus of this study.

Statement of the Problem

The English Language has become a very important unifying factor in Nigeria, being the official language and the language of instruction in schools. This has also made a credit pass in the subject a requirement for admission into the universities in the country. However, there has been poor performance in English Language especially in reading comprehension among Senior Secondary School students and this has been put partly at the doorstep of inappropriate method of teaching and the background of students (since many of them live in rural areas). It is, therefore, pertinent to adopt strategies beyond the conventional method, which has become predominantly ineffective like advance organisers, to teach English Language. This study tested if the advance organisers will enhance performance in reading comprehension and do so even in rural areas. The study also considered the counselling implications of this for senior secondary school students in Ekiti State, Nigeria?

Research Hypotheses

The following null hypotheses were tested in the study:

1. There is no significant difference in the pretest mean scores of students taught with advance organizer and the control group.
2. There is no significant difference in the posttest mean scores of students taught with advance organizer and the control group
3. There is no significant difference in the posttest mean scores of students taught with advance organizer in urban and rural areas.

Methodology

The study employed the pretest-posttest control group quasi-experimental design. The design had one experimental group exposed to the treatment of advance organizer and the control group which continued with their normal academic activities. The sample consisted of 116 Senior Secondary Class 2 students randomly selected from two secondary schools in Ekiti State, Nigeria. They comprised 58 students in the experimental group and 58 students in the control group. They were also selected through stratified random sampling technique to ensure representatives from rural and urban schools. The instrument used to collect data was titled Achievement Test in Reading Comprehension (ATRC) which was used as pretest and posttest to collect data on students' level of mastery and performance in reading comprehension. The Advance Organiser Instructional Guide was also used as a lesson plan covering six weeks and used to teach reading comprehension.

The ATRC was validated by ensuring the face and content validity through expert judgement and using the test re-test method to ensure reliability. The instrument was administered twice on a group of students who were not part of the study. The interval of both administrations was two weeks. The scores obtained were subjected to Pearson's Product Moment Correlation analysis and a coefficient of 0.78 was obtained which was regarded as adequate for the study. The instrument was administered on the subjects through research assistants and scores obtained were analysed using mean, standard deviation and t-test statistics.

Results and Discussion

Results:

Hypotheses One: There is no significant difference in the pretest mean scores of students taught with advance organizer and the control group.

To test this hypothesis, the pretest mean scores of the two groups were compared using t-test statistic. The result is presented in table 1.

Table 1: t-test summary of the Pretest Mean Scores of the Experimental and Control Groups.

Group	N	Mean	SD	df	t_{cal}	t_{table}
Advance Organiser	58	19.14	5.93	114	-0.57	1.65
Control	58	19.76	5.65			

Table 1 reveals that the critical value (-0.57) is lesser than the table value (1.65). **Hypothesis One:** is thereby not rejected. This means that there is no significant difference in the pretest mean scores of students taught with advance organizer and the control group.

Hypothesis Two: There is no significant difference in the posttest mean sores of students taught with advance organizer and the control group.

To test this hypothesis, the posttest mean scores of the two groups were compared using t-test statistic. The result is presented in table 2.

Table 2: t-test Summary of the Posttest Mean Scores of the Experimental and Control Groups.

Group	N	Mean	SD	df	t_{cal}	t_{table}
Advance Organiser	58	39.88	7.44	114	6.98	1.65
Control	58	28.38	8.73			

Table 2 reveals that the critical value (6.98) is greater than the table value (1.65). hypothesis Two is thereby rejected. This means that there is a significant difference in the posttest mean scores of students taught with advance organizer and the control group.

Hypothesis Three: there is no significant difference in the posttest mean scores of students taught with advance organizer in urban and rural areas.

To test this hypothesis, the posttest mean scores of urban and rural school students exposed to advance organizer were compared using the t-test. The result is presented in Table 3.

Table 3: t-test Summary of the Posttest Mean Scores of Urban and Rural School Students exposed to Advance Organiser.

Group	N	Mean	SD	df	t_{cal}	t_{table}
Urban	28	43.96	7.14	56	-4.77	1.67
Rural	30	36.07	5.40			

Table 3 reveals that the critical value (-4.77) is lower than the table value (1.67). Hypothesis 3 is thereby retained. There is no significant difference in the posttest means scores of students taught with advance organizer in urban and rural areas.

Discussion

From the findings, one could deduce that the two groups compared had equal pre-treatment academic performance. This shows that there were no extraneous factors which could have tampered with the genuine outcome of the study. Since the groups were equal before treatment, it shows that the performance of the group exposed to advance organiser was truly warranted by the exposure to advance organiser. This shows that the groups were homogenous.

The findings showed a significant difference between the performance of those exposed to advance organiser and the control group. The advance organiser group (Mean = 39.88) performed significantly better than the control group (Mean = 28.38). This means that students performance in reading comprehension can be enhanced with the advance organiser strategy. This finding is in line with the findings of Okewole and Osinowo (2017) who found same when they experimented on primary school pupils. Jafari and Hashim (2012) also found advance organisers responsible for improving learners' listening comprehension when they experimented on second year university students. All these attest to the efficacy of advance organisers in enhancing performance in reading comprehension.

However, the findings showed no significant difference between urban and rural school students exposed to advance organisers. This may be a bit interesting because it has been claimed that learners' background affects their reading comprehension performance (Kulo, Onchera and Indembukhani, 2014). It should have been expected that students from urban schools would have better background knowledge of the English Language which should make them perform better in reading comprehension than rural school students. This could only mean that the advance organiser is a leveler which has same impact on students no matter the circumstances of their location.

Implication for Counselling

Researchers have opined that psychological factors play a vital part in the process of reading (Lee and Shute, 2010; Sani and Zain, 2011). In which case, a learner's performance in reading and reading comprehension may have to do with his/her attitude, self-efficacy, interest, motivation or even anxiety. These may not be far-fetched with learners in rural settings who may be conscious of their disadvantage of inadequate background knowledge when it comes to reading comprehension in English Language.

From the findings of this study, it has been established that the advance organizer strategy is a leveler that has the same impact on performance in reading comprehension irrespective of the location of learners. So, whether the challenge is self-efficacy (Yoguntan, 2012), anxiety (Alrabai, 2014) or even interest and motivation, the use of advance organiser will downplay the effects of these on performance in reading comprehension. The use of advance organiser has been known to reduce foreign language learner's anxiety (Schwartz, 1995, Ambard, 2010). It has also been known to arouse learners' interest (Nemer, 2017).

Therefore, teachers of English language could easily achieve a lot when they make use of advance organisers especially to teach reading comprehension. Not only this, teachers of learners in rural schools need to see the advance organiser strategy as a veritable tool not only in enhancing learners' performance in reading comprehension but also in giving them the assurance that the circumstances of their location are not strong enough to place them at a disadvantage compared with their colleagues in urban schools.

Conclusion

It is concluded in this study that the advance organiser strategy will enhance performance in reading comprehension when used on Senior Secondary School students in Ekiti State, Nigeria. It is also concluded that the advance organiser strategy is leveler which has the same effect on performance in reading comprehension irrespective of learner's location of school. This, therefore, has counselling implications as teachers in rural schools could use this strategy to reduce students' anxiety, arouse students' interest and assure students that the circumstances of their location are immaterial to their performance in reading comprehension.

Recommendations

Based on the findings, the following recommendations are made:

1. Secondary school teachers of English Language should always adopt the advance organiser strategy in teaching reading comprehension
2. Teachers in rural schools where students may have difficulty with doing well in reading comprehension due to psychological factors should always adopt the advance organiser strategy as a solution not only to the problem of poor performance but also to reduce or even strike out the psychological challenges.
3. Teachers whose secondary school children have inferiority complex issues in their academics should always encourage them to interact with advance organisers in conducting their studies as this could help reduce the inferiority complex and assist in enhancing their performance.

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FACTORS AFFECTING TEACHING -LEARNING PROCESS AND SENIOR SCHOOL STUDENTS' PERFORMANCE IN MATHEMATICS IN EKITI STATE, NIGERIA

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Abstract

The study investigated the factors affecting teaching-learning process and senior school students' performance in Mathematics in Ado local government area of Ekiti-State. It sought to identify the students' and teachers' difficulties in Mathematics readily inside and outside the classroom and to proffer possible solutions to make the teaching-Learning process of Mathematics easier and interesting to both the teachers and students in the school. The research design used was descriptive design of survey type. The population for the study consisted of all students and teachers from the four selected secondary schools in Ado Local Government. The sample size for the study was 200 students which were selected using multi-stage sampling procedure and four teachers which were selected using purposive sampling techniques across the Senior Secondary Schools in Ado Local Government area of Ekiti State. A self constructed questionnaire was used for Data collection. Data collected were analyzed using the chi-square analysis, mean, standard deviation and t-test. The results show that there are shortage of qualified teachers teaching the subject. It was revealed that the students were exposed to only the theoretical aspect of computer science instead of the practical aspect. Based on the findings of this study, it was recommended that government should make necessary provision for teaching resources. Teachers should have positive attitude towards the teaching of Mathematics. Secondary School Students should properly be exposed to the problem-solving activities in Mathematics.

Key Words: Teaching-Learning Process, Senior School Students, Performance, Mathematics Education.

Introduction

Education is a tool to prepare people for a worthwhile living and for the development of the society. In the world over, education is making a tremendous progress in the life of individuals. New ideals and computer technology are emerging. Oyebanji, (2003) defined 'Education as the aggregate of all processes by which a child or adult develops the activities, attitudes and other forms of behavior which are off positive value to the society in which he lives. Mathematics is a core subject in national development. It is very important in the lives of individual and the state at large. The outcome of Mathematics education tends to give all round knowledge to the child and improve computer skills of the Child. Nigeria has realized the importance of functional education for the good and services of mankind. This realization is evidenced in the National Policy on Education (FRN, 2013). Where it is emphasized that, the overall philosophy of education in Nigeria among others should be directed to building a united, strong and self reliant nation by educational activities being geared towards scientific and technological progress. According to Okorie (2000) students lack interest in learning Mathematics simply because the tools or equipment use in teaching students are not provided and these includes; Lack of qualified teachers, Poor learning environment among others.

Efforts have been made to bring positive results from the teaching and learning of Mathematics education in Senior Secondary Schools since effective learning has not been achieved. Technological achievement and advancement aspired by many nations can be worthwhile if the efforts yielded positive result in Nigeria. It is therefore necessary to ascertain those factors that affect the performances of students in Senior Secondary Schools in Mathematics in Ado Local Government Area of Ekiti State.

For some years now, certain factors have been affecting the performances of computer science education students in junior secondary schools. Njoku (2019) highlighted that non provision of the necessary infrastructure to secondary school student have become a setback towards effective teaching and learning. Ukeje (2016) buttressed the argument by saying that schools are in short supply of classroom teaching resources and also practically everything connected to the teaching and learning and these among other things are contributing factors to student's poor performance in senior secondary school subjects.

Teaching- learning Process of Mathematics in Secondary Schools

In the teaching learning process of Mathematics, it is important to relate teacher's performances to students learning. The factors that affect teaching and student performances includes: teachers qualification measure of teachers attitudes, knowledge of the subject, knowledge of teaching methodology and characteristic of the environment of teaching such as the environment with a good network for browsing which aids e-learning.

Kwacha (2007) remarked that most schools lack computer teachers and experts that would support and manage the application of Mathematics in the teaching learning process. Oyebanji (2003) stated that the performance of student depends to a large extent on the competence of the teachers. Mathematics contributes to the objectives of self realization of an individual. Lack of sufficient practically oriented technical teachers who would arouse and sustain student interest is a serious setback in the progress of Mathematics as a field of study.

Purpose of the Study

The purposes of the study were to:

1. Find out the extent to which teachers' attitude affects the teaching-learning process in Mathematics among senior secondary school students in Ado Local Government Area.
2. Find out the difficulties the students faces in implementing the teaching-learning process of Mathematics.
3. Ascertain the difficulties that the teacher faces in the teaching-learning process of Mathematics.

Research Questions

The following research questions were raised for this study

1. To what extent does teacher's attitude affect the teaching-learning process in Mathematics?
2. What are the students' related difficulties affecting learning of Mathematics in senior Secondary Schools?
3. What are the teachers' related difficulties affecting teaching-learning of Mathematics in senior secondary schools?

Research Hypotheses

1. Shortage of teaching resources will not significantly influence students' academic performance in Mathematics.
2. Teacher's attitude towards the teaching of Mathematics will not significantly influence the academic performance of students.

Methodology

Research Design

This study employed a descriptive research design of the survey type of the secondary school teachers and the students on the factors affecting the teaching-learning process on senior school student's performance in Mathematics in Ekiti state.

Population

The population for this study consisted of all secondary schools in Ado- Ekiti. The whole population was however represented by students and teachers from all secondary schools in Ekiti state.

Sample and Sampling Procedure

The sample consisted of 204 respondents from the selected secondary school. The schools were selected using simple random sampling, the students' were selected using multistage random sampling procedure while the teachers were selected using purposive sampling techniques.

Multistage sampling is the form of sampling which involves dividing the population into groups or clusters. Then, one or more clusters are chosen randomly and everyone within the chosen cluster is sampled.

Research Instrument

Self-constructing questionnaire was used to gather data on the factors affecting teaching-learning process and senior school students' performance in computer science along with the teachers and students difficulties they are facing respectively.

Validity of the Instrument

The questionnaire was validated using face and content validity. To achieve this, an expert from mathematics education was also provided with a copy for assessment and scrutiny by taking necessary corrections.

Administration of Instrument

The question was administered directly by the researcher on both the teachers and students with the cooperation of the principals of each of the schools concerned. The performance of the students in their last examination was also taken through the schools registrars. In the process of administration, verbal explanation was given to the respondents and they were also assured of confidentiality of all the information supplied. The questionnaire was successfully administered and were duly completed and returned to the researcher.

Data Analysis

The data generated from the instrument were analyzed using descriptive and inferential statistics. Mean and standard deviation was used to answer the research questions and analysis of co-variance (ANCOVA) was used to test the entire hypothesis at 0.05 level of significance.

Results

Research Question 1: To what extent does Teachers' Attitude Affect the Teaching-Learning Process of Mathematics?

Table 1: Descriptive Analysis Showing the Extent at which Teacher's Attitude Affect the Teaching-Learning Process of Mathematics.

S/N	Items	SA		A		U	
		Freq	%	Freq	Freq	%	Freq
1	The topic I teach are relevant to Mathematics	1	25%	3	75%		
2	Teaching Mathematics is simple and interesting	2	50%	2	50%		
3	All the learners have the ability to learn	1	25%	3	75%		
4	I have adequate mastery and knowledge of the content	2	50%	2	50%		
5	Refresher course helps the teachers improve their skills or teaching Mathematics			3	75%	1	25%
6	Learners are self driven and willing to learn			4	100%		
7	I am confident in teaching Mathematics	3	75	1	25		

Table 1 shows that 3(75%) of the total respondents agreed that the topic they teach are relevant to Mathematics while 1(25%) respondents strongly agreed. In item 2, 2(50%) of the total respondents strongly agreed that Mathematics is simple and interesting to teach while 50% agrees with the option. Item 3 shows that 1(25%) of the total respondents strongly agreed that all the learners have the ability to learn Mathematics while 3(75%) agrees. Item 4 shows that 2(50%) of the total respondents strongly agreed and at the same time 2(50%) agreed that they have adequate mastery and knowledge of the content. Item 5 shows that 3(75%) of the total respondents agreed that the refresher course helps the teachers improve their skills or teaching Mathematics while 1(25%) was undecided. Item 6 shows that all the respondents 4(100%) agreed that learners are self driven and willing to learn. Lastly, item 7 shows that 3(75%) of the total respondents strongly agreed that they are confident in teaching Mathematics while 1(25%) agreed.

Research Question 2: What are Students-Related Difficulties Affecting Learning of Mathematics in Senior Secondary Schools?

Table 2: Students Related Difficulties Affecting Learning of Mathematics in Senior Secondary Schools

S/N	Items	Yes		No	
		Freq	%	Freq	%
1	Are teaching-learning materials adequate in your school	84	42	116	58
2	Do you find the learning materials available relevant	80	40	120	60
3	Do you have a standard Mathematics laboratory	100	50	100	50
4	Do you always have practical classes in your school	92	46	108	54

Table 2 shows that 84(42%) of the total respondents agreed that teaching-learning materials are adequate in their school while 116(58%) disagreed. Item 2 shows that 80(40%) of the total respondents agreed that they find the learning materials available

relevant while 120(60%) disagreed. In item 3, 100(50%) of the total respondents agreed that they have a standard Mathematics laboratory while 100(50%) disagreed. Item 4 shows that 92(46%) of the total respondents agreed that they always have practical classes in their school while 108(54%) disagreed.

Research Question 3: What are the Teachers Related Difficulties Affecting Teaching-Learning of Mathematics in Senior Secondary Schools?

Table 3: Teachers Related Difficulties Affecting Teaching-Learning of Mathematics in Senior Secondary Schools

S/N	Items	Yes		No	
		Freq	%	Freq	%
1	Shortage of teaching resources	3	75	1	25
2	Poor computer laboratory	3	75	1	25
3	Poor conducive aesthetic environment	2	50	2	50
4	Shortage of power supply	4	100	-	-
5	Poor funding	3	75	1	25

Table 3 shows that 3(75%) of the total respondents agreed that there is shortage of teaching resources while 1(25%). In item 2, 3(75%) of the total respondents agreed that there is poor Mathematics laboratory while 1(25%) disagreed. In item 3, 2(50%) of the total respondents agreed that they experience poor conducive aesthetic environment while 2(50) disagreed. Item 4 shows that 4(100%) of the total respondents agreed that there is shortage power supply. In item 5, majority of respondents (3(75%) agreed that they is poor funding while 1(25%) disagreed.

Hypotheses Testing

Hypothesis 1: Shortage of teaching resources will not significantly influence students academic performance in mathematics.

Table 5: Chi-Square showing the Shortage of Teaching Resources on the Academic Performance of Students in Mathematics.

Chi-Square	79.600[a]
Df	3
P-value.	.000
Remark	Significant

P<0.05

Table 5 showed that P_{-value} (0.000) is lesser that the level of significance (0.05). The null hypothesis is rejected. This implies that shortage of teaching resources will significantly affect student's academic performance in Mathematics.

Hypothesis 2: Teachers' attitude towards the teaching of mathematics will not significantly influence the academic performance of students

Table 6: t-test Analysis of Teachers' Attitude Towards the Teaching of Mathematics on the Academic Performance of Student.

Relationship	N	Mean	SD	df	t-cal	P-value	Remark
Teachers Attitude	200	3.441	.738	199	20.034	0.000	Significant
Students Performance	200	1.543	.475				

P>0.05

Table 6 shows teachers attitude towards teaching of Mathematics on the academic performance of students in Ekiti State. The result showed that t=20.034, p=.000<0.05 at 0.05 level of significance. The null hypothesis is rejected. This implies that teachers attitude towards the teaching of Mathematics will significantly affect the student's academic performance. Therefore, teacher's attitude will significantly influence the students' academic performance in Ekiti State.

Discussion of the Findings

The study revealed that majority of respondents agreed that teachers attitude affect the teaching-learning process of Mathematics. Teacher's attitude may be positive or negative as Eugene and John (2014). asserted that teachers' attitude before the treatment could be negative but after the treatment become bold and confidence to teach their students.

The study further revealed that shortage of teaching resources, poor adequate computer laboratory, poor conducive environment, shortage of power supply and poor funding are the teachers related difficulties affecting teaching-learning of Mathematics in senior secondary schools in Ekiti State.

The study revealed that shortage of teaching resources will significantly affect student's academic performance in Mathematics. According to Kalinga (2008) inadequacy of books, references and other academic resources materials are the major problems which accelerate the poor performance in many secondary schools.

Conclusion

The study concludes that there are some basic strategies that could be adopted in order to improve the teaching of Mathematics in secondary schools. The study is of the view that Mathematics should provide sound basis for further training in Mathematics at the tertiary level of education thus should be relied upon to enable students acquire the basic skills and knowledge needed to either secure a job and earn a living or to pursue further studies in the area Mathematics and information science.

Findings from this study show that factors like shortage of teaching resources, poor Mathematics laboratory, poor conducive environment, shortage of power supply and poor funding are affecting teaching-learning of Mathematics in Ekiti State. The finding of the study further revealed that shortage of teaching resources will significantly affect student's academic performance. The finding of the study further revealed that teachers' attitude towards the teaching of Mathematics will significantly affect student's academic performance.

Recommendations

Based on the findings of this study, the under listed recommendations were made:

1. Government should make necessary provision for teaching resources. Provision of infrastructures, adequate funding of education, and the rewards to the outstanding teachers should be done and organize by the government officials.
2. Teachers should be endeavor to attend workshop and seminar. On the job

training for teachers, adequate orientation, induction and regular seminar and conferences relevant to Mathematics fields should be made accessible to the teachers to update their knowledge.

3. Students should have positive attitude towards the learning of Mathematics. Teachers need to have the time to develop ideas, innovations and more friendly in order to create positive mind for the students to develop interest in the subject.
4. Teachers should have positive attitude towards the teaching of Mathematics. There is the need for professional standards in which the teachers can demonstrate their commitment to the teaching-learning process of Mathematics through their professional development. A professional credential system that acknowledges creativity, enthusiasm and commitment of teachers.
5. Government should provide incentives to the teachers. There is the need for the provision of incentives and well equipped Mathematics laboratories. This would go a long way to stimulating learning and making interactions between teachers and students pleasurable and resourceful.
6. Teacher should be encouraged to use students centered method. Students should be gainfully engaged with worthwhile classroom assignment, standard practical's work and encourage group reading.

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IMPROVISATION OF INSTRUCTIONAL MATERIALS IN THE TEACHING OF BIOLOGY IN SENIOR SECONDARY SCHOOLS IN EKITI STATE.

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Abstract

Instructional materials are materials used to make teaching effective and hold learners' attention during classroom activities. Improvised instructional materials are usually low cost/affordable materials used in place of the expensive ready-made/ imported equipments for effective teaching and learning. The paper focussed on the importance of improvised instructional materials for the teaching of Biology in secondary schools in Ekiti state, identified some of the problems militating against improvisation in the state and highlighted the basic considerations in improvisation. Some of the instructional materials that can be improvised as substitution for ready-made/ imported equipments were also listed, and further recommendations were made on how improvisation of these learning materials can be made possible for biology teaching/learning activities in Ekiti State secondary schools.

Key Words: improvisation, instructional materials, affordable, expensive, ready-made equipment, biology teaching/learning.

Introduction:

Science education must seek to permit the individual to develop to the fullest his capacities for adjustment and continuous change in order that he may meet the problems of his day and solve them successfully when they arise. Biology, the study of living things is a science which has developed methods of its own. The structural complexity of the organisms themselves, the multiplicity of functions occurring simultaneously in organism's body and the inter-relationship between the organisms and their environment have led to methods of study unique to this particular science – biology. Bremner (2000) stated that the methods are characterized by the art of scientific investigation in relation to pupils' study of new specimen, the experimental approach to biological science in relation to experiment carried out by the individual study. These are necessary for the effective transfer and permanent communication of biological knowledge.

The Federal Government of Nigeria through the Federal Ministry of Education with the assistance of UNESCO in 1998 established a science equipment centre to provide course for science teachers and laboratory assistants. The provision of this centre though laudable has been inadequate. The Nigerian school system today is experiencing a boost in population giving rise to greater demand for classroom facilities and equipment. Teachers of biology and other sciences therefore have to acquire and develop skills of producing teaching materials. This is what improvisation is all about. Improvisation becomes imperative in situation where there are scarce resources and facilities.

Improvisation is the process of providing quickly in time of need, using whatever available materials and equipment for

facilitating the teaching of biology. Improvised instructional material is an inexpensive method of widening the scope of inquiry. It is a meaningful attempt towards finding suitable substitute or alternative to conventional science materials. Nature presents a rich laboratory because specimens of plants and animals are abundant around us. However, equipment needed for capturing animals, performing physiological experiment, timing experiment or processes as well as some specimens which are available have to be improvised using locally accessible materials. As a proverb says "A picture is worth a thousand words". Instructional materials are learning resources that help in teaching and learning processes, which help the teacher to deliver his lesson during the course of his teaching.

In the National Teachers Institute (2007) manual for the retraining of primary school teachers, these instructional materials are cheaply selected equipments that are introduced in the teaching/learning process in order to enhance effective teaching and learning activities in the classroom. Mapaderun (2002) emphasized that the availability and adequacy of these facilities promote effective teaching and learning activities in schools while their inadequacy affects the academic performance negatively. In a nut shell, improvised instructional materials are teaching materials designed and produced from the available local materials in order to enhance effective teaching and learning in schools.

In view of these the study sought to investigate the improvisation of instructional materials in the teaching of biology in senior secondary schools in Ekiti state

Basic considerations in improvisation

Improvisation according to Igwe (2003), requires a considerable development through imaginative planning and good knowledge. On embarking on any improvisation in the teaching and learning process, certain basic considerations are necessary. Some of these considerations include:

i. The concept to be taught
ii. The objectives of the lesson
iii. The learners' level and academic background
iv. The durability of the improvised materials
v. The cost advantage of the improvised material and
vi. The technical know- how.

Teacher's understanding of concept to be taught and the objective of the lesson will determine the simplicity or complexity of the improvised materials. Knowledge of the learners' level and academic background would help the teacher to design the appropriate improvised materials for teaching the learners. It is also necessary to give consideration to the durability of the improvised materials. A durable material on a long-term basis reduces cost as well as saves time and labour. In the cost advantage, it may be more beneficial to acquire an already existing cheaper factory made material than to spend time and labour to embark on the improvisation of such materials. The technical know- how is the skill needed to carry out the improvisation exercise.

Importance of improvised instructional materials on biology teaching and learning

According to Johnson (2000), teachers should not take advantage of inadequate facilities and lack of equipment as an excuse to resort to both poor teaching and non teaching, but instead they should learn to improvise instructional materials. In agreement with the submission of Olumorin (2004), the importance of improvisation includes the following among others:

i. It enables the teachers and learners make proper use of their environment. This is because in improvisation of biology learning materials, we mainly make use of the available materials in the environment.

ii. The use of local materials reduces cost in terms of financial expenditure in buying ready-made materials.
iii. The production of instructional materials can lead to the discovery of new knowledge.
iv. When parent or learner or community members assist in improvising a resource material such as donating personal material, this will improve school-community relationship.
v. Improvised materials provide experience not easily obtained through other means and contribute to efficiency, depth and variety of learning.
vi. Improvisation helps to bridge the gap between theoretical knowledge and practicability. That is, it provides cognitive bridge between abstraction and reality to students.
vii. When the teacher and learners succeed in improvising an instructional material, there is a high sense of achievement and they are encouraged to higher exploits. That is, it will generate interest and motivation for indigenous technology.
viii. Improvisation helps to eradicate the menace of lack of or inadequate instructional materials for biology teaching and learning. That is, improvisation undertaken by the teacher will enable him to think and research for cheaper, better and faster methods of making the teaching and learning process easier for learners.
ix. Improvised materials increased interest and high performance in students and teachers; create innovative skills and encourage team work.
x. Improvised instructional materials make teaching biological concepts more interesting to both students and teachers in the classroom.
xi. Talents in the students are discovered during improvisation exercise.
xii. The set out educational goals is achievable through the use of improvised instructional materials in teaching biology.

Problems militating against improvisation of materials

Zarewa (1991) opined that educational authorities might not always able to provide all the materials needed for effective teaching and learning in schools. Hence, the need for teachers and other concerned stake holders in education to take the improvisation of these teaching materials serious. Teachers should be able to design and produce instructional materials from the available local materials around. However, according to Eyiuche et.al (2013), there are several challenges being faced by the teachers. Problems militating against the improvisation of materials include the following among others:

i. Lack of adequate professional training of staff. Improvisation demands adventure, creativity, curiosity and perseverance on the part of the teacher, such skills are only realizable through well-planned training programmes on improvisation.
ii. Lack of funds. There are some instructional materials that require funding. Improvisation whether they cost less than standardized manufactured ones or not, cost money. This money is usually not readily available for teachers.
iii. Lack of support/assistance from the school authority, parents, community and the government can hinder improvisation of teaching/learning materials.
iv. Improvisation can also expose teacher and students to some-hazards.

Guides on improvisation

When the desirable is not available then the available should becomes the alternative if it performs the same or similar functions as the desirable. It should be borne in mind that resource materials do not achieve any of the attributed values on their own. The usefulness depends on what the teacher makes out of them, that is, the influence made on the students by the teacher with the

materials. Hence, the teacher must make sure the improvised materials will;

- Perform the same function as the original material
- Be easy to handle by the users
- Be attractive to the students.

Cheap/Affordable Improvised Biology Teaching Materials as Against Ready-made Equipment

S/N	Ready-made/ Imported Equipment	Affordable Improvisable materials	Uses
1	Funnel	Plastic bottle open at base	For transferring liquid
2	Mounting Needle	Broom stick/Tooth pick	For sub-culture
3	Tripod stand	Unused stove frame	For supporting during heating
4	Bunsen burner	Kerosene stove	Source of heat
5	Round bottom Flask	Electric Bulbs	For measuring liquid volume
6	Indicators	Flower extract (after conducting chemical analysis)	As indicator for acid and base
7	D.N.A model	Stripped cardboard	For illustration in genetic
8	Catching net	Mosquito net, wooden ring/iron, thread and needle	For catching or collecting insects
9	Spatula	Cut handle of table spoon	For putting chemicals into test tube
10	Watch-glass	Cover of Vaseline bottle	For stocking and putting specimens
11	Clinostat	Box cut at one side	For demonstrating direction of plant growth in response to light
12	Test tube holder	Cloths hanger (peg)	For holding test tube
13	Reptile-hook	Metal, iron, eyed-screw, washer-ring bolt and nut, spring	For catching reptiles for studies in biology topics
14	Plant press	Wood/ply wood, khaki cloth, shoe buckles	For drawing moisture or water away from plants
15	Measuring cylinder	Graduated feeding bottle	For measuring liquid volume

Source: African Journal of Materials and Natural Resources. Federal College of Education, Kano.1(1)

Improvised instructional materials help biology and other science students to realize that science has to do with ordinary things and will possibly motivate them to carry out experiments and learning activities themselves using such improvised materials, (Johnson, 2000). Improvised materials are usually simple and may not have perfect finishing, because they are made from local raw resources that are acceptable to students.

Conclusion

Adequate, effective and efficient instructional materials are expected to be used by the teacher to teach topics in biology. Improvised instructional materials should be seen as a variable integral part of teaching. Even when the school budget is

sufficient to cater for original materials, commonly available materials can be carefully selected in order to make biology teaching/learning easier. Meaningful improvised instructional materials should be used effectively in teaching biology in Ekiti State secondary schools.

Recommendations

- Government should make improvisation a core course in all fields of sciences by curriculum developers, mount public enlightenment campaign on the importance of improvisation to the society as an integral part of technological development, provide fund/cash to motivate teachers on improvisation and solicit the support of experts within and outside the state to assist the teachers in the improvisation exercise.
- Seminars and workshops should be organized for teachers from time to time to teach on the importance of improvisation.
- School administrators should solicit the support of parents to assist to procure improvised materials or materials meant for improvisation. Provide storage facilities for the improvised materials in order to maximize usage within their life span.
- Government, philanthropists and the Parent Teacher Association (P.T.A) should contribute financially generously to the promotion of improvisation in secondary schools.
- Improvisation should be encouraged and should involve the learner actively since the rule of retention states that people retain more of what they hear, see and do. Hence, students should be engaged in the collection, assembling and fixing of some basic and non-injurious items for improvisation. This will relate the abstracts concept, theories, laws of biology to the real life situations.
- The interest of the learner is captured and held during the process of improvisation and so will cause them to be able to create and improve on their own ideas, so, improvisation of instructional materials should be done as often as possible.

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LOCUS OF CONTROL AS DETERMINANT OF MATHEMATICS LEARNING OUTCOME OF POLYTECHNIC STUDENTS IN SOUTHWEST, NIGERIA

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Abstract

In the past, students' success in Mathematics has been considered a major responsibility of teachers with little or no emphasis on students' personal interest and commitment to hard work in the pursuit of academic success particularly tertiary institutions. Thus, this paper focuses on the influence of locus of control on Mathematics learning outcome of Polytechnic Students in Southwest, Nigeria. This study adopted a descriptive design of the survey type with the study sample of 1500 students, consisting of National Diploma 1(ND1) Mathematics and Mathematics related students in the Faculty of Science selected from five Polytechnics in South-west, Nigeria. The participating students were tested using Mathematics Performance Test (MPT). Also the Students' Locus of Control Questionnaire (SLCQ) and Students Attitudinal Questionnaire towards Mathematics (SAQTM) were administered thereafter on the students in the selected schools used for the study. Their responses were collated, marked and recorded. The data collected from the MPT, SQLV and SAQTM were used for analysis. Inferential statistics of ANOVA was used to test the hypotheses at 0.05 level of significance. The study found that locus of control is an inherent determinant of students' academic performance, proving to coordinate and direct students' attiude towards hardwork and better performance in Mathematics. It is therefore recommended that students should be encouraged to strive for better performance through personal effort and commitment to hard work in order to improve their knowledge in Mathematics and apply what they learn toward positive outcomes for the future. To achieve this, students must realize that hard work is key to success and one's attitude determines one's success since it is found positive and significantly related.

Introduction

Mathematics is one of the core subjects that one must creditably pass at secondary school level before gaining admission into tertiary institution for further study in any field of learning. Thus, Vitasaria, Herawanb, Wahab, Othmand and Sinnaduraie (2010) view Mathematics as an integral part of life and that anyone who is a participating member of society must know basic Mathematics. Students' learning outcome in terms of attitude and achievement in Mathematics however, appears to be determined by the determination they have to control all the activities involved in Mathematics education. Locus of control which is the extent to which students can control the activities in Mathematics goes a long way in determining their achievement and building of their self-confidence. By observation, it seems students' self determination to take responsibility for the outcome of their learning has a far reaching influence on both their performance in and attitude to school subject like Mathematics. In enssence, Grantz, (2006) opined that one factor that determines being successful in school and that contributes to students'

learning outcome which has been overlooked is locus of control. A locus of control according to Sabiha and Indranee (2017) refers to the extent to which a person believes they can influence or control events in their lives and also describes what a person believes about the causes of events in their life. Also Igbeneghua and Popoola, (2011) view locus of control as a personality variable which refers to individual's perception of the main causes of events in life. The authors concluded that it is a personality trait measured in terms of an internal or external locus. Thus, locus of control can be viewed as the generalized expectation regarding where control over events resides in an individual. Locus of control according to Rotter cited in Sabiha and Indranee (2017) can manifest intrinsically (internal) or extrinsically (external).

Locus of control concept has been gaining importance in diverse disciplines in modern world starting from education, sports, organizations, religion etc. Some studies linking LOC with health have noted that internal health locus of control is linked with increased exercise, breast self-examination, weight control, non-alcoholism, smoking cessation and preventative health behaviors but they also cite several studies that have found only a weak or no relationship. For instance, Maltby, Day and Macaskill cited by Lather, Jain, and Shukla (2014) cited studies which continue linking internal locus of control with improved physical health, mental health and quality of life in people undergoing conditions as diverse as HIV, migraines, diabetes, kidney disease and epilepsy. Apart from this, locus of control has been cited to play an important role in religious orientation. Earlier Whyte correlated locus of control with academic success of students enrolled in higher education courses (Lather, Jain, and Shukla, 2014).

Learning outcome can be regarded as a platform where researcher differentiates between students academic achievement and attitude. Sabiha and Indranee (2017) viewed academic achievement as significant factor to gauge a student's performance in an educational setting. The authors further stressed that the prediction of academic achievement is germane to scientific and applicability aspect and that achievement of high grades in examinations constitutes one of the significant determinants of acceptability and popularity in the classroom. Locus of control which refers to the extent to which individuals believe that they can control events that affect them has been found to be a crucial factor in determining students' attitude towards and their performance in Mathematics. According to Opara, Magnus-Arewa and Nwaukwu (2017), attitude towards Mathematics plays a crucial role in the teaching and learning processes of Mathematics and affects students' achievement in Mathematics. Whereas, students' attitudes towards Mathematics which affect their performance seems be a function either internal or external locus of control.

Researches have shown link between locus of control and learning outcome in both science and social science related discipline such as Engineering and Economics. Akinsola (2008) for instance, found in his study, a correlation between locus of control and problem solving ability/performance of learners in Mathematics. Also, Lather, Jain and Shukla (2014) found in their studies that highly creative students are significantly higher on internal locus of control and the students who were low on creativity are significantly higher on external locus of control. With respect to attitude, Gulveren, (2008) states that the individuals, who have the internal locus of control think that they have a big role on affecting the events which influence their lives; they assess themselves as possessing the power for the attitude they want to display by having the positive ego

concept and they believe they can direct their lives in whatever way they desire. Thus, Atibuni, Ssenyonga, Olema and Kemeza (2017) found that locus of control significantly predicted academic attitudes among secondary school science teacher trainees at a public university in Uganda. From the foregoing, it is expected that student with high locus of control would most likely develop positive attitude towards serious academic work and perform better in Mathematics activities. It is against this backdrop that this paper focuses on locus of control as determinant of Mathematics learning outcome of polytechnic students' in southwest, Nigeria.

Research Hypotheses

The following resaearch hypotheses were tested for the study.

1. Locus of control will not significantly influence students' attitude towards Mathematics.
2. Locus of control will not significantly influence students' performance in Mathematics.

Methodology

This study adopted a descriptive design of the survey type with the study sample of 1500 students, consisting of National Diploma 1(ND1) Mathematics and Mathematics related students in the Faculty of Science selected from five Polytechnics in South-west, Nigeria. These principal instruments were used for the study: Mathematics Performance Test (MPT), Students Locus of Control Questionnaire (SLCQ) and Students' Attitudinal Questionnaire Towards Mathematics (SAQTM). The research instruments were validated using face, content and construct validities which were ensured by two experts in the field of Mathematics education in the Faculty of Education, Ekiti State University, Ado-Ekiti (EKSU) and two other lecturers in the Polytechnic who are currently teaching Mathematics. The reliability of MPT, SLCQ and SAQTM, were determined by using test re-test method of testing reliability. Each was administered on 25 students outside the sampled coverage. The reliability coefficients were 0.91, 0.89 and 0.90 respectively and considered relatively high enough to be used for the study. The survey were conducted by personal visit to all polytechnics involved in the research seeking the permission of the Heads of Departments (HODs) to use their students. This was done on one day arrangement for each school selected. The participating students were tested using Mathematics Performance Test (MPT). Also the Students Locus of Control Questionnaire (SLCQ) and Students Attitudinal Questionnaire towards Mathematics (SAQTM) were administered thereafter on the students in the selected schools used for the study. Their responses were collated, marked and recorded. The data collected from the MPT, SQLV and SAQTM were used for analysis. Inferential statistics of ANOVA was used to test the hypothees at 0.05 level of significance.

Results

Hypothesis 1: Locus of control will not significantly influence students' attitude towards Mathematics.

Table 1: ANOVA of the Influence of Locus of Control on Students' Attitude towards Mathematics

	Sum of Squares	**Df**	**Mean Square**	**F**	**p.**
Between Groups	1002.531	11	91.139		
Within Groups	75753.957	1488	50.910	1.790	.051
Total	76756.487	1499			

***p=0.05**

Table 1 reveals that locus of control had significant influence on students' attitude towards Mathematics (F=1.790, p=0.05). The null hypothesis is rejected. This implies that students with high locus of control will significantly have positive attitude towards Mathematics.

Hypothesis 2: Locus of control will not significantly influence students' performance in Mathematics.

Table 2: ANOVA Analysis of the Influence of Locus of Control on Students' Performance in Mathematics

	Sum of Squares	**df**	**Mean Square**	**F**	**P.**
Between Groups	5668.848	11	515.350	1.792	.050
Within Groups	427858.022	1488	287.539		
Total	433526.869	1499			

***p<0.05**

Table 2 depicts that locus of control significantly influenced students' performance in Mathematics (F=1.792, p=0.05). The null hypothesis is rejected. This implies that students with high locus of control will significantly secure better performance in Mathematics.

Discusion

The findings from the study revealed that locus of control will significantly influence students' attitude towards Mathematics. This implies that locus of control contributes to positive attitude of students towards Mathematics. In agreement with this findings, Gulveren, (2008) states that the individuals, who have the internal locus of control think that they have a big role on affecting the events which influence their lives; they assess themselves as possessing the power for the attitude they want to display by having the positive ego concept and they believe they can direct their lives in whatever way they desire.

It was also discovered from the study that locus of control significantly has influence on students' performance in Mathematics. This implies that students self determination to take responsibility for the outcome of their learning has a far reaching influence on their performance in Mathematics. In consonance with the outcome of this study, Grantz, (2006) asserts that one factor that determines being successful in school and that contributes to academic achievement which has been overlooked is locus of control. Thus, confirming the study of Akinsola, (2008) who in a study found correlation between locus of control and problem solving ability/performance of learners in Mathematics.

Conclusion and Recommendations

Based on the findings from the study, it can be concluded that locus of control is one of the inherent determinant of students' academic performance, proving to coordinate and direct students' attiude towards hardwork and better performance in Mathematics. It is therefore recommended that:

1. Students should be encouraged to strive for better performance through personal effort and commitment to hard work in order to improve their knowledge in Mathematics and apply what they learn toward positive outcomes for the future. To achieve this, students must realize that hard work is key to success and one's attitude determines one's success since it is found positive and significantly related.
2. Since locus of control is found postive and significantly connected with students' performance and attitude towards Mathematics, teachers and counsellors should assist the students in

developing their locus of control in order to improve their academic performance and to minimize the level of failure in both terminal and public examination.

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EFFECTS OF EXPERIENTIAL AND ACTION LEARNING STRATEGIES ON SENOR SECONDARY SCHOOL STUDENTS' LEARNING OUTCOMES IN MATHEMATICS IN OSUN STATE, NIGERIA

Prof. Popoola Abiodun A. and BELLO Lasisi A.

Abstract

Mathematics classroom becomes more meaningful and appealing to students' interest when teaching learning procesas help participants to study their own actions and experience in order to perform well in Mathematics. In this awareness, this paper research into the effects of experiential and action learning strategies on senor secondary school students' learning outcomes in mathematics in osun state, Nigeria. This study employed a quasi-experimental of pre-test, post-test, control group design, using 3x2x2 non randomized factorial design. The sample for the study was 300 Senior Secondary School II (SSSII) students selected from six high schools in Osun State using multistage sampling procedure. The experimental procedure was carried out in three stages namely: the pre-treatment stage (one week), the treatment stage (four weeks) and post-treatment stage (one week). Six weeks altogether was used for the whole study. The data collected for the study were subjected to descriptive statisitcs using mean and standard deviation as well as inferential statistics of Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA).Multiple Classification Analysis (MCA) was also used to locate where the difference had occurred. The study found that the use of experiential and action learning strategies enhanced better academic performance of secondary school students in Mathematics than the conventional method. Both experiential and action learning strategies are potent drive for positive attitude towards Mathematics. However, students exposed to experiential learning reported slightly high level of academic performance while those exposed to action learning had slightly highest adjusted mean scores on attitude towards Mathematics. Hence, it was recommened that the potential of experiential and action learning strategies should be maximaize in the teaching of Mathematics to enhance better achievement of students in Mathematics.

Introduction

Mathematics, because of its widest and essential applications in day to day actvities of individuals, governmental and non-governmental organisations has occupied a central stage in the global research and education curriculum. In Nigeria education curriculum and policy, the role of Mathematics as one of the core subjects in secondary school which any student seeking admission into tertiary institution must passed, cannot be over-emphasis. Mathematics formed the bedrock of information communication and technology which today bring the world to the view of common man, setting no barrier to cultural and geographical diversity. Therefore, it is critical to note according to Popoola, (2014) who described Mathematics as a science of numbers and shapes, that no nation can hope to achieve any measure of scientific and technological advancement without proper foundation in the school Mathematics. She further reiterated that Mathematics is the basis for scientific theories and experiment used in everyday life to solve personal and societal problems.

Despite the value and usefulness of Mathematics to the individual, society and

the government alike, the performance of students in senior secondary school in Nigeria has remained an issue of concern to all stake holders (Salman, Mohammed, Ogunlade and Ayinla, 2012). Rachna, (2010) and Popoola,(2014) at different times saw Mathematics as important and therefore occupied a central position since the ancient period, yet, students do not find Mathematics interesting; they reiterated that the gaps are found between aspiration and achievement. They also added that Mathematics is perceived as highly abstract which is concerned with ideas rather than objects; with the manipulation of symbols rather than the manipulation of object.

The sources of problem associated with poor performance in Mathematics as identified by researchers such as Popoola and Akinsola (2004), Popoola (2009) and Kolawole (2010) in different studies included the use of Lecture method. They describe lecture method as being monotonous and teacher centred. Lecture Method of teaching is the oldest teaching method applied in educational institution this claimed that it has been in existing since middle age. The teaching method is one way channel of communication of information. Students' involvement in this teaching method is just to listen and sometimes pen down some note if necessary during the lecture, combine the information and organize it. One of the problems in this method is to grab the attention of students in the classroom. This method, though is an old method of teaching, it has the advantage of teaching large number of students which requires no instructional material.

From the researcher's experience as a teacher of Mathematics, the content of Mathematics curriculum indicates that innovation is required in the teaching process to promote efficient learning. There is the need for the use of teaching strategies that will not only provide meaningful understanding of concepts in Mathematics but also provide students the opportunity to play active role in teaching and learning process. Thus this paper is set to examine the effects of experiential and action learning strategies on students' learning outcome in Mathematics in Osun State, Nigeria.

Research Hypotheses

The following research hypotheses were postulated for the study:

1 There is no significant difference in the performance mean scores of students in the experimental and control groups before treatment.
2 There is no significant difference in the attitudinal mean scores of students in experimental and control groups before treatment.
3 There is no significant difference in the performance mean scores of students in the experimental and control groups after treatment.
4 There is no significant difference in the attitudinal mean scores of students in the experimental and control groups after treatment.

Literature Review

1. Experiential Learning Strategies and Students Learning Outcome in Mathematics

According to Association for Experiential Education (2011), experiential learning (EL) is a philosophy and methodology in which educators purposefully engage with students in direct experience and focused reflection in order to increase knowledge, develop skills, and clarify values. By implication, it involves the process through which students develop knowledge, skill and value from direct experience outside a traditional academic setting.

Experiential Learning encompasses of varieties of activities including internships, service learning, undergraduate research, study abroad and other creative and professional work experience. Well planned supervised and assessed Experiential Learning programs could stimulate academic

inquiry by promoting interdisciplinary learning, civic engagement, career development, cultural awareness, leadership and other professional and intellectual skills. In the word of Ebonyi (2013) experiential learning is characterized by students' active participation in the learning process such that learning becomes interactive, participatory, cooperative and collaborative. Such classroom provides opportunities for students to discover and gain firsthand knowledge through observation and experimentation rather than learning or reading about other people experience.

The focus of Experiential Learning is placed on the process of learning and not the product of learning. Proponents of Experiential Learning assert that students are more motivated to learn when they have a personal stake in the teaching process rather than being assigned to review a topic or read a text book chapter. Experiential Learning teaches students the competencies they need for real- world success. It is the desire of the public that education teaches students the competencies they need for real-world success. Experiential Learning creates an invaluable opportunity to prepare students for profession or carrier. Thus Sullivan and Rosin (2008) argue that the mission for higher education is to bridge the gap between theory and practice. Bass (2012) therefore suggests that the educational environment need to intentionally create rich connection between the formal and experiential curriculum.

Experiential learning provides the conclusion for optimally supporting student's learning. It is when students are engaged in learning experiences that they see its relevance they have increase motivation to learn. Students are also motivated when they are provided opportunities for practice and feedback. Therefore, experiential learning approach integrates academic content and peer partnership (Goldberg, 2007) which is designed to increase students' understanding of the concepts and ideas in a particular subject (Goldberg &Coufal, 2009).

2. Action Learning Strategy and students' learning outcome in Mathematics

Action learning is a method and strategy that is very useful and student oriented method of instruction. Mumford (1996) described Action Learning as a dynamic process that involves a small group of people solving real problems, while at the same time focusing on what they are learning and how their learning can benefit each group members, the group itself and the organization as a whole. Afolabi (2010) described action learning as an educational process whereby participants study their own actions and experience in order to perform well in Mathematics. This is done in conjunction with others in small groups called action learning set. The foregoing projects that, action learning is based on the idea that learning is a naturally social act in which the participants talk and manipulate objects among themselves. It is through the talk and hands-on that learning occurs.

Research Methodology

This study employed a quasi-experimental of pre-test, post-test, control group design, using 3x2x2 non randomized factorial design. The sample for the study was 300 Senior Secondary School II (SSSII) students selected from six high schools in Osun State using multistagesampling procedure. Two instruments titled 'Mathematics Performance Test (MPT)' and 'Students' Attitudinal Questionnaire towards Mathematics (SAQTM)' were used for the study.Mathematics Performance Test (MPT) constituted the pre-test and post-test instruments for the students which consisted of two sections. Section A was use to retrievebio-data information of the respondents such as name of school, class, sex, age and school location. Section B consisted of a multiple choice question drawn from topics in the curriculum of SSII as at the time of experiment. The topics

from which the questions were drawn are: Number and Numeration, Geometry, and Set theory. The second instrument 'Students' Attitudinal Questionnaire towards Mathematics (SAQTM)' also consisted of two section A and B. Section A elicited demographic information of the respondent such as; name of school, sex, age, and local government area, while section B was 25 attitudinal item worded in a 4-point Likert type rating scale ranging from Strongly Agree (SA) =4, Agree (A) =3, Disagree (D) =2 and Strongly Disagree (SD) =1. Face and content validity of the instrumentswas ensure with the help of the researcher's supervisor, expert in Tests and Measurement as well as two experienced Mathematics educators in the Department of Science Education, Ekiti State University. The reliability of MAT and SAQTM was determined through test retest method of testing reliability. Reliability coefficients of 0.92 and 0.90 for MAT and SAQTM were obtained respectively. The experimental procedure was carried out in three stages namely: the pre-treatment stage (one week), the treatment stage (four weeks) and post-treatment stage (one week). Six weeks altogether was used for the whole study. The data collected for the study were subjected to descriptive statisitcs using mean and standard deviation as well as inferential statistics of Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA).Multiple Classification Analysis (MCA) was also used to locate where the difference had occurred.

Results

Hypothesis 1: There is no significant difference in the performance mean scores of students in the experimental and control groups before treatment.

Table 1: ANOVA of Students' Performance in Mathematics Scores before Treatment

Source	SS	df	MS	F	P
Between Groups	177.552	2	88.776	2.462	0.087
Within Groups	10997.578	305	36.058		
Total	**11175.130**	**307**			

p>0.05

The result in table 1 showed that $F_{2,305}$ =2.462. P>0.05.There is no significant difference in the performance mean scores of students in experimental and control groups before treatment; hence the null hypothesis was not rejected. This shows the homogeneity of performance of the three groups at the beginning of the study.

Hypothesis 2: There is no significant difference in the attitudinal mean scores of students in the experimental and control groups before treatment.

Table 2: ANOVA of Students' Attitudes' Towards Mathematics before Treatment

Source	SS	df	MS	F	P
Between Groups	261.324	2	130.662	1.353	0.260
Within Groups	29444.896	305	96.541		
Total	**29706.221**	**307**			

p>0.05

The result in table 2 showed that F(1.353) > P value at 0.05level of significance. Therefore the null hypothesis was not rejected. Hence there is no significant difference in the attitudinal scores of students in experimental and control groups before treatment. This shows the homogeneity of the attitude of the three groups at the beginning of the study.

Hypothesis 3: There is no significant difference in the performance mean scores of students in the experimental and control groups after treatment.

Table 3: ANCOVA of Students' Performance in Mathematics in Experimental and Control groups after treatment

Source	SS	df	MS	F	P
Corrected Model	9985.918a	3	3328.639	82.101	.000
Covariate (Pretest)	895.417	1	895.417	22.086	.000
Group	9568.477	2	4784.239	118.004*	.000
Error	12325.079	304	40.543		
Total	673947.000	308			
Corrected Total	**22310.997**	**307**			

***p<0.05**

Table 3 show that there is significant difference in the performance scores of students in the experimental and control groups after treatment ($F_{2,304}$=118.004> p,p< 0.05). The null hypothesis was rejected.

In order to locate the sources of pairwise significant difference among the groups, Scheffe Posthoc test was carried out. The result is presented in table 4.

Table 4: Scheffe Posthoc Analysis of Students' Performance in MathematicsafterTreatment

Learning Strategies	1	2	3	N	Mean
Experiential Learning (1)			*	101	50.50
Action Learning (2)			*	103	49.22
Control (3)				104	38.42

Table 4 showed that there was significant difference between the performance of students exposed to Experiential Learning and control groups at 0.05 level of significance. Similarly, the mean difference between Action Learning and control group is statistically significant at 0.05 level. However, there was no significant difference in the performance mean scores of students exposed to experiential learning strategy and those taught using Action leaning strategies at 0.05 level of significance.

Multiple Classification Analysis (MCA) was used to determine the effectiveness of the treatment (Learning strategies) at enhancing students' achievement in Mathematics. The result is presented in table 5.

Table 5: Multiple Classification Analysis of students' achievement mean score by treatment

Grand Mean = 46.00

Variable + Category	N	Unadjusted Devn'	Eta^2	Adjusted for Independent + Covariate	Beta
Experiential Learning	101	4.50		4.48	.14
Action Learning	103	3.22	.45	3.41	
Control	104	-7.58		-7.58	

MultipleR =0.137, Multiple R^2 =0.019

The result in table 5 showed that, with a grand means of 46.00; students exposed to Experiential Learning strategy had the highest adjusted mean score of 50.48 (46.00+4.48) in Mathematics, closely followed by those in the Action Learning strategy group; 49.41(46.00+3.41) while those in the control had the least adjusted mean score of 38.42 (46.00+(-7.58). It implies that the use of Experiential and Action Learning strategies constitutes effective strategies for enhancing students' achievement in Mathematics. The treatment accounted for about 45% (Eta^2= 0.445) of the observed variance in students' performance in Mathematics is largely due to the effectiveness of the treatment.

Hypothesis 4: There is no significant difference in the attitudinal means scores of students in the experimental and control groups after treatment.

Table 6: ANCOVA of Attitudinal Mean Scores of Students by Treatment

Source	SS	df	MS	F	P
Corrected Model	16312.292	3	5437.431	115.153	.000
Covariate (Pretest)	3830.755	1	3830.755	81.127	.000
Group	11505.129	2	5752.565	121.826*	.000
Error	14354.678	304	47.219		
Total	850137.000	308			
Corrected Total	30666.971	**307**			

***p<0.05 (Significant result)**

Table 6 showed that there was a significant difference in the attitudinal scores of students in the experimental and control groups after treatment ($F_{2,304}$,= 121.826 $p<0.05$). Thus, the null hypothesis is rejected. In order to locate the sources of pairwise significant difference in the attitudinal mean scores among the groups, ScheffePosthoc test was carried out. The result is presented in table 7.

Table 7: ScheffePosthoc Analysis of students' attitudinal mean scores by treatment

Learning Strategies	1	2	3	N	Mean
Experiential Learning (1)			*	101	55.14
Action Learning (2)			*	103	57.03
Control (3)				104	42.73

Table 7 revealed that there was significant difference between the attitudinal mean scores of students exposed to Experiential Learning strategy and control groups at 0.05 level of significance. Similarly, the mean difference between Action Learning and control group is statistically significant at 0.05 level.

Multiple Classification Analysis (MCA) was used to determine the effectiveness of the treatment (Learning strategies) at enhancing students' attitude towards Mathematics. The result is presented in table 8.

Table 8: Multiple Classification Analysis of students' attitude in Experimental and control groups

Grand Mean = 51.58					
Variable + Category	**N**	**Unadjusted Devn'**	**Eta²**	**Adjustedfor Independent + Covariate**	**Beta**
Experiential Learning	101	3.58		3.08	
Action Learning	103	5.45	.53	5.50	.40
Control	104	-8.85		-8.43	
MultipleR =0.396, Multiple R^2 =0.157					

The result in table 8 showed that with grand mean of 51.58; students exposed to Action Learning strategy had the highest adjusted mean score of 57.08 (51.58+5.50) on attitude towards Mathematics, closely followed by those in the Experiential Learning group; (51.58+3.08) while the students in the control had the least adjusted mean score of 43.15 (51.58+(-8.43). This implies that the use of Experiential and Action Learning strategies had the potency of enhancing students' attitude towards Mathematics. The treatment explained about 53% (Eta^2= 0.53) of the observed variance in students' attitude towards Mathematics is largely due to the treatment.

Discussion

This study examined the effects of experiential and action learning strategies on senior secondary school students' learning outcomes in mathematics in Osun State. The findings of the study showed that performance and attitude of students toward mathematics were improved upon exposure to the treatment. The study showed homogeneity of the performance and attitude before the treatment. There was no significant difference in the pre-test of the performance and attitude scores of the students in experimental and control groups before treatment.

By implication, the background knowledge of students in Mathematics prior to the trearment in each of the three group could be adjudge to be equal. Thus, any significance difference recorded later might not be due to chance other than the treament applied. The researcher however, observed that the reason for the low Mathematics performanceof students prior to their exposure to treatment might not be unconnected with ineffectiveness of traditional approach to teaching of Mathematics in Nigeria schools. This study conforms with the assertion of Eniayeju and Azuka (2010) who noted that over 90% of the teachers that attended the National Mathematical Centre workshops from 2002 to 2010 still use the traditional method of teaching. Thus, the authors lamented that the deteriorating students' performance in the subject clearly demonstrated the failure of the delivery system.

The study also confirmed that, the attitude of students in both experimental and control groups in pre-test were poor and do not differ statistically. Thus, explained unifomity in students attitude to Mathematics before their exposure to experiental and action learning strategies. Consequently, the attitude of students towards Mathematics prior to the trearment in each of the three group could be adjudged to be equal. However, any significance differences observed thereafter might not be due to chance, but a direct implication of the specific treatment applied. The researcher

however, suggest that the reason for the poor attitude of students toward Mathematics mightemanated from a number of factors which include teachers' disposition to students' aspiration and welfare. The result is in agreement with Good, Aronson, & Inzlicht (2007) who found in there studies that previous failures, discouragements from parents who did not perform well in Mathematics, negative attitudes of teachers, or comparison of low performing students with the higher performing students causes students to despair and give up studies in mathematical sciences. The authors thus concluded that mindsets have been discovered to impair or improve students' academic performance in Mathematics.

The study discovered that students in both experiential and action learning groups performed better that those in the control group in their performance scores in Mathematics. This implies that the use of experiential and action learning strategies constitutes effective strategies for enhancing students' achievement in Mathematics. The experimental groups jointly accounted for about 45% improvement in students' achievement in Mathematics. However, an inspection of the mean scores indicated that students exposed to experiential learning reported slightly high level of academic performance. The is in line with Goldberg & Coufal (2009) who asserted that the experiential learning approach integrates academic content and peer partnership which is designed to increase students' understanding of the concepts and ideas in a particular subject.In addition, the result justifies the opinion of Afolabi (2012) who opined that action learning is an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task or create a product.

The study also confirmed that students in both experiential and action learning groups performed better than those in the control group in their attitudinal scores in Mathematics. This implies that the use of experiential and action learning strategies had the potency of enhancing students' attitude towards Mathematics. The experimental groups jointly accounted for about 53% improvement in students' attitude towards Mathematics. Although, students exposed to action learning had slightly highest adjusted mean scores on attitude towards Mathematics. The result comforms with the view of (Hassi & Laurseen, 2009) who found that attitude of students toward the learning of Mathematics and about the nature of mathematical knowledge and skill on their own mathematical capability often determine their level of attendance and learning

Conclusion

Based on the findings of this study, it could be concluded that, the use of experiential and action learning strategies enhanced better academic performance of secondary school students in Mathematics than the conventional method. Both experiential and action learning strategies are potent drive for positive attitude towards Mathematics. However, students exposed to experiential learning reported slightly high level of academic performance while those exposed to action learning had slightly highest adjusted mean scores on attitude towards Mathematics.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The potential of experiential and action learning strategies should be encouraged in Mathematics classroom to enhance

better achievement of students in Mathematics.

2. Teachers should be encourage to maximize the potential of experiential and action learning strategies in order to foster the insterest of students in Mathematics career choice.
3. Mathematics teachers should be given adequate orientation through workshops and seminars to update their knowledge in the use of Experientialand Action Learning Strategies in Mathematics instruction.

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READABILITY OF SCIENCE TEXTBOOKS AND ACADEMIC PERFORMANCE OF MALE AND FEMALE SENIOR SECONDARY SCHOOL STUDENTS IN EKITI STATE

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Abstract

The study investigated the readability of science textbooks and academic performance of male and female Senior Secondary School students in Ekiti State. It was designed to find out how readability of science textbooks could enhance better academic performance of students' in Senior Secondary Schools. The study made use of survey type of descriptive research design. The sample consisted of 600 Senior Secondary School students who were selected from 15 Senior Secondary Schools in five Local Government in Ekiti State. Multistage random sampling technique was used in selecting the schools. One hundred and twenty science students were randomly selected from three schools in each of the local government. Two research instruments were used – Cloze test and students' achievement test. The reliability coefficients of 0.62 for Chemistry, 0.69 for Physics and 0.79 for Biology respectively were obtained with the use of Kuder-Richardson formula KR21. The instruments were administered and data collected were analyzed using Pearson Product Moment Correlation and t-test statistics. The results revealed that readability of science textbooks had significant influence on students' academic performance. The result also revealed that no significant difference was found between the academic performance of male and female students who used the selected science textbooks. The result however revealed a significant difference in the performance of students who used different textbooks i.e. Chemistry, Physics and Biology. Based on the findings of the study, it was recommended that teachers should be guided with readability level of students and content coverage in the selection and recommendation of textbooks. The curriculum planners and evaluation unit of the Ministry of Education should be conversant with the determination of readability level of science textbooks to be used in schools and be so guided in their recommendations. Students using any of the selected science textbooks should intensify efforts at reading them to enhance their academic performance. Government should equip school libraries with readable science textbooks.

Introduction

The Science Teachers Association of Nigeria (STAN), some Universities and State Governments have developed innovative science curricula and also mounted conferences, workshops and seminars aimed at facilitating the teaching and learning of science in Nigeria. In spite of all these laudable efforts, there is empirically-based evidences to show that students have difficulty in reading and mastering the concepts and principles outlined in the National Science Core Curricula prescribed for the Senior Secondary Schools (Aghenta, 1992 cited in Afolabi, 2009)

The researcher observed that the difficulty in the readability of science textbooks contribute substantially to many of the educational problems generally encountered by students and particularly their inability to master some of the contents of science syllabus. Difficulties experienced in reading and understanding of science textbooks by students may also be due to abstractness of some concepts in science.

Reading serves a wide range of purposes in the lives of different categories of people who are literate. Reading is the basis for learning different subjects in schools. Whatever, the aspect of life one is considering, one discovers that the ability to read efficiently enhances individual ability to function in an effective manner (Perekeme, 2012). Readability, according to Ziriki (2009) is defined as reading ease, especially as it results from a writing style. It is also said to be the reading difficulty level of a textbook in relation to the class for which it is meant. The readability level of a book therefore, is one of the factors that determine the understanding of a subject by the students. Readability, according to Frank (2006), can be used as a rough estimate for placing written material in appropriate grade level.

On the students' academic performances in Nigeria, differential scholastic achievement of students in Nigeria has been and is still a source of concern and research interest to educators, government and parents. This is so because of the great importance that education has on the National development of the country. All over the country, there is a consensus of opinion about the fallen standard of education in Nigeria (Adebule, 2004). Parents and government are in total agreement that their huge investment on education is not yielding the desired dividend. Teachers also complain of students' low performance at both internal and external examination. The annual releases of Senior Secondary Certificate Examination results (SSCE) conducted by West African Examination Council (WAEC) justified the problematic nature and generalization of poor secondary school students' performance in different school subjects (Adebule, 2004).

However, not much research has been done on reading of science textbooks as it affects male and female students' performance in senior secondary schools. Ogundele (2003) was of the opinion that research in the areas of readability of science textbook as it affects students' performances is required in secondary schools.

The last two decades have been devoted to addressing gender inequality in education. Some studies (Okebukola, 1993; & Jiboku, 2008) have shown an all – time low participation of women in education. Educators have therefore expended tremendous efforts in the study of the personal factors affecting academic achievement especially in the sciences and social sciences. Notable among these variables is the study of the phenomenon of gender or sex equity in education. A rich harvest of explanation of causes, understanding of cost to the society and possible intervention has brought about several researches, workshops, seminars and training in this area.

Experts in the study of gender such as Hyde (2004) as well as Hyde & Mezulis (2001), believed that the cognitive differences between females and males have been exaggerated. For example, Hyde (2004) pointed out that there is considerable overlap in the distribution of females and males scores on math and visuospatial tasks. In a personal study by the U.S. Department of Education (2000), boys did slightly better than girls at mathematics and science. Overall, though, girls were far superior students, earning better grades and were significantly better than boys in reading. In another national study, females had higher reading achievement and better writing skills than male with the gap widening as students progressed through school. Females are more likely than male to be assigned to special/remedial education classes – females are more likely to be engaged with academic materials, be attentive in class, put forth more academic effort, and participate more in class than boys (Dezolt & Hull, 2001).

From the above background information, it was considered necessary to embark on a research that will investigate the readability of science textbooks and academic performance of male and female senior secondary school students.

Statement of the Problem

Educators over the years are concerned about the need to improve students' academic performance generally and particularly in science subjects. A lot of researches have been carried out on inadequate science facilities, poor methods of teaching and poor students' motivation as factors affecting their academic performance. Little attention has been paid to the issue of the science textbooks as they influence the academic performance of male and female students in science. This study will establish a relationship between readability of science text books and academic performance of male and female students and shall also examine the question on either gender would have effects on the readability of science textbooks or not.

Purpose of the Study

The study investigated the readability of science textbooks and academic performance of male and female in Senior Secondary Schools. The study therefore, was specifically designed to find out the mean performance of students using the selected science textbooks in the schools of study. The study also compared the performance of the students using the selected science textbooks in each of the science subjects in the various schools.

Research Question: Is there any difference between male and female students' academic performance in the selected science textbooks.

Research Hypothesis One: There is no significant difference between the academic performance of male and female students who use the selected science textbooks.

Research Hypothesis Two: There is no significant relationship between readability of science textbooks and academic performance of secondary school students.

Significance of the Study

The study would serve as a reliable assessment on which the senior secondary school science curriculum improvement could be made in the areas of objectives, content, learners' activities and evaluation.

It is also hoped that the findings of this study would pose challenges to authors and publishers on the need to re-assess their publications and make readable texts available to students in their subsequent editions.

It would serve as a guide to the curriculum planners and the Ministry of Education in the recommendation and selection of appropriate science textbooks for the use of senior secondary school students.

Finally, the findings of the study would serve as a diagnostic measure to the Science Teachers' Association of Nigeria (STAN) in selecting readable science textbooks that would meet the needs of students and boost their performance in science subjects.

Research Design

The design was a descriptive research design of the survey type. This design was used because of the largeness of the population. The researcher chose the sample to be representative of the entire population. The researcher described the situation and occurrences just as it occurred in the population. The variables were found in their natural phenomena.

Population

The population consisted of all Senior Secondary School three students in Ekiti State. This includes schools that have been graduating students for at least five years. The three basic natural science subjects are offered in the schools. The schools used are those schools that are using the selected textbooks for the science subjects chosen.

Sample and Sampling Techniques

The sample of this study consisted of 600 Senior Secondary Class three students selected from 15 selected senior secondary schools in Ekiti State. One hundred and twenty students each were selected from five local government areas. All the questionnaire given to the respondents were returned.

Multistage random sampling technique was used in this research. The first stage was to select the three senatorial district in Ekiti State, the second stage, five local government areas were selected in each senatorial districts. While one school was selected from each local government area. Stratified random sampling technique was used to select students based on class, sex, age and subject. Stratification was based on science subjects – i.e. Physics, Chemistry and Biology, the researcher went to the selected schools and asked the science teachers to name the science textbooks they were using. Two science textbooks were selected for each subject based on the most commonly use in schools.

Research Instruments

Two instruments were used for the study. These are: Cloze tests and Achievement Test which were used to determine the readability level of the students. The Cloze Tests were made for Biology, Chemistry and Physics. Achievement Test was also made for Physics, Chemistry and Biology. These were tagged Biology Achievement Test (BAT), Chemistry Achievement Test (CAT) and Physics Achievement Test (PAT) respectively. The reliability coefficients of 0.62 for Chemistry, 0.69 for Physics and 0.79 for Biology respectively were obtained with the use of Kuder-Richardson formula KR21

Results and Discussion

Question 1: Would gender have effect on the readability of science textbooks?

To answer this question, the mean scores of male and female students in the selected science subjects were computed. The result is shown in Table 1.

Table 1: Descriptive analysis showing the mean scores in academic performance of male and female students using the selected science textbooks.

Science subject	**Male**			**Female**		
	N	mean	S.D	N	mean	S.D
Physics	96	16.56	7.21	85	15.12	7.65
Chemistry	130	11.65	5.65	74	11.65	6.17
Biology	127	13.08	6.77	88	13.25	6.77

Table 1 shows that the mean scores of male students in physics, chemistry and biology are 16.56, 11.65 and 13.08 respectively while that of female in physics, chemistry and biology 15.12, 11.65 and 13.25 respectively. The mean score of both male and female students are very close. This implies that gender would not have any significant influence on performance of students in science subjects.

The bar chart representation of this mean score of male and female in the selected science textbooks is shown in Figure 1

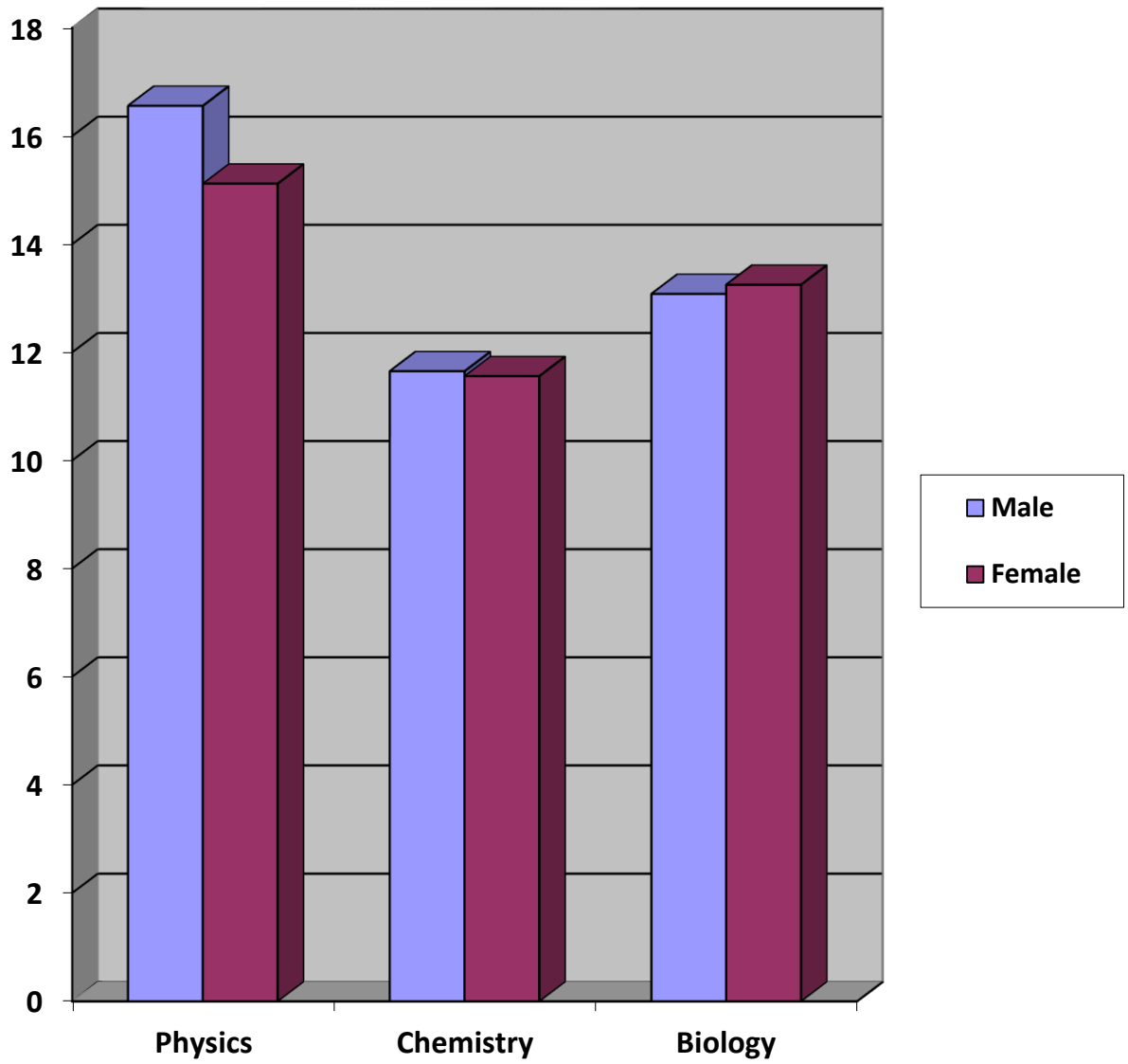

Fig.1 Bar chart showing the means scores of male and female students using the selected science textbooks.

Hypothesis 1

H_{01}: There is no significant difference between the academic performance of male and female students who use the selected science textbooks.

To test the hypothesis, the mean scores of male and female students academic performance in science subjects were compared using t –test statistics at 0.05 level of significance. The result is presented in Table 2.

Table 2: t-test Comparison of the Influence of Gender on Students Academic Performance in Science Subjects.

Group	N	Mean	S.D	*df*	$t_{cal.}$	$t_{tab.}$
Male	353	13.50	6.79			
Female	247	13.41	7.01	598	0.160	1.960

P > 0.05

The null hypothesis is accepted (t_{cal} = 0.160, P > 0.05). Therefore, there is no significant difference between the performance of male and female students who used the selected science textbooks.

To test the influence of gender on the performance of students in each of the selected science subjects, t-test statistics was also applied. The result is presented in Table 3. This is further explanation of Table 2.

Research Hypothesis Two: There is no significant relationship between readability of science textbooks and academic performance of secondary school students.

Table 3: t-test Summary of the Influence of Readability on Gender Performance of Students in Selected Science Subjects

Science Subject	Group	N	Mean	S.D	*df*	$t_{cal.}$	$t_{tab.}$
Chemistry	**Male**	130	11.65	5.65	202	0.627	1.960
	Female	74	11.65	6.17			
Biology	**Male**	127	13.08	6.77	213	0.183	1.960
	Female	88	13.25	6.77			
Physics	**Male**	96	16.56	7.21	179	1.327	1.960
	Female	85	15.12	7.65			

P > 0.05

The influence of gender on the performance of students in each of the selected science subjects is not statistically significant at 0.05 level of significance i.e. Chemistry ($t\text{-}_{cal}$ = 0.627, p>0.05), Biology (t -cal = 0.183, p>0.05) and Physics (t-cal = 1.327, p>0.05). It implies that gender will not significantly influence the performance of students in science subjects.

Discussion

The result of the descriptive analysis showed that all the selected science textbooks were appropriate for the use of class of students meant for. The textbooks were at readability levels of the students.

The result also revealed that, there was no significant difference between the performance of male and female students who used the selected science textbooks. This finding agreed with the view of Ayodele (2009) and Fatoba (2014) who found no gender differences with respect to students performance in science. This was at variance with many researches that found significant difference between the male and female performance in science Inyang and Hannal (2000); Omoniyi (2003) and Lietz (2006) who found that boys in Secondary Schools surpass their female counterparts in Science and Mathematics

Conclusion and Recommendations

This study examined influence of the readability of some selected science textbooks on academic performance of male and female senior secondary school students in Ekiti State.It is concluded that the level of understanding and academic performance of male and female senior secondary schools determined to a large extent by the readability of science textbooks in use .No gender difference in the performance of secondary school students.

Based on the findings, the following recommendations are made:

1. Teachers should be guided with readability level of the students and content coverage in the selection and

recommendation of science textbooks for student use.

2. Students using any of the selected science textbooks should intensify efforts at reading them to enhance their academic performance.
3. Government should make it a point of duty to equip every school library with appropriate science textbooks that are at the readability level of the s

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