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ARTICLES

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Assessment of the level of preparedness of independent national electoral commission towards inclusion of voters with disabilities in 2019 election in Nigeria

Adeniyi, S.O.
Department of Educational Foundations
University of Lagos, Akoka

Kuku, O.O.
Department of Educational Psychology
Federal College of Education (Technical) Akoka
Yaba

Abstract
Election is one of the fora for selecting leaders into various positions of authority, which demands collective representation and participation in governance by every member of a community, state or nation. Hence, it is a right for all with reference to certain criteria as obtainable in communities across the globe. However, some people may have been denied this right because of race, position and differences in physical mental, emotional, sensory and psychological attributes considered to be at variance to the extant laws. Consequently, this study investigated the level of preparedness of the Independent Electoral Commission towards inclusion of voters with disabilities in 2019 general election in Nigeria. The study employed ex-post-facto research design. A sample of 1001 adhoc officers trained for the election was selected from different training zones. Disabilities Voting Inclusive Scale with reliability of 0.75 was used to collect data. The data collected was analysed using descriptive statistic such as percentage and bar chart. The results revealed that physically challenged and albinos were fairly included while individuals with visual and hearing impairment were grossly at disadvantage. It was recommended that the Nigerian electoral body should involve the services of experts in the area of Special Needs while preparing for election. This will ensure that the needs and interest of people with disabilities are adequately taken into consideration during election.

Keywords: *General election. Inclusion. Independent National Electoral Commission. Voters with disabilities.*

Introduction
The universal adults' suffrage dictates that section of adults can vote and be voted for. However, as political awareness becomes more sophisticated, expansion in the opportunity to vote and be voted began to assume new dimension with a more inclusive political participation. Political alienation across economic power, race, gender and differences in term of physical, intellectual, emotional and psychological diversities begins to disappear given room for more participation of citizens with reference to age in many countries of the world.

Globally over one billion people live with one form of disability or the other and majority of whom live in low and middle-income countries like Sub-Saharan African (Virendrakumar, Jolley, Badu & Schmidt, 2018). The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) describes persons with disabilities

as those who have long-term physical, mental, intellectual, psychological and or sensory impairments, which interact with various barriers that hinder their effective participation in society on the same basis with others (International Foundation for Electoral System, 2014; United Nation, 2011). The *2011 World Report on Disability* reported that although people with disabilities have the same needs as non-disabled people, they often experience limited access to services including health, education, participation in politics and economic opportunities (World Health Organization, 2011).

Political participation is a fundamental aspect of democratic governance, the rule of law, social inclusion and human rights approaches aimed at eliminating marginalisation and discrimination (United Nations, 2011). Political participation can then be the actions of citizens to seek participation in the process of electing qualify and quality leadership to represent them in business of governance (Inclusion International, 2015). The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) has taken step towards transforming people with disabilities from state of passivity to fully empowered citizens who enjoy equal rights and protections under national and supranational laws (National Democratic Institute for International Affairs, 2013). Article 29 of the treaty focuses on participation in political and public life. It calls on States to ensure that persons with disabilities can effectively and fully participate in political and public life on an equal basis with others, directly or through freely chosen representatives, including the right and opportunity for persons with disabilities to vote and be elected (United Nations, 2007). With this proclamation, the principles of democracy which believe in inclusiveness and participation should have made person with disability politically viable in process of electing leaders through political education.

Political education is very important as election will not be successful if citizens are not enlightened. The education brings to bear what should be expected from every leader's manifesto through individual and or party, what to be expected at the election venue, registration, voting and its process amongst others. This cuts across physical intellectual, sensory, emotional and racial divide. The various relevant International and Regional instruments to which Nigeria is a signatory to including the United Nations Convention on the Rights of Persons with Disabilities (CRPD) means that the country is legally obliged to set up standards for the full and equal participation of Persons with Disabilities (PWDs) in the electioneering process.

Nigeria's electoral management body, the Independent National Electoral Commission (INEC), in a bid to embrace these principles and values has introduced several reforms to the electoral process that take care of people with Special Needs. This is crucial because Nigeria is estimated to have 25 million people with disabilities. According to Centre for Citizens with Disabilities 3,253,169 Nigerians are suffering from one form of disability or the other; 1,708,751 males and 1,544,418 females suffer impairment of sight, speech, hearing, mobility and brain (Nigeria Civil Society Situation Room, 2019). All-inclusive electioneering process is about intimating all major stakeholders on the process of including people with special needs in voting processes before, during and after election.

Voting is one of the ways that members of political community exercise their franchise to bear their voices. However, participation in electoral processes is more

than just voting, it includes the ability to take part in the conduct of public affairs, the opportunity to register as a candidate, to campaign, to be elected and to hold office at all levels of government, political education and campaign and that are involved in selecting leaders in to various elective offices (Inclusion International, 2015). Nigeria had recently introduced legislation to strengthen the participation of youth, PWDs and IDPs (The Commonwealth, 2019). This is the latest development of all-inclusive election.

The Government of Nigeria in January 2019 signed into law the Discrimination against Persons with Disabilities (Prohibition) Act 2018 to ensure the full integration of PWDs into society, establishing the National Commission for People with Disabilities and giving the Commission responsibility for their social, economic and civil rights. Fifteen per cent of Nigeria's population are PWD. Towards the preparation for the 2019 elections, several policy and legislative provisions were implemented to enable full participation of PWDs in the electoral process. Section 14 of Nigeria's 2010 Electoral Act makes provisions for special measures for PWDs. Notably, 2019 was the first time that the visually impaired were afforded the opportunity to vote independently using a braille ballot jacket. As referenced, provisions were made for magnifying glasses, sign language translation and a priority queue for PWDs. All adhoc members of staff were expected to be given a checklist that focused on identifying and assisting PWDs.

There is provision for training of all INEC and Adhoc members of staff on how to handle sensitive equipment pertaining to people with disabilities. The training manual included section on how to effectively deal with people with disabilities during electoral process which include comportment before, during and after election and how to vote. With these, Nigeria electoral process was positioned at all-inclusiveness. Consequent upon these, it is the expedient to assess the level of inclusiveness of people with disabilities in 2009 election in Nigeria. Hence, this study seeks to assess the preparedness of Independent Electoral Commission towards voters with disability in 2019 general election in Nigeria.

Research Questions

These questions were answered in the course of the study.

1. What are the preparations towards accommodating physically challenged persons in the 2019 electoral process?
2. How were the hearing-impaired persons considered in the 2019 electoral process?
3. To what extent were the visually impaired accommodated in the electioneering process?
4. What are the measures taken to include the albinos in the 2019 electoral process?

Methodology

This study employed ex-post-facto research design. This design is appropriate because variables in focus already received treatment before investigation which allows for assessment. The population comprised all INEC and Adhoc officers during

the 2019 election in Lagos State. These officers partook in the training that was organised by INEC in preparation for the 2019 general election. Simple random sampling was employed to select an intact class across the training venues in the Local Governments. This led to a sample of one thousand and one (1001) INEC Adhoc members of Staff.

The instrument for data collection was Disabilities Voting Inclusive Scale (DVIS) with sub scales on physical challenges, hearing impairment, visual impairment and albinism. The instrument was constructed based on 7-point rating scale ranging from inadequate to adequate. The respondents were expected to rate the level of adequacy of training given by INEC towards PWDs during the 2019 elections. Responses were from 1 to 7, with 1-4 regarded as *inadequate* while options 5-7 was termed as *adequate*. The instrument was validated by two psychometricians from both University of Ibadan and University of Lagos for face and content validity. Thereafter the instrument was pilot tested among 30 INEC officials in Oyo State and the reliability of 0.75 was derived using test retest to ensure stability of the DVIS.

Before the instrument was distributed among INEC officers that were undergoing training, permission was taken from Election officer (E.O.) in each of the Local Governments where training took place. After permission, the instruments were distributed among trained officers present in the locations selected. Prior distribution, the reasons for the investigation was made known to them and some areas perceived to be difficult were duly explain to the officers. Thereafter, the instruments were distributed among the participants. The researchers waited till the participants attended to the instruments. Completed instrument was collected one after the other from the participants. The data was analysed using descriptive statistics, which are percentage and bar chart.

Results

Research Question 1: What are the preparations towards accommodating physically challenged persons in the 2019 electoral process?

Table 1
INEC preparedness towards including the Physically Challenged Persons in 2019 electoral process

SN	**Physically Challenged**	Inadequate	%	Adequate	%
1	Voter education	434	43	567	57
2	Finding or getting to polling unit	476	48	525	52
3	Getting inside polling place (e.g., steps)	434	43	567	57
4	Waiting in line	427	43	574	57
5	Reading or seeing ballot	392	39	609	61
6	Understanding how to vote or use voting equipment	364	36	637	64
7	Communicating with election officials	448	45	553	55
8	Thumb printing the ballot paper	329	33	672	67
9	Priority for timely and immediate voting on arrival at the polling unit.	434	43	567	57
Average		415	41	586	59

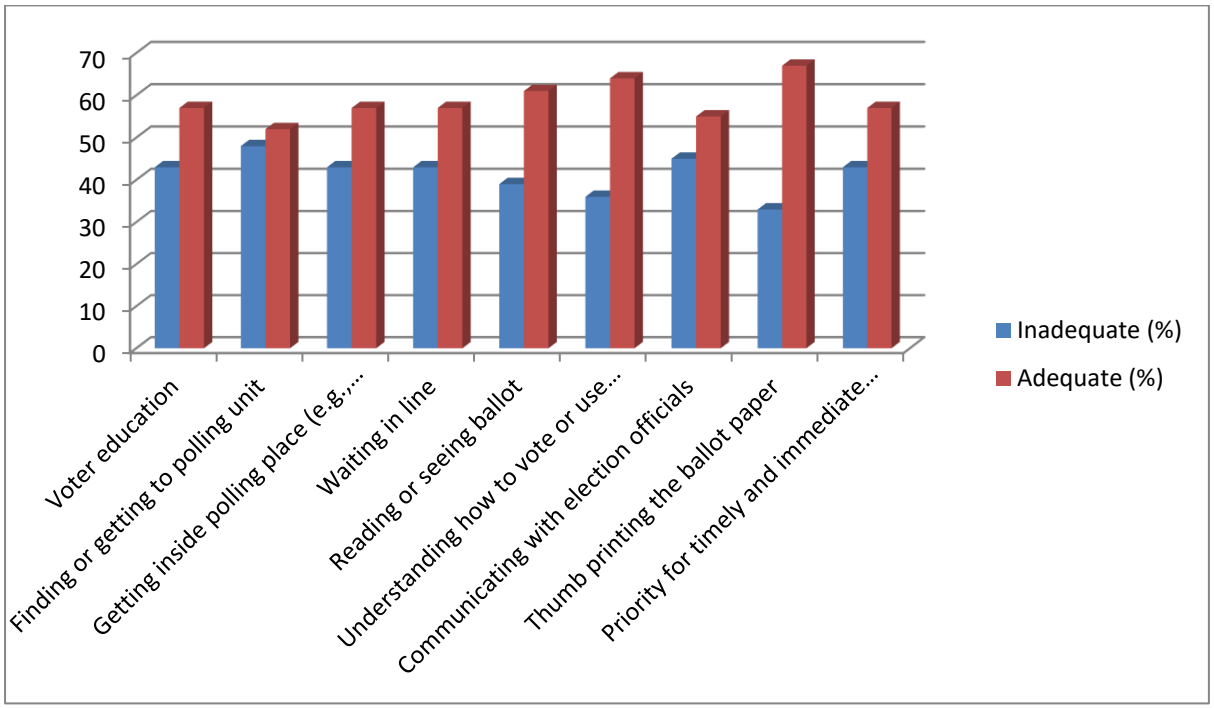

Figure 1: Responses on Election Training towards Physically Challenged.

Observation from Figure 1 shows that 41% of the electoral officers perceived the training as inadequate. However, the remaining 59% perceived it as adequate for the physically challenges persons towards 2019 general elections in Nigeria.

Research Question 2: How was the hearing-impaired persons considered in the 2019 electoral process?

Table 2
INEC preparedness towards including the hearing-impaired persons in 2019 electoral process

SN	Hearing Impaired	Inadequate (%)		Adequate (%)	
1	Voter education with sign language interpreter	693	69	308	31
2	Finding or getting to polling place	623	62	378	38
3	Getting inside polling place (e.g., steps)	413	41	588	59
4	Waiting in line	420	42	581	58
5	Reading or seeing ballot	420	42	581	58
6	Understanding how to vote or use voting equipment.	455	45	546	55
7	Communicating with election officials	546	55	455	45
8	Thumb printing the ballot paper	392	39	609	61
9	Other type of difficulty	595	59	406	41
10	Priority for timely and immediate voting on arrival at the polling unit.	399	40	602	60
11	Sign language interpreter for hearing impaired	630	63	371	37
Average		508	51	493	49

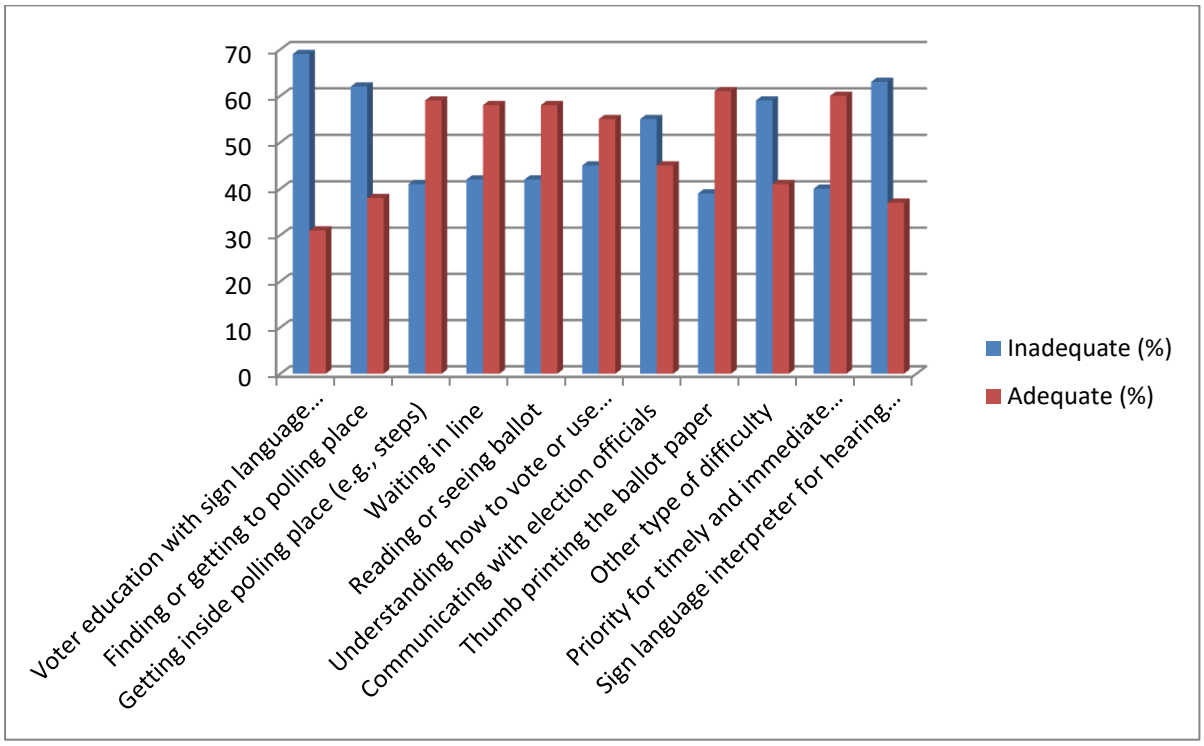

Figure 2: Responses on Election Training towards Hearing Impaired

The analysis from Figure 2 shows that 51% of the respondents feel the training given with regards to hearing impaired citizens in preparation for 2019 election was inadequate while 49% observed the training as adequate.

Research Question 3: To what extent were the visually impaired accommodated in the electioneering process?

Table 3
INEC preparedness towards including the visually challenged in 2019 electoral process

SN	**Visually Impaired**	Inadequate	%	Adequate	%
1	Voter education with braille reading	651	65	350	35
2	Finding or getting to polling place	574	57	427	43
3	Getting inside polling place (e.g., steps)	490	49	511	51
4	Waiting in line	497	50	504	50
5	Reading or seeing paper with magnifying lens	504	50	497	50
6	Understanding how to vote or use voting equipment	518	52	483	48
7	Communicating with election officials	490	49	511	51
8	Thumb printing the ballot paper	511	51	490	49
9	Other type of difficulty	553	55	448	45
10	Priority for timely and immediate voting on arrival at the polling unit.	350	35	651	65
Average		514	51	487	49

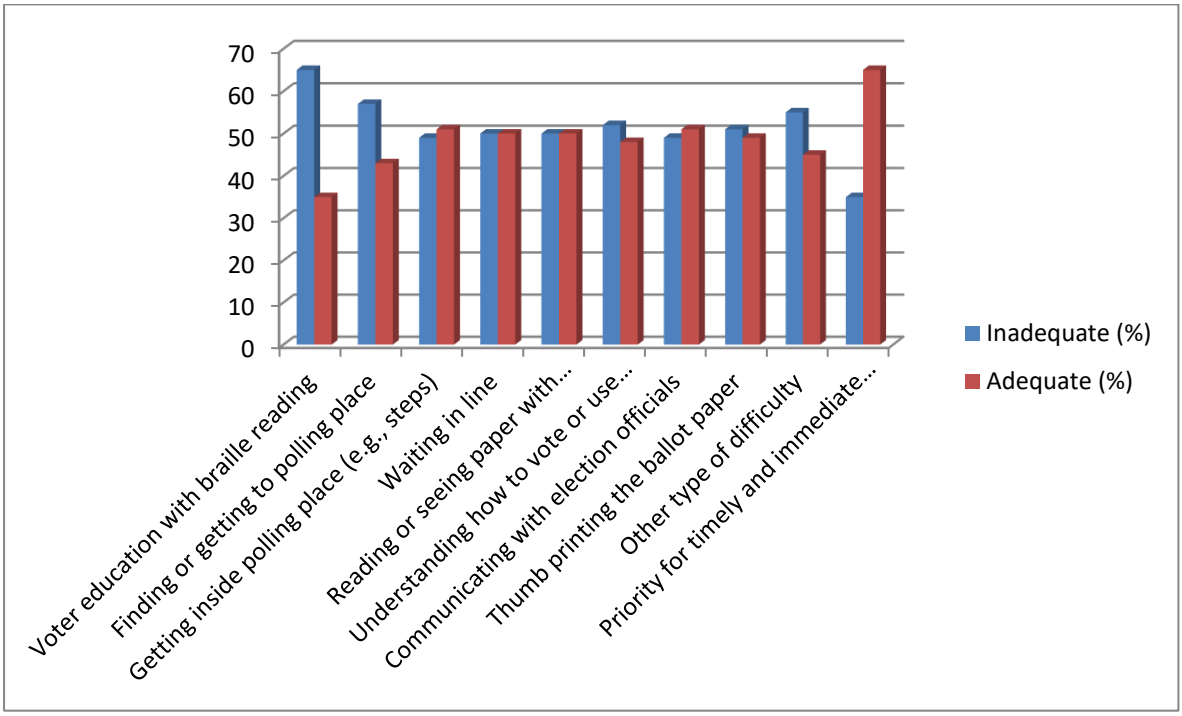

Figure 3: Responses on Election Training towards Visually Impaired

Observation from Figure 3 shows that 51% of the electoral officers perceived the training with respect to the visually impaired as inadequate. However, the remaining 49% perceived it as adequate.

Research Question 4: What are the measures taken to include the albinos in the 2019 electoral process?

Table 4
INEC preparedness towards including the Albino persons in 2019 electoral process

SN	**Albino**	Inadequate	%	Adequate	%
1	Voter education	364	36	637	64
2	Finding or getting to polling place	378	38	623	62
3	Getting inside polling place (e.g., steps)	378	38	623	62
4	Waiting in line	399	40	602	60
5	Reading or seeing paper with magnifying lens	350	35	651	65
6	Understanding how to vote or use voting equipment	378	38	623	62
7	Communicating with election officials	413	41	588	59
8	Thumb printing the ballot paper	329	33	672	67
9	Other type of difficulty	539	54	462	46
10	Priority for timely and immediate voting on arrival at the polling unit.	308	31	693	69
Average		384	38	617	62

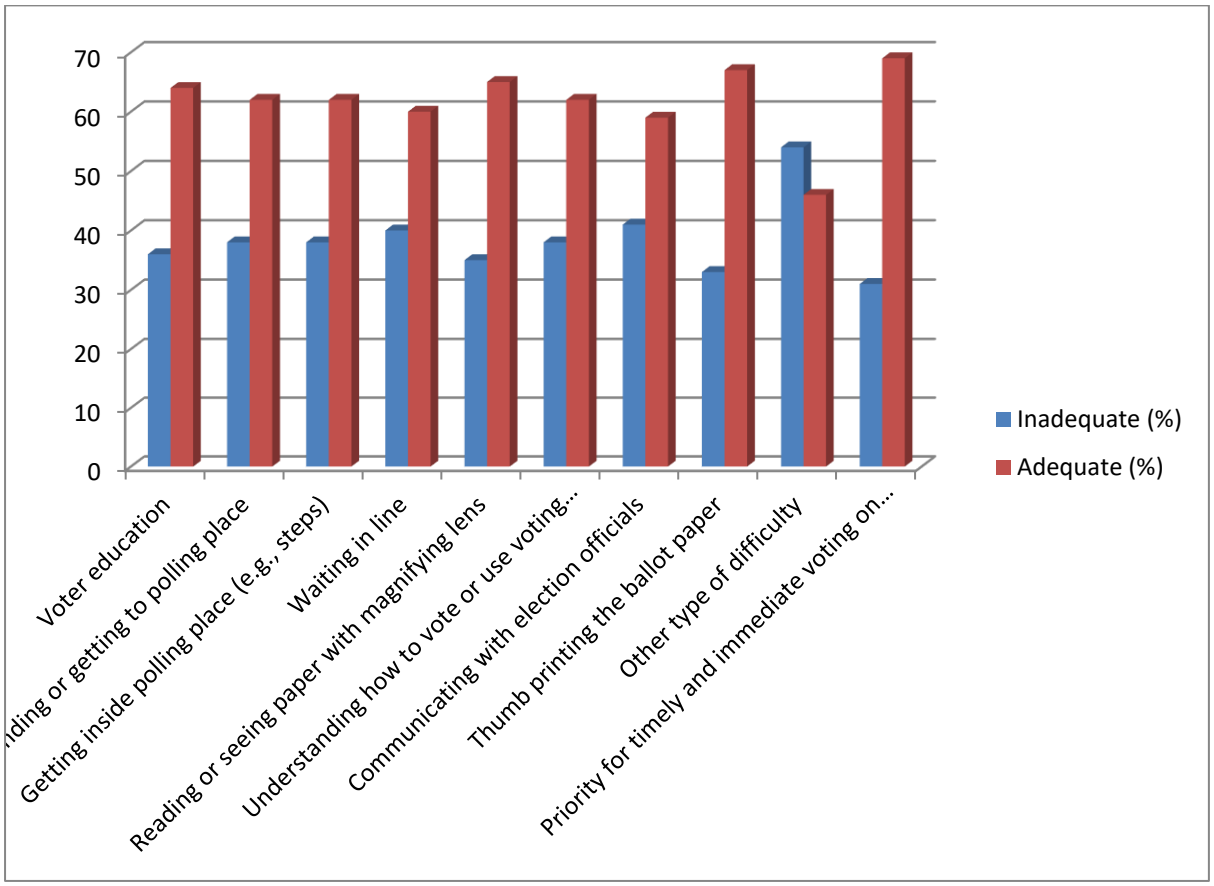

Figure 4: Responses on Election Training towards Albinos

Figure 4 provides the evidence of training provided to the electoral officers in the 2019 general election as it relates to Albinos. It shows that 31% of the electoral officers perceived the training as inadequate, while 69% perceived it as adequate.

Discussion

The findings from data analysed revealed different levels of INEC responses to different categories of people with disabilities during 2019 general election. Result from Table 1 showed that there is average level of inclusion of the people that are physically challenged in the electioneering process. The reason for this might be adduced to the fact that this group might not need any serious technical assistance compare with disabilities like hearing impairment. However, the result demonstrated a level of compliance to United Nation Convention on the Rights of Persons with Disabilities (UNCRPD) article 29 that focus on ensuring that persons with disabilities effectively and fully participate in political and public life on an equal basis with their non-disabled counterparts directly or through freely chosen representatives, including the right and opportunity for persons with disabilities to vote and be elected (United Nations 2007). With this result, Nigeria is rightly complying with global standard on rule of equality on the part of people that are physically challenged.

The finding on the provisions and inclusion of persons with hearing impairment in election in 2019 revealed that this group were not adequately provided for in the 2019 general election. For instance, there was no provision for sign language interpreter; communication with polling official was perceived to be difficult because

most INEC officials did have knowledge sign language and voter education as regards people with hearing impairment was perceived to be low. This result run contrary to the position advocated for by (United Nations, 2011) that political participation is a fundamental aspect of democratic governance, the rule of law, social inclusion and human rights approaches aimed at eliminating marginalisation and discrimination. If fundamental assistance is not provided for people with hearing impaired, it means that the government of Nigeria especially the electoral body has failed to be guided by the Framework on access and participation of persons with disabilities in election process which ensure that disability issues are mainstreamed into electoral matters throughout the electoral phase, in line with the conduct of free, fair and credible elections towards strengthening and deepening of democracy in Nigeria; and support PWDs throughout the electoral cycle (Nigeria Civil Society Situation Room, 2019).

In the same vein, the finding of from data gathered on inclusion of persons with visual disabilities demonstrated level of inadequacy. For instance, voter education through the use of braille, getting to polling place and the use of equipment that will aid smooth voting (magnifying glasses) were not adequate. These create some level of constraints to people with visual impairment. This result is contrary to the expectation of (United Nation, 2011) that advocate for total rule of law, social inclusion and human right for all citizens.

However, the result on inclusion of albino in 2019 election fairly depicts a level of political inclusion. The revelation might be influenced by the level of advocacy carried out by albino group. Their group has always been active on the course of people with disabilities. This finding is in line with the United Nation Convention on the Rights of Persons with Disabilities (UNCRPD) Article 29 that focused on ensuring that persons with disabilities effectively and fully participate in political and public life on an equal basis with their non-disabled counterparts directly or through freely chosen representatives, including the right and opportunity for persons with disabilities to vote and be elected (United Nations 2007). The latest development in the electioneering process can be seeing as a new development towards achieving total inclusion of people with disabilities into the society.

Conclusion

People with special needs have been severally isolated from vital decision making in Nigeria most importantly in the area of politics. Nevertheless, their contributions cannot be trivialised. People with special needs have demonstrated their worth significantly in the areas of sports and education. It is therefore imperative for Nigeria to allow for inclusiveness in the area of politics and leadership through periodic election. The findings revealed some levels of inclusion of voters with physical disabilities and albino but exclusion of voters with hearing impairment and visual impairment going by United Nations stated guidelines on the right of people with disabilities in area of political participation (United Nations, 2007).

Recommendations

Electoral body in Nigeria is henceforth encouraged not to partly implement global standard for political participation of people with Special needs as this will amount to political alienation of this group in the era of total inclusion. Nigeria electoral body should employ the service of experts in the area of special needs while preparing for

election so as to know what to be included that will make interests and needs of individuals with special needs to be all inclusive

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Comparative effects of digital instructional video and power point presentation on academic achievement and learning retention of basic technology students

Olabiyi, O.S.
University of Lagos, Faculty of Education,
Department of Science and Technology Education Akoka, Nigeria

Ojo, B.
Federal University, Oye-Ekiti, Ekiti State, Nigeria

Keshinro, O.T., & Okeowo, S.O.
School of vocational and technical education
Adeniran Ogunsanya College of Education, Otto/Ijanikin, Lagos, Nigeria

Abstract

The study compared effects of digital instructional video (DIV) and Power point Presentations (PPP) on academic achievement and learning retention of Basic Technology students. Pre-test, post-test non-equivalent control group, a quasi-experimental research design was adopted. The population for the study comprises of 250 Basic Technology students in five public and private junior secondary schools in Lagos State. Purposive sampling technique was adopted to sample the schools that teach with the application of multimedia tools. Three research questions and three null hypotheses were tested at 0.05% level of significance. The instrument used for data collection was the Basic Technology Achievement Test (BTAT). The reliability coefficient of the instrument yielded 0.83 using Cronbach Alpha. Mean were used to answer research questions, while ANCOVA was used to test the null hypotheses. The study revealed that students taught Basic Technology with PPP had a higher mean score than students taught using the DIV technique in the achievement test. Furthermore, multimedia presentation increased students' academic achievement while PPP improved students' academic achievement in Basic Technology than digital instructional video presentations. Consequently, it was recommended that Basic Technology teachers should improve the academic achievement of their students by incorporating multimedia tools into teaching as a viable and effective strategy to enhance students learning.

Keywords: *Achievement Test. Basic Technology. Digital Instructional Video. Multimedia. PowerPoint.*

Introduction

Since independence, 1960, Nigeria has built many educational and training institutions and has also developed one form of education or the other to develop citizenry, whether indigenous or western education which specifies a range of curricular and educational systems. The range determines to a large extent the

methods, techniques, and materials used in curricular delivery. The body of knowledge in the school system is usually classified into small units called subjects. One of these subjects is Basic Technology. Basic Technology is one of the pre-vocational courses of study in Technical Vocational Education and Training (TVET). TVET promotes an understanding of various aspects of the industry, technology, and the broader environment while developing in students' specific manipulative and cognitive skills (Olabiyi, 2005). Basic Technology as enshrined in the National Policy on Education (Federal Republic of Nigeria, 2013) is a compulsory pre-vocational subject at the Junior Secondary School (JSS) in Nigeria which is aimed to prepare students for the future career. It includes counseling on career choices, skills gaining and professional ethics. Basic Technology as a subject is of great importance and relevance to Nigeria's economy because it is fundamental to the basic knowledge required in various fields of study (Aluwong, 2002).

The purpose of Basic Technology is to contribute to the achievement of the National Education Goals. Therefore, Basic Technology as a pre-vocational subject is designed among others to provide prevocational orientation in Technology, to provide basic technological literacy for everyday living and to stimulate creativity. Basic Technology is based on the understanding that the world is increasingly driven by technology. This is the major reason why the Basic Technology curriculum was revised to reflect the national policy orientation of teaching technology and the world globalization trends in education. The responsibility of every nation and school is to provide opportunities for all to acquire technological literacy and this is in line with the current goals of the National Economic Empowerment and Development Strategies –(NEEDS), (NERDC, 2007) (Federal Republic Nigeria, 2013).

Basic Technology is a foundation subject at the Junior Secondary School (JSS) level meant to provide the basic knowledge and skills in technology. Basic Technology as one of the pre-vocational subjects is a unique and multi-disciplinary subject that covers a very large area and draws from many other disciplines in TVET. The revised Basic Technology Curriculum covers the following nine themes: You and technology (ICT inclusive), safety, materials, and processing, drawing practice, tools and machines, applied electricity and electronics, Energy and power, maintenance and building. The major difference in the curriculum content of the Introductory Technology and that of Basic Technology is the Information and Communication Technology (ICT) that was introduced as a topic under "You and Technology" and also the conceptualization of the themes as well as the change in the name from Introductory Technology to Basic Technology (NERDC, 2007).

The contents under each theme are made to reflect the basic nature of technology; where the knowledge, skills, creativity, and attitude needed by the students are explained in detail. Whereas the objectives and the contents of the curriculum of Basic Technology are laudable, numerous impediments are affecting the teaching and learning of the subject in Nigerian schools which are likely to obviate the realization of the objectives. Some studies have tried to identify the problems affecting the teaching and learning of Basic Technology, while others have attempted to proffer solutions. Looking at the Nigerian schools and how far the objectives have been realized, one must be concerned with how best to attain the objectives of Basic Technology. Over the years, academic achievement in Basic

Technology has been lower than in other subjects. One may want to find out the reasons why the achievement of students in Basic Technology that is a core subject, has been so low over the years at the Junior Secondary School Certificate Examination (JSSCE) in Lagos State.

The academic achievement in Basic Technology has consistently been lower than other core and other selected elective subjects. According to Ogbeide (2010), the low academic achievement in Basic Technology needs to be investigated by educators if the nation must advance technologically. Stressing the low educational achievement of students in Basic Technology, Akinyede and Uwameiye (2010) stated that: the very low achievement in Basic Technology by Junior Secondary School leavers should worry everyone concerned with Science and Technology Education in Nigeria. Akinyede and Uwameiye (2010) further pointed out that the JSSIII results in Basic Technology in recent years is 30 percent failure or above on the average.

Achievement is an accomplishment, attainment, completion, fulfillment, performance or realization. Academic achievement or performance is the outcome of education, that is, the extent to which a student, teacher or institution has achieved their educational goals (Wikipedia, 2019). Academic achievement according to Wikipedia (2019) is commonly measured by examination or by continuous assessment but there is no general agreement on how it is best tested or which aspects are most important, the procedural knowledge such as skills or the declarative knowledge such as facts. Whichever knowledge and whatever aspect that is being tested, academic achievement is the level of the individual attainment on learning task which may be high or low. The high and low attainment is due to individual differences and the individual differences influence academic achievement (Stumm, Sophie, Hell & Thomas, 2011). Academic achievement can also be referred to as a measure of how much an individual has accomplished after a course of instruction or training. In the school setting, it may be measured by the score of the student with others in the class test or examination.

The academic achievement of a school child in any school subject can be attributed to many factors. Uwameiye, Guobadia, Olaitan and Obiaha's studies as cited in Nwachukwu, (2004) stressed that the factors responsible for this low achievement could be associated with poor teaching methods, socio-economic, gender, and minimum equipment as well as fund. These factors as expressed by these researchers could contribute positively or negatively to the academic attainment of a school child. One of these factors that are of interest to this study is the teaching method. Research evidence showed that the major problem students are facing in passing Basic Technology at JSS examination is traced to the teaching method employed by the teacher to impart the knowledge. Adepoju (2006) points out that students encountered difficulties in learning when they are instructed using the verbal approach.

Achieving the objectives of teaching Basic Technology requires effective teaching methods. The teaching method can be explained as the method a teacher employs to deliver his/her subject matters to students, based on pre-determined instructional objectives, to promote learning in students and to facilitate the accomplishment of

the set objectives. What a teacher does in the classroom depends to some degree upon his approach to learning situations. Correct use of an appropriate teaching method is critical to successful teaching and learning. Ndagana and Onofade (2000) observed that no method has been the best for every situation. However, a carefully designed teaching method can make making learning more effective, Ndagana and Onofade (2000) further explained that the success in the use of the method depends on an intelligent analysis of the educational objectives, a student in the class, the curriculum content or type of subject matter being taught.

Armstrong (2000) posited that teachers must diversify their instructional techniques if they are to successfully reach students of different abilities and learning preferences. Technology tools have been introduced for teaching. Technology tools are electronic devices used for accessing, processing, gathering, manipulating, presenting and communicating information. The application of technology tools in teaching and learning refers to the use of tools to make learning more interesting, motivating, stimulating and meaningful to the students. The teaching and learning materials using technology tools are designed to accommodate differing needs and abilities which may result in the fuller realization of students' capabilities and potentials and allowing students to take greater responsibilities for managing their learning (Levin, 2002). Technology tools facilitate the implementation of Basic Technology, the provision of learning content, and communication between teachers and learners. To enhance students' academic achievement, interactive methods of teaching are selected. The interactive method of teaching is the use of interactive media in the classroom setting.

Interactive media is explained as the integration of digital media including combinations of electronic text, graphics, moving images, and sound into a structured digital computerized environment that allows individuals to interact with the data for appropriate purposes. The digital environment includes the Internet, telecoms, interactive video, power point and interactive digital television (Andy Finney, 2002). One method through which students' academic achievement and retention in learning can be improved is the use of the multimedia method. Multimedia technique, according to Onwuka (1981), makes schoolwork real, uses students' experiences, motivates natural interest, promotes retention of learned materials, and carries students forward in clearly defined terms. It also minimizes waste of time, eliminates irrelevant materials from the curriculum and emphasizes creativity. According to Onwuka, this method is an excellent means of fostering cooperation amongst learners. Considering the advantages of power point and digital video method of teaching, this study is undertaken to compare the effects of both methods of teaching in improving the academic achievement of Basic Technology, since learning style preference varies between students, the most effective mode of instruction will also vary. This research work aims at comparing the effects of digital educational video and power point presentation on academic achievement and learning retention of Basic Technology students.

PowerPoint Presentation (PPP) is one of the interactive methods of teaching. It is more structured and interesting to students/audiences than other methods (Amare, 2006). It is a computer-based training tool that provides stable presentations in lecture halls and conference rooms. It is used in over 30million presentations a day

and its software is on 250million computers world-wide (Alley & Neeley, 2005). Several studies have suggested that graphics improve students' memory ability (ChanLIn, 2000). Other researchers also reported a corresponding increase in students' performance in courses where it was adopted (Stolo, 1995; Susskind, 2005; Szaba & Hastings, 2000). PPP can be as simple as a few texts on a color screen or as complex where tables, pictures, graph, sound effects, visual effects are inclusive. The effectiveness of PPP and other multimedia like Instructional Video presentations may, however, depend on the complexity of the topic that is being presented. Several researchers have demonstrated that materials, such as graph aided charts are interesting but extraneous texts (Schraw, 1998). However, the Power point used in this study does not involve audio.

Digital instructional video is another multimedia that combines motion, color and sound for a better understanding of ideas. Instructional Video, otherwise called Digital Educational Video (DEV) is one of the Interactive media that shows/projects motion pictures, when the picture is a significant factor of a subject. Educational films are always in black and white, but sometimes in color. Video embedded in PPP files or shown separately on television shows historical footage or re-created events, it can also demonstrate processes or events that cannot easily be replicated in a laboratory or slow down and analyze motion (Farrant, 1981, Kemp & Smellie, 1989; Wittich & Schuller, 1973). Interactive learning occurs when a student pulls together the knowledge and skills acquired from information and experiences provided by the teacher. The student is engaged both intellectually and emotionally thus feedback, reflection and dialogue are integral components of interactive learning (Blythe-Lord, 1991).

Besides technology tools, gender is another factor that influences the achievement of students, Okeke (2008) gave a broad analytical concept which draws out women's roles and responsibilities with those of men. According to Okeke, gender refers to the socially culturally constructed characteristics and roles that are ascribed to males and females in any society. Gender is a major factor that influences career choice and the subject interest of students. Okeke (2008) described the males' attributes like bold, aggressive, tactful, economical use of words while the females are fearful, timid, gentle, dull, submissive and talkative. It may be the reason Umoh (2003) stated that more difficult works are usually reserved for males while the females are considered feminine in a natural setting. Thus, in schools, males are more likely to take too difficult subject areas like technical while the females take to the career that will not conflict with marriage chances, marriage responsibilities and motherhood (Okeke 2008). This created fewer job areas available for women, which might be of low status and low income.

Gender issues are currently the focus of discussion and research all over the world, Nigeria inclusive. The question of gender is a matter of vital concern, especially among academics and policy formulators. Intellectuals are worried about the role of male and female in the psychological, political, social, economic, religious, scientific and technological development of nations. Meanwhile, concerns about academic achievement concerning males and females have generated considerable interest in the field of TVET over the years. Differences in the academic achievement of the two

genders are likely to contribute disparities in the allocation of cognitive roles in the world of work.

Also, because today's children have grown up with a different digital landscape than their teachers (Jukes, 2008), they, most likely, are inspired and motivated by different technology. Today's digital natives speak a different language than their teachers do (Prensky, 2001). For these reasons, students of the 21st century may retain more information if it comes to them through a digital medium. In a more digital world, multimedia tools are better for a student's memory (Miller, 2009). SMART boards, digital "clickers," and computers all spur interest in a child and are more likely to motivate a student to perform at his or her highest level, multimedia tools that promote content creation among students, such as videos, audio podcasts, and web pages, are more effective strategies than traditional methods Miller added. Instead of memorizing facts for a test, teachers want their students to retain the information longer than a week. Because of the pressures of standardized tests, teachers must find different ways to teach the required curriculum and help students retain the necessary information.

Statement of the problem

The understanding of the Federal Government of Nigeria is that Basic Technology would contribute to the national goal of education since the world was increasingly driven by technology. The teaching of the subject has been faced with numerous problems that can impede the realization of the objectives. One of such problems is the low academic achievement in the subject. Over the years, student achievement in Basic Technology has been so low that Basic Technology has the highest percentage failure and the lowest percentage pass at the JSSCE for the past 10years (2005-2015) compared to the other core subjects at the junior secondary school level. How to achieve the objectives of Basic Technology has been a major concern to educators. Some researchers have tried to identify some of the problems affecting the teaching and learning of basic technology but it seems the problem of low academic achievement is a persistent one and has reached a level that should worry everyone concerned with the technological development of the nation. It is, therefore, imperative that the state of academic achievement in Basic Technology should be re-appraised so that possible solutions could be offered to remedy the present situation in the teaching and learning of the subject. There are always differences in the academic achievement of students in the same class even when taught by the same teacher. This means that the rate of achievement varies may be as a result of certain factors such as teaching methods, gender, and students' attitude. Thus, there may exist gaps or disparities in the academic achievement of students based on the influences of these variables. Influences resulting in low academic achievement do not favor national development, and therefore, ought to be minimized. Therefore, the study was designed to compare the effects of digital video and power point presentations on academic achievement in Basic Technology to improve on the academic achievement in the subject in Lagos State.

Purpose of the Study

The study was guided by the following purposes:

1. Compare mean academic achievement of Basic Technology students taught using Power point Presentation (PPP) and digital Instructional video (DIV).
2. Compare the mean performance learning retention of Basic Technology students taught with digital Instructional video (DIV) and PowerPoint Presentation (PPP).
3. Influence of gender on students' academic achievement in Basic Technology

Research Questions

The following research questions were raised to guide the study.

1. What are the mean academic achievement scores of Basic Technology students taught with digital educational video and PowerPoint Presentation?
2. What are the mean performance retention scores of learning of Basic Technology students taught with digital Instructional video and Power point Presentation?
3. What is the influence of gender on the academic achievement of students in Basic Technology?

Hypotheses

The following null hypotheses tested at 0.05% level of significance guided the study.

1. There is no significant difference in the mean academic achievement score of Basic Technology students taught with a digital instructional video and Power point Presentation as measured by the Basic Technology Achievement Test (BTAT).
2. There is no significant difference in the mean performance retention score of Basic Technology students taught with a digital instructional video and Power point Presentation as measured by the Basic Technology Achievement Test (BTAT).
3. There is no significant influence of gender (male and female) on the academic achievement of students in Basic Technology as measured by the Basic Technology Achievement Test (BTAT).

Methodology

Research Design

The research design employed was the quasi-experimental design and non-randomized, pre-test/post-test. The subjects were not randomly assigned to groups rather intact classes were randomly assigned to experimental and control groups. The design is symbolically represented as follows:

Treatment Group I $O_1 X_1 O_2$

Treatment Group II $O_3 X_2 O_4$

Key: X_1 = treatment with Power point Presentation

X_2 = treatment with Instructional Video

O_1 = pre-test scores of the group treated with Power point Presentation

O_2 = post-test scores of the group treated with Power point Presentation

O_3 = pre-test scores of the group treated with Instructional Video
O_4 = post-test scores of the group treated with Instructional Video

Area of the study
The study was carried out in five public and private junior secondary schools where teachers employ the use of multimedia (power point and instructional video) in teaching basic technology in Education District four of Lagos State, in the South-west of Nigeria.

Population of the study
The population sample for the study consisted of 250 students of Basic Technology in five public and private junior secondary schools in Lagos. Purposive sampling technique was adopted and used to sample the schools that teach Basic Technology with the application of technology tools for lesson delivery.

Instrument for data collection
The instrument used for data collection was the Basic Technology Achievement Test (BTAT). BTAT was based on standardized test items from the National Examination Council Junior Secondary Certificate Examination (NECO JSCE). The BTAT contained 80 multiple choices of items, 40 for the pre-test and 40 for the post-test of four options. The topics covered the entire Junior Secondary Schools year I and year II curriculum for Basic Technology. The topics were taught with the application of digital educational video and power point presentations.

Lesson plan

A set of the lesson plan was written based on power point presentation, which was used to teach the experimental group, while the control group was taught using a digital instructional video set of lesson plans.

Validation of instrument

Face and content validity of the study instrument and the lesson plan were ascertained by three lecturers in the Department of Science and Technology Education and two experts from the Technical Department of Education District V, Agboju, Lagos. The recommendations and suggestions given by these experts were used to modify and improve the test instrument and lesson plan

Reliability of the Instrument
The reliability coefficient of the Basic Technology Achievement Test (BTAT) was established using Cronbach Alpha reliability. The reliability coefficient of BTAT was 0.86.

Training of the basic technology teachers as research assistants for the study
A week induction training program was organized for the teachers that used a power point presentation lesson plans. The teachers were given a detail explanation on the use of power point and digital educational video and other research expectations. The training exercise was based on the aim and objectives

of the research, the topic to be tutored, the use of lesson plans, and the use of the Basic Technology instrument and general conduct of the study.

Experimental procedure: The conduct of the study took place during the normal school lesson periods. The normal timetable of the schools used for the study was followed. The regular school Basic Technology teachers were used. On the first day, before the lesson commences, the instruments BTAT was administered as a pre-test to the two groups after which proper teaching commenced by using the prepared lesson plans. The experimental group was taught using power point presentation while the control group was taught using digital instructional video the selected topics by the research assistants. The two groups were taught using researcher-designed lesson plans respectively. The treatment lasted for six weeks. After teaching for six weeks, the two groups were post-tested. The scores obtained from both groups were compared to determine if there was any significant difference in the performance of the two groups. The data collected was used for further analysis. Therefore, they were collected and kept under the custody of the researcher.

Method of data collection

Each student was given a pre-test of the Basic Technology Achievement Test (BTAT). Lesson delivery styles were Power point presentations and digital instructional videos (i.e., lesson with slides) in the Basic Technology subject. In Power point presentations involved both instructor and graphics presentations, the presentations were made to reflect on the screen from a laptop using Power point software, basic text, tables, and diagrams relating to topics were presented On the other hand, digital instructional video, presentation involved instructor and the corresponding graphics presentations, the presentations on the Television screen from the recorded Video cassette played on the Video player connected to Television. Only basic text, tables, and diagrams relating to the topic were presented and the presentations were supported by verbal illustrations for student's easy understanding. Both groups were taught the same topics by the same regular Basic Technology teachers and at the scheduled time.

Method of data analysis

The research questions were answered using the mean of the pre-test and post-test scores. The Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05% level of significance

Results

Table 2: Mean of Pre-test and Post-test Scores of Learning Retention in Basic Technology Achievement Test (BTAT)

Group	N	Pre-test	Post-test	Retention Test
Power point Presentation	135	19.47	27.47	29.18
Digital Instructional Video	115	18.77	27.67	29.02

The mean score for the retention test for power point presentation (experiment group) was 29.18 when compared with digital instructional video (control group) with

the mean score on the retention test 29.02, the difference is 0.16 points. To see whether there was a significant difference between the groups, the ANOVA analyses were carried out.
The ANOVA shows a significant difference between the groups at the retention test F (2, 99) = 3.316, p < 0.040. Post hoc comparisons indicated that the difference is between experiment group A and experiment group B, Dunnett t= -2.543, p <.051.

Table 3: Mean of Pre-test and Post-test Scores of Male and Female in Basic Technology Achievement Test (BTAT)

Power point Presentation					Digital Instructional Video			
Gender	N	Pre-test	Post-test	Mean diff. $\overline{X}$	N	Pre-test	Post-test	Mean diff. $\overline{X}$
Male	74	7.28	13.08	5.80	68	7.02	12.26	5.24
Female	63	5.82	7.94	2.12	45	6.52	6.88	0.36

The data presented in Table 3 showed that male students taught with power point presentation had a mean achievement score of 7.28 in a pre-test, and a mean score of 13.08 in post-test, making a pre-test, post-test mean a difference in a power point presentation in the BTAT for the male to be 5.80. Meanwhile, the female students taught with power point presentations had a mean score of 5.82 in the pre-test and a post-test mean of 7.94 with a pre-test, post-test mean difference of 2.12. Also, male students taught with digital instructional videos had a mean score of 7.02 pre-test and a mean score of 12.26 in the post-test making a pre-test, post-test mean a difference in the male students taught with a digital instructional video to be of 5.24. Meanwhile, female students taught BTAT with digital instructional videos had a mean score of 6.52 in the pre-test and a post-test mean of 6.88 with a pre-test, post-test mean difference of 0.36. With these results, the male students taught BTAT had a higher mean score than the female students. This means that gender influences the academic achievement of male and female students measured by the BTAT.

Discussion

The analysis of data presented in Table 1 indicates that students in the power point presentation group had better mean scores compared with their counterparts in a digital instructional video in both pre-test and post-test. The differences in the mean scores in the pre-test may, however, be attributed to the initial difference in the knowledge and skills possessed by the students in both groups before the treatment. The post-test result implies that students taught with power point presentation perform better than those taught with digital instructional video group. This result stands as evidence that Power point Presentation method has positively affected student achievement test in Basic Technology. This agrees with Bartsch and Cobern (2003), and Gonen and Basaran (2008) who revealed that Power point-aided education facilitated learning, attracted students' attention and enhanced their motivation. Also, the teaching method that incorporates Power point Presentation positively affected student academic achievement and retention. Additional studies support this view (Bartsch & Cobern, 2003; Gok & Sılay, 2008). The work is also in agreement with Szabo and Hastings (2000) who emphasized that power point presentation helps to keep students' interest and attention on the lecture (, improves

student learning (Lowry, 1999), and aids explanations of complex illustrations (Apperson, Laws, & Scepansky, 2006). Gambari and Olumorin, (2013) also stressed that power point presentation made students work better, allow students to do more work in a short time. Thus, give room to greater productivity.

Furthermore, the study is in support of the view of Bartsch and Cobern, (2003) and Gok and Sılay, (2008) who stressed that complex shapes that provided a suitable enough rendition of the original image cannot easily be achieved in the instruction video presentation. However, texts and complex figures in a PPP can be easily achieved from the computer/laptop onto a screen. In this way, color and concrete presentation of graphics helps students to understand better and remember knowledge during examinations because such graphics are identical to the original image. Therefore, the rationale behind the success of the students in the power point presentation group stems from the alleged views. According to the present research results, a teaching method that incorporates Power point Presentation positively affected the student academic achievement and learning retention.

When learning occurs, students will place relevant words into their auditory working memories and relevant images into their visual working memories. They then organize the information separately in their auditory and visual memory and, finally, integrate these representations with prior knowledge. This idea has been supported by Mayer's cognitive theory of multimedia learning (2001). Similar discussions had been put forward by El-Ikhan (2010) and Moore (1993), who highlighted that Power point-aided education, enhanced an adult student's success, attention, and motivation. It was argued that Power point increases visual quality in the learning process. They also contend that it takes less time to present a subject matter; therefore, more materials can be covered in the classroom. Opponents of Power point, however, believe that it diminishes creativity and innovation besides elevating format over content, betraying an attitude of commercialism that turns everything into a sales pitch (Tufte, 2003). On the other hand, Creed (1997) describes Power point as a teacher-centered instructional tool that nourishes teacher-controlled lectures. Similarly, Tufte (2006) points out that Power point reduces the analytical quality of a presentation, limits the amount of detail that can be presented, and often weakens verbal and spatial thinking.

Conclusion

The choice of instructional method is a factor in the delivery of a curriculum and consequently impacts on the quality of performance of the recipients. The use of power point presentation as a teaching aid and an instructional technique would generally aid students' motivation, skill development, and subject matter assimilation. Students learn better when they are allowed to participate actively in the class by interacting freely with the teacher and their peers, working in groups and using interactive computer software to perform tasks. Furthermore, the findings are supported by other studies conducted by El-Ikhan (2010) and Tao (2001). They stated that the teaching method that includes the presentation of graphics (slides) had a positive effect on student achievement at every teaching level.

The concept of a student-centered approach to teaching and learning would be better articulated using powerpoint presentations since the application of multimedia

can positively, if developed appropriately, complement the teachers' pedagogy. The present study provides information on the contributions of intelligent use of Power point Presentations to the academic community. The findings also shed light on students' understanding of the scientific concepts and how best they (students) can apply the principles in real-life situations. Additionally, the results give insights into how classroom teachers can improve student performance in the classroom setting.

Recommendations

Based on the findings of the study, the following recommendations are made: Basic Technology teachers should improve the academic achievement of their students by incorporating multimedia into the teaching and learning process as a viable and effective strategy created to enhance students learning. Also, ministry of education through science and technology education should organize seminars, conferences and workshops to sensitize Basic Technology teachers on the use of multimedia tools and to ensure availability of the facilities for teacher and students use.

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Parents' personality and parenting styles as correlates of personality development among adolescents in Egor Local Government Area of Edo State, Nigeria

Alika, I.H., Aihie, O.N., & Azi, U.
Dept. of Educational Evaluation and Counselling Psychology
Faculty of Education
University of Benin
Benin-City, Nigeria

Abstract

The study investigated the relationship between parents' personality, parenting styles and adolescents' personality development. Specifically, the study was carried out to examine personality of parents, styles parents adopted in the upbringing of adolescents and how these two variables influenced the personality development of adolescents. To guide the study, two hypotheses were formulated. A correlational survey design was adopted for the study. Ten schools were selected and a total of 200 senior secondary school students drawn from 10 secondary schools as well as their parents were used for the study. The sample was achieved using a simple random sampling technique. The respondents thoroughly completed three 20-item questionnaires: The big Five Personality Inventory, Parenting Style Questionnaire and Adolescent Personality Development Questionnaire. The results showed that Parents' personality significantly influenced adolescent personality development (P < 0.05; r = 0.351) while Parenting styles does not influence adolescent personality development (P > 0.05; r = -.103). These findings imply that the personality of parents influenced adolescents' behaviour more than the styles parents adopted in their upbringing. It is suggested that parents make conscious efforts in modeling good behaviours in order to help adolescents achieve set goals.

Keywords: *Adolescents. Correlate. Parenting style. Parents. Personality.*

Introduction

Adolescent personality which predicts adolescents' behaviour and influences who they eventually become is a product of the interaction of genetics and environmental factors. The genetic makeup of adolescents' personality may result from the combination of the different personality traits of their parents (Edobor & Ekechukwu, 2015). While both parents may jointly influence an adolescent's personality, the parent with the dominating gene may have greater effect on the personality development of the adolescent. There are different types of personality traits; while some traits are positive, others may be negative (Brown, 2018). Positive personality traits may be developed through interaction with parents (genetics) and or the environment (Schofield, Conger, Donnellan, Jochem, Widaman & Conger, 2013). Negative personality on the other hand may arise from inherited traits or from environmental influence (Ikediashi & Akande, 2015).

Adolescents with positive personality may behave better in school, have better grades, become well-adjusted and may have high self-esteem; while adolescents

with negative personality may have poorer grades, low self-esteem and may behave poorly. Adolescents having positive personality may eventually perform well academically and thus achieve expected goals, while adolescents with negative personality may under perform in academics and may consistently perform poorly in school and this may eventually lead to underachievement (Sobowale, Ham, Curlin & Yoon, 2018).

Adolescent personality may be formed not only from personality of the parents but also, the style of parenting used in rearing of the adolescents (Edobor & Ekechukwu, 2015). While personality may be categorized into positive and negative traits, parenting styles also could be divided into positive and negative styles. Adolescents reared with positive parenting styles may become more confident in handling life affairs, have happier attitude and may achieve expected goals. Adolescents reared with negative parenting styles may behave poorly, become socially withdrawn and may have difficulties setting and achieving expected goals (Liew, 2017).

Waude (2017) noted that personality comprised of two broad factors: biology and environment. Biological factors are genetic traits which are beyond the control of the adolescent; but the environment could also have significant influences on adolescent personality development (Schofield *et al.,* 2013). Environmental factor as used in this study refers to the home environment, which is made up of the family. When a child is born, he lives with his parents and he is deeply influenced by their behaviours and attitudes (Alutu, Ifelunni & Ikegbunam, 2016). While the home environment is the first social platform for an infant therefore, it is the behaviours exhibited by the parents and significant adults in the home that an infant may likely imitate and may then form his own personality. Erikson cited in McLeod (2017) noted that personality is recognized soon after toddlerhood; hence, a growing child may assume any personality in so far as the model is within the child's immediate environment. In the home for instance, the best model a child may have is the parents. Therefore, the personality traits expressed by parents may be learned by the children. Personality therefore refers to the unique distinctive qualities that differentiate one person from another (Ayodele, 2013).

Parenting style is the strategy that parents deem fit to use in the upbringing of their children (William, 2006). Three styles of parenting were initially put forward by Baumrind (1966) cited in Sarwa (2016) namely: authoritarian parenting, authoritative and permissive parenting. Later negligent parenting was added by Maccoby and Martin (1983) cited in Kendra (2016), as a result of several interviews conducted with parents. Authoritarian style of parenting can be described as the child rearing style where the level of conformity adolescents give to parental rules is higher than the responsiveness given to the needs of adolescents (Alika, Akanni & Akanni, 2016). Authoritarian style of parenting is a highly restraining and demanding style of parenting (Gafor & Kurukkan, 2014). Simply put authoritarian parenting places emphasis on total obedience to rules rather than having a well-adjusted adolescent. Authoritative parenting may be termed the opposite of authoritarian parenting as the level of adolescents' conformity to rules equates parents' responsiveness to the needs of the adolescents. According to Kopko (2007), authoritative parents may be warm, responsive to the needs of their adolescents, easily approachable yet very firm when it comes to discipline and doing things in the right way. Permissive

parenting is an extremely relaxed parenting approach where excessive freedom is given to adolescents (Walton 2012). It is characterized by few behavioural expectations, very high parental responsiveness with little or no parental control (Alika *et al*., 2016); and, adolescents reared in permissive homes, may not desire to take up responsibility (Ogbeba, 2012). Neglectful parenting also referred to as uninvolved parenting is very low in parental responsiveness and control (Darling, 2017). Adolescents raised in neglectful homes may perform poorly in all domains (Darling, 2017) and this may lead to underachievement and the development of negative personality.

Parents' personalities influence their interaction with their children (Edobor & Ekechukwu, 2015). This interaction is done with the aim of shaping the children into what the parents perceive to be right. The process of this interaction constitutes parenting styles and the way parents go about this interaction may show the personality of the parents. Edobor and Ekechukwu (2015) noted that the personality traits of parents could determine their style of parenting. Therefore, a parent with negative personality may adopt the parenting style that will allow him/her to feel at ease and often in control of everyone in the home. To affirm this, Aihie (2016) opined that authoritarian parents exercised much control over the children. Such control makes children obey set rules without questioning. Authoritarian parenting is fraught with rules that adolescents are bound to obey yet the rules are not explained. The point worthy of note here is the issue of unquestionable obedience to parents. Yet, some of these parents may be poorly responsive (neglectful) to the needs of their children. Adolescents reared in authoritarian homes may appear moody most of the times as they may misinterpret the attitude of parents as hatred and thus feel neglected or even hated by their own parents. The long-term effects of authoritarian parenting may culminate into having socially withdrawn adolescents who often appear moody, may develop negative personality, and may even attempt deliberate self-harm or suicide (Darling, 2017; Mohammad, Nasirudin, Mona & Amin, 2012; Tunde-Ayinmode & Adegunloye, 2011).

On the other hand, parents with positive personality traits may adopt the authoritative parenting style (Maliki & Inokoba, 2011). Authoritative parenting is a democratic style of child rearing where parents tend to be loving and attentive to the needs of their children; provide warmth and fair discipline, thus produce well-balanced children. Adolescents reared in this kind of environment may feel loved, excel in their studies, develop self-confidence and happy attitude. Navuluri (2017) described authoritative parenting as the kind of parenting where parents are demanding yet provide the basic needs of their children. Adolescents raised in authoritative homes have better social-emotional development and they may likely develop positive personality traits. (Mohammad *et al.,* 2012).

Permissive parents have little control over their children as they are allowed to make their own decisions and there is minimal or no punishment for wrong doings (Mohammad *et al.,* 2012). This implies that adolescents whose parents adopted the permissive parenting may equally excel academically, have high self-esteem (Darling, 2017), but they may likely exhibit anti-social behaviours (Williams 2006) such as truancy, drug abuse, bullying, stealing, and so on (Anake & Adigeb, 2015).

The negligent parents according to Samkange (2015) are neither demanding nor responsive to the needs and behaviour of their children. That is, there is little or no monitoring or parent-child communication in the home. When growing children are given minimal attention, they tend to tilt towards the direction where the needed emotional support may come from, and it is usually from their peers who may likely misdirect the gullible ones (Anake & Adigeb, 2015).

The actions exhibited by adolescents reared in authoritarian homes may not differ greatly from the permissive and neglected adolescents. But they may differ in the degree of anti-social activities the adolescents may likely engage in. Adolescents reared in authoritarian homes may excel in academics and may not have the courage to associate with anti-social groups, abuse drugs, or engage in illicit sexual activities because the strict manner with which they were raised may have instilled fear in them. But the negligent and permissive adolescents may venture into various forms of anti-social behaviour without restrictions (Anake & Adigeb, 2015).

Statement of the problem

The foremost problems bordering on adolescent personality are unacceptable behaviours exhibited by some adolescents. These unacceptable behaviours, if not curbed may hinder expected goals. Several risk factors may give rise to these unacceptable behaviours; and some of the factors may include parents' negative personality traits and inadequate parenting styles. The pattern of parenting adopted by some parents appears to have been unsuccessful in aiding the development of "positive" behavioural characteristics among adolescents. Recently, news highlights have shown that adolescents consistently exhibit undesirable behaviours that may be detrimental to the society and to the adolescents themselves. Undesirable behaviours such as truancy, stealing, lying, illicit sexual activities including homosexuality and lesbianism, bullying, cultism, substance abuse, examination malpractices amongst others, appears to have become the current trend among some Nigerian adolescents. These undesirable behaviours if not curbed, may lead to the development of negative personality and may then pose great problems to parents, teachers, the community and to the adolescents themselves. Adolescents with negative personality may lack the will power to set academic goals and achieve them thus posing problems for their parents. It is a problem because an adolescent's inability to make proper choices may result in delayed academic achievements; involvement in antisocial activities and the long-term effects may impact on parents and the society negatively. Negative personality development could be a problem for teachers because the affected adolescent may consistently perform poorly in class and may resort to truancy or bullying. Adolescents with negative personality may pose problems for the community as they may cause serious threats to their immediate communities. Adolescents with negative personality may fall into depression, and the long-term effect of this may lead to poor academic performance. Adolescents, who consistently fail, tend to suffer from self-doubt, criticisms, and shame. In order to be socially acceptable, these adolescents may resort to smoking to boost their confidence, robbery and other antisocial activities; and this may cause untold problems for the parents, community and the adolescents themselves.

Studies have shown that adolescents with negative personality were affected by the personality of their parent(s) and reared in authoritarian homes (Coste, 2015) while

those with positive personality were positively affected by the personality of their parent(s) and raised in authoritative homes (Maliki & Inokoba, 2011). Therefore, the desire to investigate parents' personality and parenting styles as correlates of personality development among adolescents in Egor local Government Area of Edo state has motivated this study.

Hypotheses

1. There is no significant relationship between parents' personality and adolescent personality development.
2. There is no significant relationship between parenting styles and adolescent personality development.

Rationale for the study

This study investigated the relationship between adolescents' personality development, parents' personality and their parenting styles. More specifically, the study examined whether personality influenced parenting style, if parents' personality predicted adolescents' personality development and if parenting styles determined adolescent personality traits; and how each of these variables contributes to the development of adolescent personality. The questionnaire was used to investigate these relationships. The "Big five" model was used in the assessment of parents and adolescents' personality because of the reliability of the scale. Also, it has several useful features such as the positive and negative aspects of each personality traits. Four parenting styles were x-rayed to ascertain the style of parenting that influenced adolescent personality the most.

It is hoped that the outcome of this study will be of immense benefit to teachers, as it will help them understand some of the challenges pupils and students undergo and help them adjust. To parents, it will equip them with up- to - date information bordering on risk factors that predisposes their adolescents to negative personality development and thus redefine their parenting styles and make conscious effort in raising proper adolescents. To counselling practitioners, this study will aid them in providing guidance to adolescents and parents.

More so, a considerable amount of literature on parenting styles and personality has been published, it is therefore hoped that this study will provide a new lens to viewing parents' personality and parenting styles by adding to existing knowledge. Finally, it is hoped that the study will form reference points for future related researches.

Methodology

The study employed the correlational survey design. It was carried out among senior secondary school students in Egor Local Government Area (LGA) of Edo state, Nigeria. Egor LGA is one of the three LGAs within the Benin metropolis and one of the eighteen LGAs in Edo State, Southern Nigeria. The respondents that were used for the study were selected from ten secondary schools, using a simple random sampling technique (balloting). Fractions of students in each school from Senior Secondary Class one to Senior Secondary Class three were calculated to ascertain the proportion of respondents allotted to each school. The parents of all the selected respondents were included in the study.

Three 20-item questionnaires were used. The Big Five Personality Inventory (BFI) was adapted from John and Srivastava (1999). Big five trait taxonomy and also from the NEO five factor inventory (NEO-FFI). The BFI is a 4-point rating scale ranging from strongly agree to strongly disagree. It is divided into two sections and was used to assess parents' personality traits. Section A is on demographic data while section B borders on questions measuring both positive and negative personality traits. The BFI was used to determine the dominating personality trait(s) of the parents. The second instrument, titled Parenting Style Questionnaire (PSQ), adapted from Pitzer (2001) is a 4-point rating scale ranging from strongly agree to strongly disagree. It is divided into two sections. The first section is on demographic information of respondents while the second section generated information based on the four parenting styles (authoritarian, authoritative, permissive and neglectful). This questionnaire was exclusively for the parents of the respondents. The third instrument titled Adolescent personality development questionnaire (APDQ) adapted from Lounsbury, Tatum, Gibson, Sundstrom, Hamrick and Wilburn (2003) is also a 4-point rating scale questionnaire with only one section. It was used to measure positive and negative personality traits of adolescents.

Procedure

Permission to gather data from students was granted by the school principals. Code numbers were assigned to each of the questionnaires. The code numbers of the students tallied with that of the parents. This was to enable researchers match parents to their adolescents. These code numbers were assigned with the help of the class teachers. The students' questionnaires were retrieved immediately they were duly completed; while that of the parents were sent home through the students and were retrieved on a later date. The Pearson Product Moment Correlation was used to test the hypotheses.

RESULT

Table1 Correlation between parent's personality and adolescent personality development

Variables	N	Pearson's r	p-value (sig. 2 tailed)
Parents' personality/ Adolescent personality development	200	.351	.000

α = 0.05

Table 1 shows a Pearson's r value of .351 and a P value of .000. Testing at an alpha level of .05 showed that the P value is less than alpha value; this means that the null hypothesis which states that there is no significant relationship between parents' personality and adolescent personality development was rejected. It therefore implies that there is a significant relationship between parents' personality and adolescent personality development.

Table 2: Pearson's Product Moment Correlation of parenting styles and adolescent personality development

Variables	N	Pearson's r	p-value (sig. 2 tailed)
Parenting styles/			

Adolescent personality development	200	-.103	.146

α = 0.05

Table 2 shows a Pearson's r value of -.103 and a P value of .146. Testing at an alpha level of .05, the P value is greater than the alpha level. Thus, the null hypothesis which states that there is no significant relationship between parenting styles and adolescent personality development is therefore retained. This suggests that parenting styles does not determine the personality development of adolescents.

Discussion

The findings of this study first showed that the influence of parents' personality on adolescent personality developments could be very remarkable. Personality is genetically based, that is, personality traits can be inherited (De Fruyt *et al*. in Schofield, Conger, Donnellam, Jochem, Widaman & Conger, 2013).To buttress this, Kamarulzaman (2012) noted that the openness personality traits like every other personality trait can be transferable from parents to their young ones. Personality is of various traits; parents could have two or more of the traits which is either positive or negative. For instance, Openness to experience is a two-sided personality trait: openness vs. closedness. Parents with higher openness personality traits are classified as being "open", they are very creative, emotionally stable, flexible and always motivated to seek new knowledge; while parents with lower degree of this personality trait (closed) are mostly conventional, and more opposed to change. These same traits from parents may be transferred to adolescents.

Similarly, Schofield *et al*. (2013) found that parents with higher traits of openness, agreeableness, emotional stability and conscientiousness will demonstrate positive and supportive behaviours toward their adolescents; while parents with higher traits of neuroticism will express anxiety, depression and extreme self-consciousness; and the young ones may copy either the positive or negative behaviours and these could contribute to the development of their personality.

Undesirable behaviours among adolescents such as truancy, alcohol intake, drug abuse, and illicit sexual relationships may stem from the personality traits inherent in adolescents. To affirm this, Ibigbami (2012) opined that the trait of extraversion correlated positively with risky sexual behaviour; this therefore implies that adolescents having the extraversion trait may engage in premature sexual activities more often than adolescents with traits of openness to experience, conscientiousness, agreeableness and neuroticism. In same study Ibigbami (2012) also found that individuals with openness personality traits were prone to use alcohol more than adolescents having conscientiousness, extraversion, agreeableness and neuroticism personality traits.

Secondly, parenting style was found to have no significant relationship on the personality development of adolescents; even though several studies have shown that there is a relationship between parenting styles and adolescent personality development. Mohammad, Nasirudin, Mona and Amin (2012) found that there was a direct and significant relationship between authoritarian parenting style and personality trait of neuroticism; Edobor and Ekechukwu (2015) found that

authoritative parenting style has a positive and significant relationship with extroversion. Coste (2015) found that Juvenile delinquency is directly linked to the parenting style adopted in raising young ones, Rosli (2014) from his findings, established that children who lived in a neglectful home showed higher level of depression and low self-satisfaction which is typical of neuroticism.

Despite the positive relationship between parenting styles and adolescent personality development arrived at from previous studies, the findings of this study showed no relationship between parenting styles and adolescent personality development. The difference in the results was in consonance with Edobor and Ekechukwu (2015) where it was established that assumption of extroversion, agreeableness and neurotic personality traits does not depend on the style of parenting an adolescent was exposed to. This therefore implies that parenting styles does not determine the personality development of adolescents.

Conclusion

This study was geared at describing the relationship between adolescents' personality development, parents' personality as well as style of parenting. Based on the findings therefore, the following conclusions were drawn. The personality traits of parents are major determinants of the outcome of adolescents' personality development. Personality traits are genetically based therefore; they could be transferred from parents to adolescents. Parenting style does not determine the personality outcome of adolescents.

Recommendations

The study has shown that the thought patterns and behaviours of parents could be imitated by adolescents. To prevent adolescents from assuming negative behaviours, it is recommended that parents always make conscious efforts to demonstrate positive behaviours especially problem-solving skills as it will enable adolescents develop positive personality traits.

Implication for counselling

The findings of this study are relevant to counselling practitioners. Programmes can be organized for parents on televisions, radios, Youtube channels, or other platforms, with the sole aim of interacting with parents on their character and temperament, styles of parenting and the impact each personality trait and parenting styles may have on adolescents. Counsellors can also guide parents through seminars or Parents/Teachers session (PTA) meetings to assuming positive personality traits and parenting styles to enable their adolescents develop positive personality traits which will go a long way in helping the adolescent achieve set goals.

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Effect of digital game-based learning on achievement of primary school pupils in sciences in Enugu State, Nigeria

Ugwuanyi, C.S.
Department of Science Education,
University of Nigeria, Nsukka
Enugu State, Nigeria.

Okenyi, E.C., Ezema, V., & Amoke, C.
Department of Educational Foundations
University of Nigeria, Nsukka
Enugu State, Nigeria.

Abstract

Considering the growing need for the infusion of digital technologies in the teaching pedagogy, the study sought to investigate the efficacy of digital game-based learning on achievement of pupils in sciences. The study adopted pretest-posttest randomized control group design with 45 participants. Science achievement test (SAT) was used to collect data for the research. The instrument was both face and content validate and as well trial tested. The internal consistency and stability indices of the SAT were estimated to be 0.87 and 0.76 respectively using Kuder-Richardson formula 20 and Pearson's product moment correlation. Mean and analysis of covariance were used to analyse the data collected in order to answer the research questions and test the hypotheses. The findings revealed that digital game-based learning significantly ($p < .05$) improved the achievement of primary school pupils at both the post-test and follow-up measures. Pupils who were exposed to DGBL, participated actively during the teaching learning situation than those who were exposed to the traditional method of teaching.

Keywords: *Achievement. Digital game-based learning. Primary school pupils. Sciences.*

Introduction

Improving the academic achievement of learners especially at primary school level has been the efforts of researchers in this twenty first century. Modern teaching strategies are important and most preferred in the technological age. A modern education system uses technology to impart education especially in this twenty first century world. The growing usage of digital games and applied sciences into learning environments has affected both the teaching by educators and the learning of students. The integration of digital games in the educational environment has shown positive results in enhancing the learning process (Trybus, 2014). The emergence of computers and multimedia technologies have led researchers to develop digital content and systems for teaching various subjects at different levels of education. According to Turner, Johnston, Kebritchi, Evans and Heflich (2018), strategically designed and integrated digital games have the potential to increase academic and learning effectiveness.

Several research have examined the effect of digital game-based learning for non-traditional students enrolled in postsecondary education and the implication games can have on achievement and learning outcomes (Chia-Li, Ting-Kuang & Chun-Yen, 2016; Turner, Johnston, Kebritchi, Evans & Heflich, 2018, Ming-Hsiu, Shih-Ting & Chi-Cheng, 2019). Chia-Li *et al*. (2016) found that through the fun and enjoyment of the self-developed instructional RPG, students could engage in an active and effective learning process even when they were not aware of an upcoming test. However, based on the result of Chia-Li, Ting-Kuang and Chun-Yen's study, the effectiveness of RPG as a supplementary reviewing tool for grade 10 geological instruction fell short of researchers' expectations. This is contrary to other several studies that suggested that students learned effectively with instructional games (Chen, Wang & Lin, 2015; Hwang, Wu & Chen, 2015)

Besides, Ming-Hsiu, Shih-Ting and Chi-Cheng (2019) found that after exposing students to game-based instruction intervention, the improvement rate of the students in the low-score group was clearly greater than that of the high-score group, thereby indicating that the game-based instruction increased concentration. Morales (2005) developed mathematical lessons on a website for engaging student in self-learning and found that the time for remedial instruction was significantly reduced. Application of multimedia could assist students in mathematical learning (Damian & Duguid, 2004). According to Nguyen, Hsieh and Allen (2006), web-based learning allowed students to enhance their mathematical learning attitude and promote their learning motivation. The interactive and instantly responsive instructions which are the major aspects of web-based learning help students or learners to construct knowledge (Steen, Brooks & Lyon, 2006; Moyer, Salkind & Bolyard, 2008).

Similarly, Hennessy, Deaney, Ruthven and Winterbottom (2007) opined that the interactive records of information technology instructions could allow teachers to reflect and improve the curriculum design, as well as cultivate student capabilities of independent thinking and problem-solving. Discussions between teachers and students through technology allowed the curriculum to be closer to students' thinking and further promoted their learning quality (Jewitt, Moss & Cardini, 2007). The foregoing indicates the potentials of technology-supported learning such as digital game-based learning (DGBL) in enhancing learners understanding of scientific concepts.

According to Prensky (2001), DGBL refers to the development and use of computer games for the purpose of classroom instructional delivery. Hwang, Sung, Hung & Huang (2012) found that adding instructional objectives and materials into digital games increases students' learning motivation due to the challenging and enjoyable nature of the games. Hung, Huang and Hwang (2014) found that DGBL significantly increased the students' self-efficacy in learning mathematics than the traditional instruction group. Wang and Chen (2010) showed that, with the DGBL approach, students were highly involved in programming activities, which have been recognized as being difficult and boring tasks to most students. Yien, Hung, Hwang, and Lin (2011) revealed positive effect of computer games on students' learning achievement in a nutrition course. Hung, Hwang, Lee, and Su (2012) found that with proper design, digital games could improve students' spatial cognition ability. From the literature, it is found that DGBL could be a good approach for improving students'

learning motivation and achievement. However, none of the studies reviewed considered the effect of DGBL on pupils' achievement in science at primary school level in Nigeria. Thus, the need for the present study. The researchers therefore sought answers to the following questions

1. What is the effect of DGBL on pupils' achievement in sciences at the posttest measure?
2. What is the effect of DGBL on pupils' achievement in sciences at the follow-up measure?
3. What is the interaction of time of measures and treatment on pupils' achievement in sciences?

Materials and methods

Ethical considerations

The researcher strictly followed the ethical standard specifications of the American Psychological Association (APA, 2017).

Design of the study

Pre-test post-test randomized control trial experimental design was adopted by the researchers for the study. Subjects were randomized into experimental and control groups.

Participants

The sample for the study was 45 primary five pupils in primary schools in Enugu State Nigeria. Besides, the accuracy of the sample size was determined using *G-Power*, version 3.1 which gave 0.91.

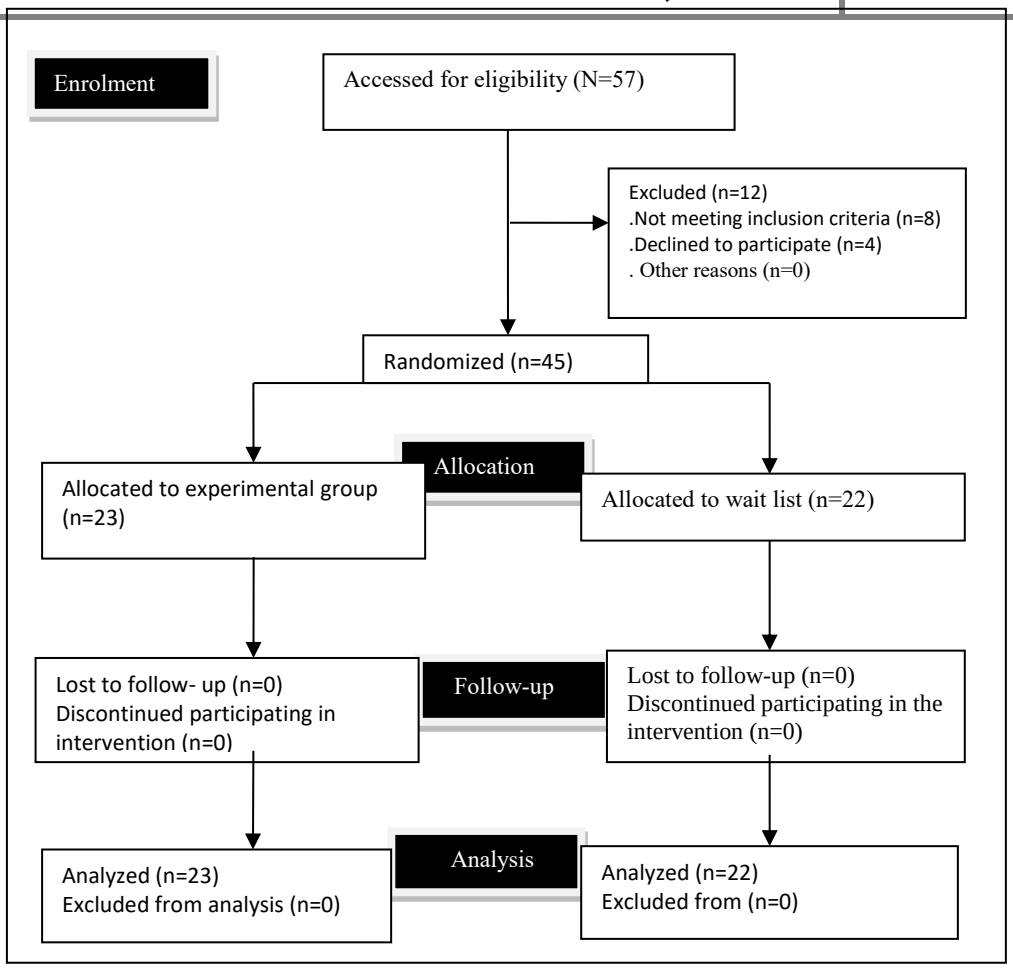

Figure 1: Sampling Distribution for the Study

The demographic statistics of the participants are presented in Tables 1.

Table 1: Demographic information of the participants

Variables	Categories	Treatment group	Control Group	Total
Gender	Male	11(47.83%)	10 (45.45%)	21(46.67%)
	Female	12(52.17%)	12 (54.55%)	24(53.33%)
	Total	23 (100%)	22 (100%)	45(100%)
Mean Age	M±SD	10.13±1.21	10.00±1.09	
Location	Urban	14(60.87%)	12 (54.55%)	26(57.78)
	Rural	9(39.13%)	10 (45.45%)	19(42.22)
	Total	23(100%)	22 (100%)	45(100%)

Measures

The instruments for data collection were Pupils' Demographic Questionnaire (PDQ) and the Science Achievement Test (SAT). PDQ was administered to the pupils before the commencement of the treatment. That helped the researchers to gather the demographic characteristics of the participants. SAT comprised 30 multiple-choice questions of response options A, B, C & D. SAT was developed by the researchers using table of specification to ensure adequate contents coverage. The

items of SAT were generated for content areas of basic science and technology for primary schools. SAT was face validated by three test development experts. An internal consistency reliability index of the SAT was estimated as 0.87 using Kuder-Richardson 20 (KR-20) formula. Temporal stability index of the SAT was found to be 0.73 using Pearson's product moment correlation coefficient.

Procedure

The researchers visited the headmasters of each of the schools in Enugu state Nigeria to notify and obtain permission for the conduct of the research from them. At the course of the visits, the researchers explained to the school authorities what Digital Game-Based Learning (DGBL). Out of a total of 57 pupils screened for participation in the study, 45 indicated interest for the study. Thereafter, Inform Consent Form (ICF) were distributed to them. Prior to that, the researcher wrote the parents informing them about the intervention program which was conducted during 2019 long vacation (July and August). After that, the students who filled ICF were randomly assigned to experimental (23 participants) and control (22 participants) groups conditions using a simple randomization procedure (participants were asked to pick 1 envelope containing pressure-sensitive paper labelled with either E-experimental group or C-control group) from a container by the researchers.

A demographic questionnaire was administered to the eligible participants to access their age, gender, and location as students. In order to remove randomization bias, information from the demographic questionnaire were concealed from the person who randomized the participants to experimental and control conditions. Prior to the commencement of the treatment sessions, pre-treatment assessment (pre-test) was conducted using the SAT in order to collect baseline data (Time 1). Thereafter, the experimental group was exposed to 45 minutes instruction with Digital Game-Based Learning while the control group were exposed to the traditional method of teaching. The program lasted twice a week for a period of 8 weeks. The treatment took place between July and August 2019. Post-test (Time 2) assessment was conducted at the end of the last treatment session. One month after the intervention program, regular follow-up assessment measure (Time 3) was conducted by the researchers. Data collected from the experimental group at each evaluation were compared to that from the control group.

Data analysis

Analysis of covariance (ANCOVA) was used to analyze the data collected. The effect size of the treatment on primary school pupils' achievement in sciences was reported using Partial Eta square and adjusted R^2 values. The assumption of the sphericity of the test statistic was tested using Mauchly test of sphericity which was not significant (Mauchly W=0.874, p=.732), implying that the assumption was not violated. Thus, the variances of the differences between all combinations of the related measures are equal. The analysis was done using statistical package for social sciences version 18.0.

Results

Table 2: Analysis of variance of the effect of digital game-based learning on pupils' achievement in sciences

Time	Measures	Group	Mean (SD)	F	p	η^2	ΔR^2	95%CI
1 Pre-test	SAT	Experimental Control	28.15(3.43) 28.76(4.23)	1.15	.865	.010	.013	0.21, 1.32
2 Post-test	SAT	Experimental Control	58.20(2.12) 35.19(6.43)	24.521	.000	.802	.812	19.17, 35.04
3 Follow-up	SAT	Experimental Control	59.87(2.01) 34.54(6.76)	26.022	.000	.811	.815	19.89, 40.06

PAT = Sciences Achievement Test, Mean (SD) = Mean (Standard Deviation), p = probability value, CI – Confidence Interval, η^2 - effect size, ΔR^2 = Adjusted R^2

Table 2 reveals that there was no significant difference in the achievement scores of pupils in the experimental and control groups as measured by SAT, $F(1,42) = 1.15$, $p = .865$, $\eta^2 = .010$, $\Delta R^2 = .013$. At the post test and follow-up measures, the effect of digital game-based learning on pupils' achievement in sciences was significant, $F(1,42) = 24.521$, $p = .000$, $\eta^2 = .802$, $\Delta R^2 = .812$; and $F(1,42) = 26.022$, $p = .000$, $\eta^2 = .811$, $\Delta R^2 = .815$. The results also showed that there was a significant interaction effect of time and group on the achievement of students in physics, $F(2,42) = 16.852$, $p = .000$, $\eta^2 = .402$, $\Delta R^2 = .221$. Figure 2 shows the graph of the interaction effect of time and group.

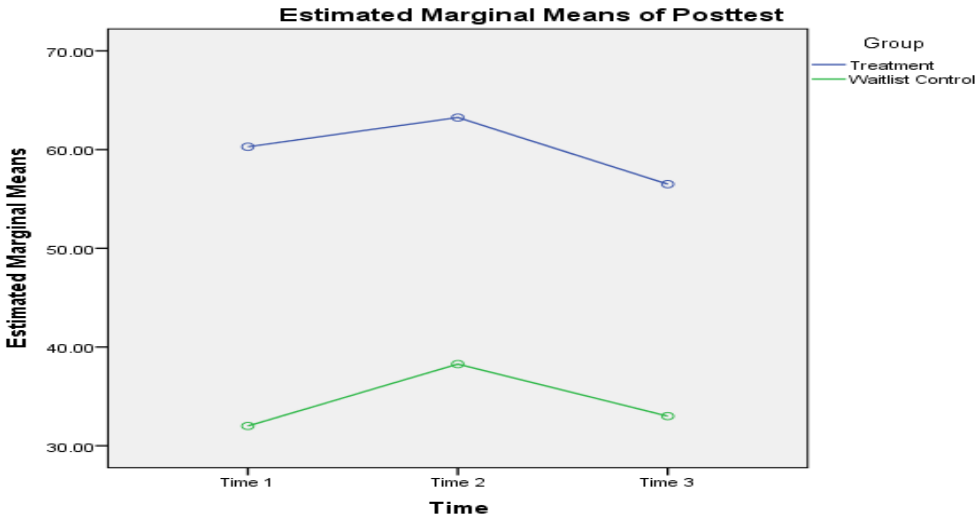

Figure 2: Interaction plot of Time x Group

Discussion of the findings

The findings of the study revealed that digital game-based learning significantly improved the achievement of primary school pupils at both the post-test and follow-up measures. It was found that the pupils who were exposed to DGBL, participated actively during the teaching learning situation than those who were exposed to the traditional method of teaching. The researchers are not surprised on the findings of the study due to the interactive nature of the DGBL which catches the attention of

the study thereby activating their interests during science classes. In line with these findings, Trybus (2014) found that the integration of digital games in the educational environment has shown positive results in enhancing the learning process (Trybus, 2014). According to Maraffi, Sacerdoti and Paris (2017), educational game improves learning processes, and at the same time, renew teaching competences of mentors integrating information and communications technology (ICT), storytelling, and digital game base learning (DGBL) with an ease to realise new didactic product.

These findings aligned with the findings of Turner, Johnston, Kebritchi, Evans and Heflich (2018); Ming-Hsiu, Shih-Ting and Chi-Cheng (2019). Ming-Hsiu, Shih-Ting and Chi-Cheng (2019) found that after exposing students to game-based instruction intervention, the improvement rate of the students in the low-score group was clearly greater than that of the high-score group, thereby indicating that the game-based instruction increased concentration. According to Holzinger, Nischelwitzer and Meisenberger (2005), computer games directly support learning by giving pupils an opportunity to develop knowledge and cognitive skills in an emotional way, to make decisions in critical situations by solving problems, to learn by researching and to experience situational learning. By playing computer games pupils discover and develop their abilities and skills, gain experience, learn and create. Games develop imagination and creativity. Computer games have their meaningful context learning becomes a situation contributing to the formation of a competent and confident individual (Lee & Hoadley, 2007).

Corroborating these findings, Hung, Huang, and Hwang (2014) found that DGBL significantly increased the students' self-efficacy in learning mathematics than the traditional instruction group. Wang and Chen (2010) showed that, with the DGBL approach, students were highly involved in programming activities, which have been recognized as being difficult and boring tasks to most students. Yien, Hung, Hwang and Lin (2011) revealed positive effect of computer games on students' learning achievement in a nutrition course. Hung, Hwang, Lee and Su (2012) found that with proper design, digital games improve students' spatial cognition ability. Blanzenka and Damir (2011) equally found that using mathematical computer games for teaching contributes to more efficient and quicker realisation of educational goals at all levels of education. Blanzenka and Damir further found that using mathematical computer games for teaching influences formation of a positive attitude of pupils of different ages toward mathematics as the most difficult subject and contributes to boosting their motivation, quicker acquisition and long-term knowledge when compared to teaching without mathematical computer games.

Strength of the research

In Nigerian context, there is dearth of literature on the effect of digital game-based learning on primary school pupils' achievement in sciences. Hence, the findings derived from this study have important contribution to the scholarly discussion of the effectiveness of digital games for learning on pupils' achievement in sciences.

Limitations

The generalization of the findings of this is limited to situations with a similar population. Thus, the cultural diversity of population raises the question about whether cultural background may influence the effects of digital games on students.

Direction for further research

Replicating the study in multi-cultural settings would offer an opportunity to confirm results as well as.

Conclusion

The effectiveness of digital game-based learning in enhancing the achievement of primary school pupils in sciences has been empirically found to be significant. This may have been the case due to the fact that during the intervention period, the pupils who were exposed to DGBL were very active in the learning process than their counterparts who were not so exposed. Thus, the use of digital game-based learning enhances pupils' achievement in sciences more than the traditional method of teaching.

Recommendations

Considering the findings of this study, the researchers made the following recommendation;

1. Primary school teachers should be trained to develop the required computer literacy and skills on how to use digital game-based learning for sciences contents delivery of the classroom lessons.
2. The state government in synergy with the school authorities should provide good digital game-based learning facilities which will aid pupils' achievement and technological development to compete with the world at large.

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The effects of video-taped instructional strategy on the academic achievement and retention of chemistry students in Lagos State

Job, G.C.
Department of Educational Foundation,
Faculty of Education
National Open University of Nigeria,
Jabi Abuja, Nigeria

Opeyemi, A.
IHS Towers
Victoria Island, Lagos Nigeria

Abstract

This research investigated the effects of video-taped instructional strategy on the academic achievement and retention of Senior Secondary 2(SS2) chemistry students in Lagos State. The continuous low academic achievement of students in this core science subject has been of major concern to stakeholders in the education sector in Lagos State in particular. The study adopted an experimental design of pretest – posttest factorial design. The population for this study was made up of 4500 chemistry students in Ikorodu and Kosofe LGAs, while the sample comprised 93 SS2 chemistry students selected through multi staged method. The instrument used was Chemistry Achievement Test (CAT). The instrument was validated by experts in Educational Technology and Measurement and Evaluation while the reliability was derived through a test – retest method. Pearson product moment correlation coefficient ® was used to arrive at 0.78. Mean and standard deviation were used to answer the research questions, which indicated that students achieved better when taught with video-taped than conventional methods. On the other hand, t-test was used to analyze the hypothesis, which indicated significant difference between students taught with video-taped and conventional method, amongst others. The study also recommended that video-taped instructional strategies should be used regularly in teaching chemistry in senior secondary schools in Lagos State amongst others.

Keywords: *Academic. Achievement. Chemistry. Instructional strategy. Video.*

Introduction

Instructional strategies have remained the bane of teachers over the years across the globe as most research findings have reported that this may be contributing to the low academic achievement of students, (Abimbade, 2001; Abubakr, 2001; Kozima, 2005). This phenomenon has resulted to the recent emphasis from teaching by the teacher to learning by the learner. Therefore, instruction ought to be learner-centered rather than teacher-centered. The teachers also need to deduce what their students desire to know, how it is important to their life work and how best they can learn. Students generally have different learning styles; hence the teacher is to identify these learning styles and find the most appropriate instructional strategies

that will suit the preferred styles in order to promote effective teaching and learning method in the classroom.

Learning activities usually starts at birth and continue through to the classroom. Formally, learning takes place where facilities and personnel are employed with the aim of preparing all the learners to work as well as participate in the society in which they live. In the same vein, the place of science in national development has been emphasized as opined by Shedrack and Robert (2016). Orukotan (2007) averred that science education has introduced a lot of changes in our world today and will continue to do so in the future. Achievement in science education will go a long way in reducing illiteracy and poverty, which are impediments to national development (Nwachukwu, 2008). Science amongst other inventions contributes to the quality of life in such areas as health, agriculture transportation, material and energy production, and industrial development.

The integration of Information and Communications Technology (ICT) into teaching and learning has engendered positive changes in the educational sector. This has served as a substitute to the diverse methods of teaching, learning, acquisition and use of instruction, training and development, instructional aids as well as sharing of resources (Akinboboye, 2016). This has also offered more opportunities for new teaching methods such as student-centered teaching and provided greater opportunity for teacher-to-teacher, student-to-student and teacher-to-student relationship, (Akinboboye, 2016) This has also ensured provision of and broadening access to new resources, services for teachers and students; thereby strengthening the quality and quantity of education delivery as well as improving the efficiency of education administration and management (Fisseha, 2011).

As a science discipline, chemistry is concerned with compounds composed of atoms, i.e. elements, and molecules, which include their composition, structure, properties, behavior and the changes they undergo during a reaction with other compounds, (Reinhardt, 2001) In the scope of its subject, chemistry occupies an intermediate position between physics and biology (Reinhardt, 2001). This is sometimes called the central science because it provides a foundation for understanding both basic and applied scientific disciplines at a fundamental level. Chemistry as a branch of science has attained a unique position in the school curriculum as an essential part of general education for life. Chemistry enables learners to understand what happens around them and the most interesting aspect of chemistry is that it applies to our daily lives. In order words chemistry is a real-life science subject (Fahmy, 2000).

In Nigeria, the inclusion of chemistry in the curriculum of secondary schools and Technical Colleges of Education has been justified for attracting youths to careers with chemistry options and commended as innovative creating wealth of experiences for the educated citizenry (Igwe, 2002). Chemistry curriculum is designed in such a way as to show inter-relationships between the subject (chemistry) and other science subjects (biology and physics) and to satisfy requirements for senior secondary school programme in the National Policy on Education, (Igwe, 2002). Students are required to learn chemistry by understanding, which demands a mastery of reasoning capabilities of students at the formal operational stage, (Fahmy, 2000). The curriculum content is organized around major concepts of energy, periodicity

and structure, which subsumed many other chemical concepts. The objectives of Chemistry curriculum as specified in the Senior Secondary School syllable are:

a. To facilitate transition in the use of scientific concepts and techniques acquired integrated science (now basic science) with chemistry.

b. To provide basic knowledge in chemistry concepts and principles through efficient selection of contents and sequencing.

c. To show inter-relationships between chemistry and other science subjects

d. To show chemistry and its link with the industry, everyday life, hazards and benefits, and

e. To provide students not proceeding for higher education with adequate foundation for other future careers (Igwe, 2002).

The teaching of chemistry helps to imbibe scientific knowledge and stimulate science-oriented attitude in learners (Odutuyi, 2012). This attitude when directed to the world of work results in the development of the individual, the society and general standard of living of the citizenry. Therefore, the place of chemistry knowledge and skills in economic and industrial development in the Nigerian society cannot be underestimated, (Odutuyi, 2012). Chemistry goes beyond processes in chemical industries to other industries such as fertilizers, petroleum, paper and pulp, iron and steel, cement, coal, glass, electronics and so on, (Odutuyi, 2012). It plays major roles in the vital sectors of the economy, execution of other professions and improvement of quality life. The acquisition of professional qualification in chemistry equips an individual with skills to be self-employed because chemistry involves the use of process skills which are the paths for ways and strategies followed by the chemist in order to arrive at the products of science, (Falilat & Are, 2017).

Despite the central position of chemistry among science subjects and its importance in sustaining sustainable economic growth and development, the academic achievement of Chemistry students in (SSCE) over the years is not encouraging (Baanu, Oyelekan & Olorundare, 2016). The realization of the goals of chemistry to some extent has been impeded because the achievement of students in the subject remains low in Nigeria (Adesoji & Olatunbosun, 2008). The low academic achievement in sciences especially chemistry in (SSCE) attests to the fact that chemistry teaching and learning and the conditions under which they take place need to be re-examined. In recent times such a re-examination focused on assessing teacher-students' interaction patterns and how this can serve as a source for enhancing students' performance in the subject (Odutuyi, 2012).

Teaching and learning processes are very crucial at all levels of educational development. If well planned and directed, they are the keys to success and progress of an individual. Therefore, best methods must be used in order to enhance effective teaching and learning. It is therefore pertinent to employ the use of audiovisual resources to enhance effective teaching and learning (Ode, 2010). Audio-Visual Instructional method refers to the integration of sound and pictures, which are presented in form of slides and video clips and recorded speech and

music, which are visually presented to the students by the teacher. Audio-visual aids are those instructional aids which are used in the classroom to encourage teaching learning process, Singh (2005) defined audiovisual aids as any device which by sight and sound increase the individual's experience beyond that acquired through reading. Audio-Visual aids are those instructional devices which are used in the classroom to encourage learning and make it easier and interesting.

This study leaned on the constructivist theory as the theoretical framework. Constructivist theory implies that learning is a process whereby learners are actively involved in the process of constructing relevant knowledge. In contemporary terms, Bransford, Brown and Cocking (2000) submitted that learning involves constructing new knowledge and understandings based on what is already known and believed. However, Schunk (2001) quoted in Valcke, (2010: 238) explained that constructivism does not propound that learning principles exist and are to be discovered and tested, but rather that learners create their own learning. This perspective that learners 'create' own learning supports the idea that students bring their own created experiences to the learning process but require adequate support in during the learning process (Simons & Bolhuis, 2004). For us to understand the process, it is necessary to be aware of different ways in which each student learns by establishing what the learner already knows and believes. Within this context, education be a form of dialogue at different levels between educator and students (Fransen, 2006; Laurillard, 2002) which can lead to a co-constructivist approach between the students and teacher (Carnell, 2007). It is therefore important to understand the role of knowledge construction during teaching and learning. When deploying video and considering its educational effect, it can be helpful to keep the constructivist perspective clearly in focus to ensure that the student is assisted in taking an active role in constructing the relevant knowledge (Hattie, 2009). Because by its nature, video viewing is often passive, therefore remains a continual challenge on how to activate the learning process of students in order to stimulate them to construct relevant knowledge from what is presented on screen (De Boer, 2013).

Guo *et al*. (2014) opined that several principles are presented give guidelines in the arrangement and presentation of e-learning materials effectively. Accordingly, words should be synchronized with the relevant graphic (i.e., contiguity principle). Also, words should be presented as audio rather than on the screen as text (i.e., modality principle). While visuals should be explained with words or text, and graphics should support rather than distract from the content (i.e. coherent principle). In the same vein, lesson content should be carefully planned and segmented into more manageable sections. It is obvious that this segmentation, also known as chunking, can lead to better understanding and retention. Video content should take into consideration the aspects of human cognition in learning. How much information, in what format and through which channels (audio/visual) can a student acquire and for what specific learning goals? To learn effectively, a student should be made aware of this process and how they learn.

Educational technologists are of the view that video-taped instruction has high potential in teaching and learning situation (Abimbade, 2001; Abubakr, 2001; Kozima, 2005). Video-taped instruction like some other audio-visual aids can multiply and widen the channels of communication between the teacher and the students (Kozima, 2005). It has the qualities of providing a semi-permanent, complete and

audiovisual record of events (Agommuoh & Nzewi, 2003). It is a method that has the potentials of increasing the probability that students will learn more, retain better and thus improve performance. Video-taped instruction reduced abstractions as well as boredom among students in the classroom and laboratory (Adams, 2011). In the same vein, the benefits of colour, sound and motion attached to video-taped package will be of interest to students who are the target of the study (Bada, 2006). Students could receive individual instruction with videotapes at their own pace, and as when they needed it (Mitchell & Surprise, 2007). It is relevant for both homogenous and heterogeneous sets of learners (Ajayi & Dudan, 2000). It is the commonest, cheapest, and easiest to operate among Information Communication Technology (ICT) gadgets and can be afforded by schools for the purpose of teaching and learning processes (Fowoyo, 2006).

Despite the enumerated advantages, video has been criticized as having some shortcomings. It is considered dominant in instructional setting, as learners in most cases remain passive during the period of receiving instruction that is with little or no involvement (Lendha & Stone, 2002). Several studies indicated that multimedia such as video and computer can improve learning and retention of material presented during a class session or individual study period, as compared to "traditional" lectures or study materials that do not use multimedia (Anyanwu, Gambari & Ezenwa, 2013; Gambari & Olumorin, 2013; Anyanwu, 2013; Gambari, Yaki, Gana & Ughovwa, 2014; Mayer, 2001). A study in Greek reported that primary school pupils taught Physical Education using Multimedia Computer-Assisted Instruction (MCAI) performed better than those that used the traditional approach (Siskos, Antoniou, Papaioannou & Laparidis, 2005). In the study, the effects of four video instructional types were examined, that is, Text + Animation (TA), Text + Narration (TN), Text + Animation + Narration (TAN) and Text Only (TO). In another study, Gambari, Ezenwa and Anyanwu (2013) found that students taught geometry with Animation with Text (AT) performed better than those taught with traditional method. Similarly, on Animation with Text (AT) mode, Yen, Lee and Chen (2012) reported that the group using image-based (animation) concept mapping showed higher level than the text- based group in the dimension of understanding and creating. Similarly, Mahmood (2002) revealed that Computer Assisted Instruction (CAI) involving Animation with Text (AT) and Animation with Narration (AN) improved students' achievement in mathematics. However, Koroghlanian (2000) found that participants in the Text treatments achieved the same as participants in the Audio (narration) treatments on both the practice and post-test. In another study, Jolly (2003) reported no significant differences in the performance level of the students in animation-with text as compared to graphics-with-text when exposed to Life Cycle of a Monarch Butterfly in Biology.

Empirical evidences on Animation and Narration (AN) mode of multimedia are inconclusive. For instance, on Narration with Text (AN) mode, Mayrath (2009) found that students who received the voice-only (narration) tutorial performed significantly better on the transfer test than students who received the text-only tutorial. Gambari, Ezenwa and Anyanwu (2013) reported no significant difference between students taught geometry using animation with narration and those taught using Animation with Text (AT). However, those taught using animation with narration performed better than those taught with traditional method.

Ayogu (2000) stated that when videotape is used to compliment instruction, it can:

i. Reduce abstractions in class lesson;
ii. Reduce boredom among students and teacher;
iii. Conserve the teacher's energy;
iv. Allow moral learning autonomy among students;
v. Restructure the learning environment;
vi. Make learning interesting and motivating to students;
vii. Minimize the problems of large class size;
viii. Promotes students' participation in classroom;
ix. Reduce problem of insufficiency learning resources, and materials;
x. Encourage individualized learning.

It is important to understand different learning preferences within the student population and it can be helpful to allow them to learn at their own pace (Schwartz, 2013). This can enable content to be provided in a variety of formats other than the traditional classroom setting (e.g., video) with the potential to make learning more accessible to students with different learning preferences. A number of different ways in which students actually view video teaching have been identified. Some students watch the entire video in one go without stopping, some watch it again having already viewed it, some select a part of the video and view it multiple times, and some 'zap' through it skipping from one section to another (De Boer, 2013). This feature is referred to by Laurillard (2002) as self-pacing which provides greater learning control. It is important for teachers using video in their teaching to understand the individual learning patterns of students and how these can impact the effectiveness of learning.

Statement of the problem

In recent years, the level of understanding and commitment of chemistry students as reflected in their academic performance in external examinations has not been impressive over the years, particularly in Lagos state. This has triggered perpetual worries to science educators and especially chemistry teachers because the bulk of the blames of this downward trend in achievement of chemistry students in public examinations has been shouldered on either directly or indirectly on the teachers' poor knowledge of the subject, method of subject delivery , non-commitment and poor dedication to duty. This situation worsens especially at this era of information technology where the use of Global System for Mobil Communication (GSM) by secondary school students has eroded deep into the academic interest of the students. This poor achievement in academics has been confirmed by the analyses of results of the performance of candidates in May/June West African Senior Secondary Certificate Examination (WASSCE) in chemistry from 1999-2016 WAEC (2016). Asiem, Bassey, & Essien (2015); West African Examination Council (WAEC) (2016) reported on the performance of students in West African Senior School Certificate Examination (WASSCE) chemistry from 2014-2016. In these reports, the mean performance score in chemistry essay was 35 in 2014; 36 in 2015; 37 in 2016.

In Practical, the mean score in 2014 was 29; 22 in 2015 while in 2010 it was 24 (Asiem, Bassey & Essien (2015). These poor achievements in chemistry are reflected in several other years of the students' performance in external examinations such as WAEC as shown below. The effect of this poor achievement has resulted in backwardness in development of science related courses in higher institutions, high rate of students drop-out, food insecurity, economic meltdown and others (Igwe, 2002).

Performance of Chemistry Students in WAEC in Lagos State

Year	Total Pass (A1-C6)	Mean Score
2002	47	42
2003	36	30
2005	39	32
2007	46	37
2013	44	39
2014	40	35
2015	42	36
2016	47	37

Source: Research and Statistic Unit, WAEC, Lagos 2016

These repeated poor performances of secondary school students in Chemistry have been attributed to various variables, and research works have also been mounted on most of these variables. But lately, the calls for urgent use of other instructional strategies in teaching Chemistry have been persistent. Hence this work is poised to find out if there exist any effect on the use of videotaped instructional strategy on the academic achievement and retention of Chemistry students in Lagos State.

Research questions

The following research question was used for this study:

- What is the mean difference in the academic achievement of chemistry Students taught with videotaped instruction and those taught with conventional method?
- What is the mean difference in the retention ability of chemistry students taught with videotaped instruction and those taught with conventional method?

Research hypotheses

The following hypotheses were tested at 0.05 level of significance

- There is no significant mean difference in the academic achievement score of students taught chemistry with videotaped instruction and those taught using conventional method

- There is no significant mean difference in the retention of students taught chemistry using videotaped instruction and those taught with conventional method

Research design and methodology

The pretest, posttest factorial design i.e. two levels of instructional strategies – video-taped and conventional were adopted for the study. The experimental and control groups were given the pretest before the treatment. Experimental group 1 was exposed to video-taped instructional design while Experimental group 2 was taught using conventional method.

Sample and sampling procedures

The sample for this study consisted of a total of 91Senior Secondary 2,(SS II) Chemistry Students. The researcher adopted Multi-staged sampling technique to select the sample from the population of 4,500 Chemistry students in Ikorodu and Kosofe Local Government Areas (LGA) in Lagos State. First, a purposive random sampling was adopted to select 4 Senior Secondary Schools (1 private and 1 public schools) each from the 2 LGA in Lagos State. These four schools were purposively sampled based on infrastructure (laboratories, manpower), gender composition (male and female), school type (private and public), and student's enrollment for WASSCE. Secondly, Intact Class method was used to capture the entire students in SS II Chemistry classes from the selected schools. Two schools (one public and one private) were designated experimental and control groups respectively. Thirdly, simple random sampling was used to assign individual learners to the treatment groups.

Instrumentation

The test instrument used in this study was a self-designed Achievement Test known as Chemistry Achievement Test (CAT). The CAT consisted of a 15 multiple choice objective items adopted from the past Senior Secondary School Certificate Examinations of West African Examinations Council (WAEC) and the National Examinations Council (NECO) questions (from 2005 - 2017). The Chemistry Achievement Test (CAT) was based on SS2 curriculum. The CAT was administered as pre-test and posttest to the experimental and control groups.

Validity

The instrument was face and content-validated by experts in the field of Chemistry Education, Educational Technology and Measurement and Evaluation.

Reliability of instrument

The instrument was face and content-validated by experts in the field of Chemistry Education, Educational Technology and Measurement and Evaluation. To test the reliability of the CAT, a random sample of 20 (SSII) students who were part of the research population but not part of the sample for the study were selected. The test was administered on the pilot sample. The data collected was tested using the test-retest method. The reliability coefficient of the instrument was 0.78 using Pearson Product Moment Correlation.

Data collection procedures

The researcher visited the four Senior Secondary Schools selected for the study in Ikorodu and Kosofe Local Government Areas of Lagos State, where he briefed and sought permission and cooperation of the school's management to conduct the experiment. There -after, intensive teaching commenced in the four (4) selected schools. The schools were used as both the treatment and control groups. The control groups were taught by the subject teacher using the conventional method (chalk and talk teaching process). An Adapted Video-taped lesson was used to teach the students the Periodic table of elements. The classes used were SS II Chemistry Students. The teaching lasted for one week and the Chemistry Achievement Test (CAT) was administered to the two treatment groups (experimental group 1 and experimental group 2). The tests were marked, and the scores were recorded appropriately. The students were given a retention test 14 days after administering the posttest.

Statistical analysis procedure

The data obtained from the schools were subjected to descriptive statistics using mean and standard deviation. The null hypotheses were tested at 0.05 level of significance using t-test.

Research question 1:
What is the mean difference in the Academic Achievement of Chemistry Students taught with videotaped instruction and conventional method?

Table 1
Posttest Mean Achievement Scores of Students using video-taped and conventional method

Instructional Design	N	Post-test Mean	Std. D	Difference of Means
Video-taped method	43	18.40	1.58	8.20
Conventional method	50	10.20	2.49	

The result in table 1 shows the difference between the Mean Achievement Scores of Students who were taught Chemistry with videotaped instruction and those taught using conventional method. The result shows that the students taught with videotaped instructional strategy had a mean achievement score of ***18.40*** while those taught with conventional strategy had a mean achievement score of **10*.20***. The difference between the mean achievement scores (***x = 8.20***), which infers that students performed better when taught Chemistry with Video-Taped Instructional Design than in Conventional Instructional Design.

Research question 2:
What is the mean difference in the Retention of Chemistry students' academic achievement taught with videotaped instruction and conventional method?

Table 2
Retention test Mean Achievement Scores of Students

Instructional Design	**N**	**Mean**	**Std. D**	**Mean Difference**
Video-taped method	43	17.72	1.58	9.12
Conventional method	50	8.60	2.19	

The result in table 2 shows difference in retention of students taught in Chemistry with videotaped instruction compared to those taught using conventional method. The result shows that the students taught with videotaped instructional strategy had a mean retention score of ***17.72*** while those taught with conventional strategy had a mean achievement score of **8.60**. The difference between the mean retention scores (***x = 9.12***) infers that students retained knowledge better when taught Chemistry with Video-Taped Instructional Design than in Conventional Instructional Design.

Hypothesis discussion
H_1: There is no significant mean difference in academic Achievement score of Students taught Chemistry with videotaped instruction and those taught using conventional method

Table 3
T-test table showing mean achievement scores of students in both instructional design

Instructional Design	N	Mean	Std. D	df	t	t crit	P	Remark
Video-taped method	43	18.40	1.58	91	18.35	1.987	0.05	Significant

Conventional method	50	10.20	2.49					

Tw0-tailed: p<0.05

Table 3 shows the difference in achievement scores of students taught using Videotaped and Conventional instructional design. The table shows that there is significant difference in achievement scores of students taught using Videotaped and Conventional instructional design. (df = 91; t = 18.35; p<0.05). Based on this result, the null hypothesis is not accepted.

H_2 There is no significant mean difference in retention of Chemistry students' academic achievement taught with videotaped instruction and those with conventional method

Table 4 T-test table showing Mean Retention Scores of Students in both Instructional strategies

Instructional strategies	N	Mean	Std. D	Df	t	t crit	P	Remark
Video-taped method	43	17.72	1.58	91	22.73	1.987	0.05	Significant
Conventional method	50	8.60	2.19					

Tw0-tailed: p<0.05

Table 4 shows difference in retention of students taught in Chemistry with videotaped instruction compared to those taught using conventional method. The table shows that there is significant difference in mean retention scores of students taught using Videotaped and Conventional instructional design. (df = 91; t = 22.73; p<0.05). Based on this result, the null hypothesis is not accepted.

Discussion of findings

The mean achievement post-test score of students in the experimental group was higher than that of the control group. Thus, there was significant difference in their mean achievement score. Students taught with videotaped instruction performed better than those taught with the conventional method. There was also significant difference in mean retention scores between the experimental and control group. The experimental group taught with videotaped design could produce learning contents better than those with conventional instructional design. This result has established that teaching methods were significant factors on students' achievement in Chemistry. The results of the study was consistent with Akinpelu (2003), Ajelabi (2008), Salawu (2009), Abubakar (2001), Agommuoh and Nzewi (2003) and Osokoya (2007) who indicated that students taught using video-taped instruction performed significantly better in achievement than those taught using the conventional method.

Conclusion

Information Communication Technology (ICT) has resurfaced the quality and quantity of Science delivery in educational institutions. In recent times, the performance of students in Chemistry which is a science of nature and utilization of natural substances and creation of artificial ones have not been impressive due to the method of delivery of the subject in conventional strategy. This research presents the video-taped instructional strategy as a panacea on the on-going performance problems. Students taught with the video-taped instructional strategy achieved better than students taught with the conventional/traditional method. Achievement was greatly improved by the use of video-taped instructional approach in teaching Chemistry. From the above results, it is obvious that Video-taped instructional design is more effective than the conventional strategy. It is more effective for the cognitive and attitude development of the students than the conventional method as there is a significant difference in the achievement score of both groups. Video-taped instructional strategy helps to develop higher order cognitive skills and appeal the student psyche towards learning. It can thus be concluded that the use of animations, sound, and video and audio clips makes the lessons attractive and affective.

Recommendations

The following recommendations are advanced from this study:

- For students' better academic achievement and positive attitude development, Video-taped instructional strategy should be used in teaching of Chemistry
- Multimedia Infrastructure should be provided to schools for teaching of Chemistry in secondary schools
- Chemistry teachers should practice the use of viewing programmes on video-tapes as part of their teaching methods
- Chemistry curricula should be tailored toward Video-taped instructional strategy which moves us toward the constructivist approach of learning in which learner plays an active role in the teaching and learning process
- Authors of Chemistry textbooks and publishers should lay emphasis on the use of video-tape instruction in their textbooks
- Ministries of Education, School Management Boards as well as professional educational bodies should arrange seminars, workshops and conferences on the training of Chemistry teachers on the use of video-taped method in the Nigeria secondary schools.

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Level of test anxiety as a factor in test score characteristics in South West Universities in Nigeria

Aladenusi, O.
Department of Educational Psychology
Federal College of Education (Technical)
Akoka-Yaba, Lagos State, Nigeria

Abstract

Scores generated from test instruments should be investigated for its accuracy and precision. Test scores without these validity and reliability are meaningless and cannot be used for accurate decision making. Investigating and providing evidences of score validity and reliability with respect to level of test anxiety are the main objective of this study. This study examined the levels of test anxiety on score validity and reliability using cognitive measures. Causal comparative research design was adopted, 400 participants were randomly selected from two Federal and two State Universities in South-West, Nigeria. Achievement tests in English Language MCQ and Test Anxiety Inventory (TAI) were used to collect data. Results indicated among others are that: the tests score reliability of cognitive tests with respect to level of test anxiety was not significant ($\chi^2(1) = 0.0040, p > 0.05$). Based on the findings of this study, it was concluded that examinees level of test anxiety yielded no effect in score reliability. Recommendations made among others were examinees should be kept at a low level of anxiety for accurate test scores to be yielded.

Keywords*: Cognitive measures. Anxiety. Characteristics. Test. Test Score.*

Introduction

Test scores have two inherent characteristics called validity and reliability. The evidence of validity and reliability are requisites to ensuring the integrity and quality of test scores. These are important concepts in modern research, as they are used for enhancing the accuracy of the assessment and evaluation of a research work (Tavakol & Dennick, 2011). Test scores are generated from psychometric instruments such as tests, questionnaires, observer ratings among others, which are used in research, education, and administration. Psychometric instruments are used in educational and psychological research and practice to obtain information for theory building and decision making.

Examinees are subjected to variety of testing situations, such as school examinations and entrance examinations for promotion, admission and placement. However, it could be observed that many of these scores do not represent the ability of these students on certain construct of interest for such accurate decision making. If the test scores are not valid, they misrepresent students' true level of knowledge. Therefore Jimoh and Omorege (2012) posited that any action that undermines examinations poses a great threat to the validity and reliability of the examination results and its certification. It is imperative that those who use tests can evaluate

whether the data they obtain so cleverly are any good in the first place (Cone & Foster, 1991).

The field of educational measurement appears to have reached a broad consensus that score validity should be a judgment of the degree to which arguments support the interpretations and uses of test scores (Kane, 2013). Anastasi and Urbina, (2012) advanced that the validity of a test concerns what the test measures, how well it does so and what can be inferred from the test scores. Whenever a test user wishes to make an inference from test scores, the validity of those inferences must be verified. All evidences provided strengthens the argument that the construct of interest is the construct the scores represent. A key point to understanding validity is the realization that it is not the test that is valid or invalid, but the test scores and the proposed inference the test user wishes to make that are valid or invalid. Score validity deals with the degree to which scores from a measurement measure the intended construct (Thompson, 2003). Score validity is about whether the inference one makes is appropriate, meaningful, and useful given the individual or sample with which one is dealing and the context in which the test user and individual/sample are working. That is, one cannot separate validity from the sample from which, or the context in which, the information was obtained (Zumbo, 2009). Hubley and Zumbo (2011) posited that validity is about the inferences, interpretations, actions, or decisions that are based on a test score and not the test itself. Violations of score validity severely impact the function and functioning of score interpretations.

Reliability is a measure of stability or consistency of test scores. Anastasi and Urbina (2012) posited reliability to be the consistency of scores obtained by the same person when re-examined with the same test on different occasions or with different sets of equivalent items, or under other variable examining conditions. An instrument (test) yield scores from testees on the number of times the test is administered, and the scores generated from the testees will have internal consistency to consider the scores reliable. Score reliability is of utmost importance in measurement because it is a necessary but not enough condition for score validity, any weakness in score reliability will impact the validity of an instrument used (Russel, 2008). In other words, poor score reliability often compromise the ability of the scores to measure the intended constructs. Thus, the validity of any scores are influenced directly by the reliability of the data and none of these things can be correctly interpreted without examining the reliability of one's data (Nilsson, Schmidt & Meek, 2002). Poor score reliability may compromise score validity. Lack of score reliability has a direct consequence on the uses of test scores. Ghiselli (1964) stated that unreliable scores are of little value when we wish to compare two or more individuals on the same test, to assign individuals to groups or classes, to predict other types of behaviour, to compare different traits of an individual, or to assess the effects of various systematic factors upon an individual's performance (Jönsson, Hahn & Olsson, 2015).

Examinee characteristics cannot be ignored when it comes to performance in the classroom. Examinees are of different behaviours as a result of the inherited traits in them that may also interplay in their performance. A trait can be thought of as a relatively stable characteristic that causes individuals to behave in certain ways. Potentially, test anxiety is one of those stable traits that may affect score validity and

reliability. Test anxiety has been shown to be a relatively stable trait associated with test performance in many situations, including testing in schools (Kuku & Oladesu, 2019; Lang & Lang, 2010). Text- anxiety is a variable that could influence what one does before, during and after the examination (Okubanjo, 2009). It may be undeniable that nearly everyone is affected by test anxiety which may affect the consistency of scores in an examination. It has been found that students consistently perceive examination as a source of increase in anxiety and a situation engulfed with uncertainty/unfairness in letting them demonstrate their true achievements (Zollar & Ben-chain, 1990). Anxiety is an undesirable emotional state which is associated with perturbation, dread and phobia which may alter score validity and reliability.

Research Hypotheses

1. There is no significant difference in the validity of English Multiple-choice test scores based on level of test anxiety.
2. There is no significant difference in the reliability of English Multiple-choice test scores based on level of test anxiety.

Methodology

Research design

The research design adopted for this study is causal comparative design in which the participants were exposed to the independent variable which was the levels of test anxiety which can either be low or high. The dependent variables involved cognitive test of English Language multiple choice achievement test scores.

Population of the study

The population of the study consists of students attending pre-degree classes in public universities in South-West, Nigeria. Students in this category are expected to sit for the Joint Admission Matriculation Board (JAMB) examination to confirm their admission into the degree programmes. The public universities with the pre-degree programme in South-West Nigeria are; Olabisi Onabanjo University (OOU), Ago-Iwoye in Ogun-State, Ladoke Akintola University (LAUTEC), Ogbomosho in Oyo-State, Federal University of Agriculture (FUNAAB), Abeokuta. in Ogun- State, Tai-Solarin University of Education (TASUED), Ijebu-Ode in Ogun-State, Obafemi-Awolowo University (OAU), Ile-Ife in Osun-State, Adekunle Ajasin University (AAUA), Akungba in Ondo-State, Ekiti-State University (EKSTU), Ado-Ekiti in Ekiti-State, Osun-State University (UNIOSUN), Osogbo in Osun-State, Federal University of Technology (FUTA), Akure in Ondo-State. In all the nine (9) universities that were in this category, each of them has a pre-degree students population that ranges between 140 and 5000.

Sample and sampling techniques

The sample for this study comprised of 400 pre-degree students in selected institutions. The institutions from the public Universities in South-west, Nigeria where there are pre-degree students and computer center for CBT were selected through stratified random sampling technique. Federal and State Universities was the basis for stratification. Two universities were randomly selected from the State and Federal Universities. The systematic random sampling technique was also used to select the participants for the study in each of the Universities. Students nominal roll of the

Universities were collected, and the serial number of each student was used to pick the participants in the sample.

Research instrument

Self developed Achievement Test in English (ATE) was used to collect data via CBT, and, Test Anxiety Scale to assess the level of anxiety of each participant was adopted for the study. The English achievement test consist of two sections; section A and B. Section A was used to generate information pertaining to the participants in terms of name, age, gender, name of institution, etc. While section B were 50 items in English multiple choice based on the table of specification below (Table 2). The instruments were validated using table of specification, item analysis and pilot study. The reliability of the scores generated from the ATE using Cronbach Alpha was estimated at 0. 71. Sarason test anxiety scale was adopted. This scale includes 37 True/False items and its grades ranges between 0 - 37. The cut-off points are; 12 and below indicates low level of anxiety while 13 and above will indicate high level of anxiety in the participants (Sarason, 1980). The reliability was estimated to be 0.70 using Cronbach alpha.

Table 1
Table of Specification for a 50-Item Test in English

Content	Cognitive			Total Items
	Knowledge	Comprehension	Application	
Comprehension.	2	7	1	10
Sentence interpretations.	1	4	-	5
Opposite in meaning (Antonyms).	3	2	-	5
Nearest in meaning (Synonyms).	2	3	-	5
Sentence completion.	2	8	5	15
Oral forms.	3	3	4	10
Total Items	**13**	**27**	**10**	**50**

Method of data collection

The two instruments were administered via CBT. ATE test was administered in the four universities selected for the study by the researcher with the assistance of four proctors and four computer technologists. TAI was first administered to the participants and immediately after English MCQ achievement test was administered to the participants using CBT mode. Data was generated electronically and immediately. Scores generated were factor analysed and co-related.

Methods of data analysis

Descriptive and inferential statistics were used to find the group effects on the score validity and reliability. Thus for validity, construct evidence in form of factor analysis was established for each group. Also, the equivalence of the factors generated by the two groups were examined using Turker's Exact Test. The difference in performances between the groups was established through analysis of variance model. Reliability was determined through the internal consistency using Cronbach Alpha. Differences in group level effect was also determined by comparing the Alpha value through t-test of correlated values at 0.05 level of significance.

Results

Hypothesis 1: There is no significant difference in the validity of cognitive test scores based on level of test anxiety.

To test this hypothesis, the examinees responses to English language MCQ achievement test were divided into two clusters respectively: cluster one, examinees having low test anxiety and cluster two, examinees having high test anxiety. These examinees were placed into the groups based on the scores on the test anxiety scale (Sarason, 1980). In all, 132 examinees were in the low-test anxiety group while the high-test anxiety group had 220 examinees. The responses of these two groups were respectively subjected to factor analysis to examine the factorial validity of the test. In order to know the number of factors or traits underlying the test in the two groups, parallel analysis (PA) was conducted for the examinees response to the test items in the two groups respectively.

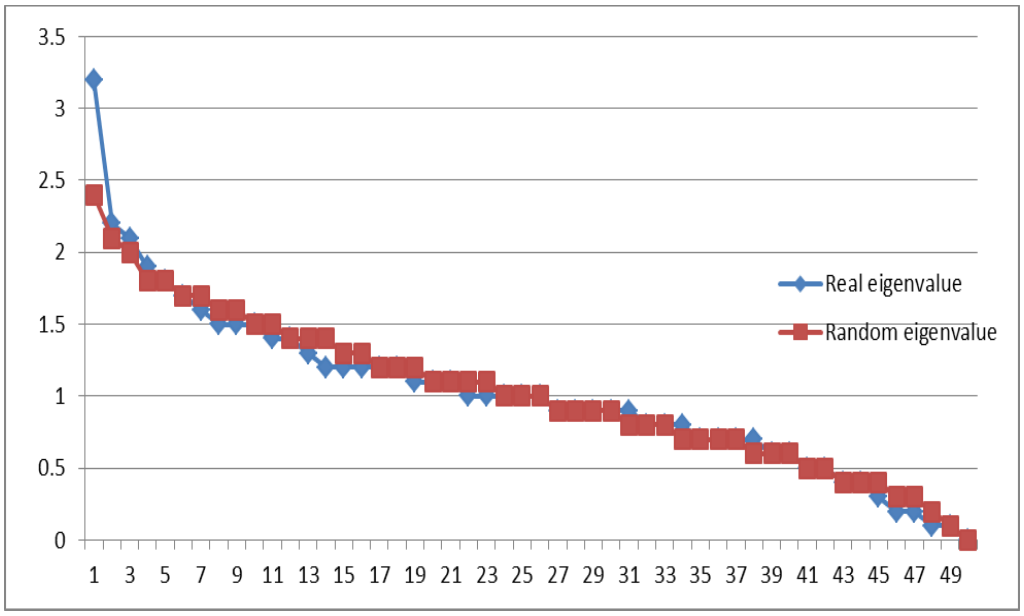

Figure 1: Number of factors of the English test based on low test anxiety

Figure 1 presents the result of parallel analysis showing the number of factors underlying the English test among examinees with low test anxiety. The figure shows that there are four factors that were extracted to underlie the English test among examinees with low test anxiety. This is because there were four eigenvalues that were observed above the point at which the random eigenvalue intercepted the real eigenvalues.

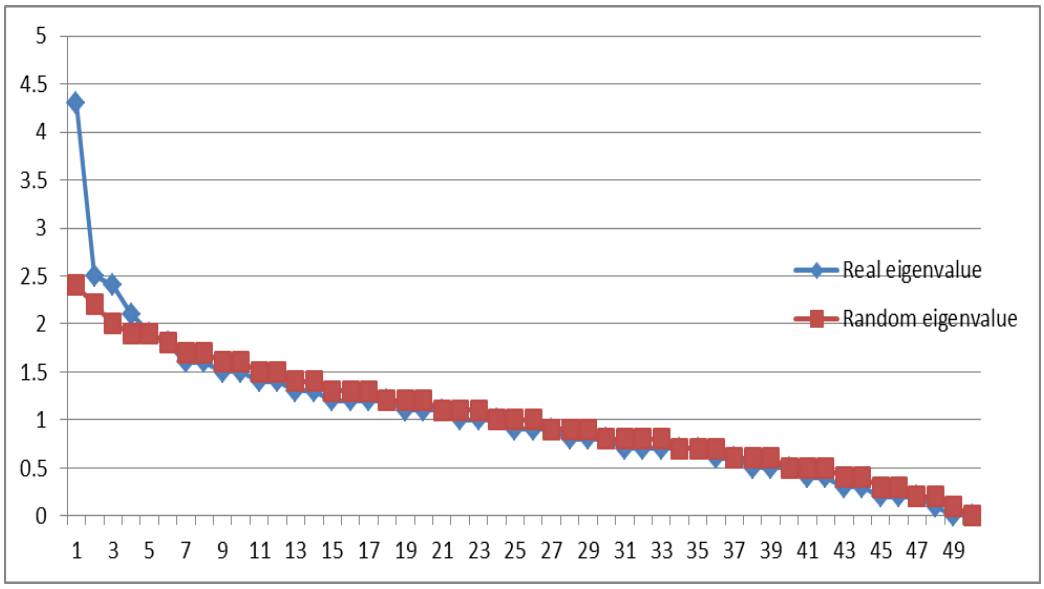

Figure 2: Numbers of factors of the English test based on high test anxiety

Figure 2 shows that there are four factors. The figure shows that there are four factors that were extracted to underlie the English test among examinees with high test anxiety. This is because there are four eigenvalues that were observed above the point at which the random eigenvalue intercepted the real eigenvalues. In order to compare the factors observed to underlie the English test between the examinees with low- and high-test anxiety level groups. To compare the factorial validity of the test, Principal axis factor analysis was conducted respectively on the test scores for samples for the two groups based on the number of factors predicted by the parallel analysis (PA). The resulting rotated loading matrix was assessed to determine the number of variables that load on each factor to evaluation how well the factors were defined. Thereafter, the well-defined factors were then compared through Tucker's congruence test if they have same number of factors that underlie them.

Table 2:
Comparing of Factor loading of English test in low test anxiety examinees and English test in high test anxiety examinees

Table 2 presents the comparison factor loadings of English test in low test anxiety examinees and English test in high test anxiety examinees after rotation. The results showed that in the low test anxiety sample, three factors (factor 1, factor 2 and factor 4) out of the four factors predicted have three or more loadings greater than or equal to 0.32, the condition set for adjudging a factor well defined (Tabachnick & Fidell, 2013). The table further shows that in the high-level test anxiety sample, three factors (factor 1, factor 3, and factor 4) out the four extracted factors are well defined. These results showed that the English test in low and high level of test anxiety examinees have three well defined factors that underlie them respectively. These results suggest that both groups examinees measure three dominant traits respectively irrespective of their level of test anxiety. However, the extent of equivalence of the extracted factors was assessed using Tucker's test of factor congruence.

The congruence coefficient is the cosine of the angle between two vectors and can be interpreted as a standardized measure of proportionality of elements in both vectors. It is evaluated as:

$$\phi(x,y) = \frac{\sum x_i y_i}{\sqrt{\sum x_i^2 \sum y_i^2}}$$ ---------- equ 1

Where x_i and y_i are loadings of variable i on factor x and y, respectively, i = 1, ……,n usually the two vectors are columns of a pattern matrix. So, how large should the coefficient be before you declare the factors highly similar? Lorenzo-Seva and Ten-Berge (2006) suggested "a value in the range .85–.94 corresponds to a fair similarity, while a value higher than .95 implies that the two factors or components compared can be considered equal."

For comparison of the factors, Tucker's congruence test was conducted on the factors of the test in the two samples. The result is presented as follows:

Table 3:

Comparison by size factor loading of English test in low test anxiety examinees and English test in high test anxiety examinees groups

Table 3 shows that Factor 1 of English test in low test anxiety examinees group corresponds to Factor 2 of English test in high test anxiety examinees group, Factor 2 of English test in low test anxiety examinees group corresponds to Factor 1 of English test in high test anxiety examinees group, and Factor 3 of English test in low test anxiety examinees group corresponds to Factor 3 of English test in low test anxiety examinees group. Thus, the comparison of the factors that underlie the English test in low test anxiety examinees and English test in high test anxiety examinees were done along the earlier stated pairs.

Using the Tucker's formula, the various indices of the formula are presented in Table 4

Table 4:

Indices for calculating the congruence of the factors of English test in low test anxiety examinees and English test in high test anxiety examinees groups

	N	Sum
ProductF1_low_F2_high	50	0.38
ProductF2_low_F1_high	50	0.30
ProductF3_low_F3_high	50	0.81
sqfactorloadingF1_low	50	3.57
sqfactorloadingF2_low	50	1.97
sqfactorloadingF3_low	50	1.69
sqfactorloadingF1_high	50	2.78
sqfactorloadingF2_high	50	1.97
sqfactorloadingF3_high	50	1.95

Congruence of Factor 1 low and Factor2 high test anxiety group = $\frac{0.38}{\sqrt{(3.57)(1.97)}}$ = 0.054

Congruence of Factor 2 low and Factor1 high test anxiety group = $\frac{0.30}{\sqrt{(1.97)(2.78)}}$ = 0.055

Congruence of Factor 3 low and Factor3 high test anxiety group = $\frac{0.81}{\sqrt{(1.69)(1.95)}}$ = 0.24579

The results showed that extracted factors in examinees sample have congruence coefficient of 0.054, 0.055 and 0.246 respectively. The results suggest that the extracted factors or traits found to underlie the English test in the low- and high-test anxiety groups of examinees are not equivalent. This implies that English test could not measure equivalently the same trait among examinees with low- and high-test anxiety status. This showed that the validity of the English test among examinees having low anxiety differed significantly from the test sore validity recorded from the English test among examinees having high test anxiety. To determine between which levels of test anxiety of English was more valid, exploratory factor analysis with covariate (type of university of examinees) was conducted. To achieve this, the examinees having low and high level of test anxiety were divided into two groups (i. examinees from state and ii. examinees from federal university). The results are presented in Figure 2

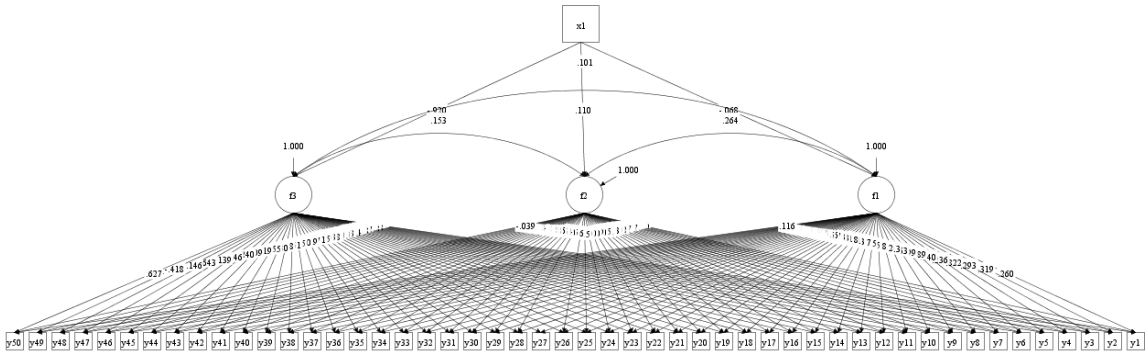

Figure 3: Exploratory Factor Analysis with covariate (university type: federal and state) of English multiple-choice test among examinees having low test anxiety

χ^2 (1125) = 1196.296, P= 0.0686); RMSEA= 0.020 (90% CI = 0.000 – 0.029, probability of RMSEA ≤ 0.05 = 1.000), CFI= 0.95, TLI=0.94

Figure 3 shows Exploratory Factor Analysis with covariate (university type: federal and state) of English multiple-choice test among examinees having low test anxiety. The model tests the null hypothesis that the extracted three factors underlying the English MCQ test among low test anxiety examinees were consistent in samples of federal and state universities. The figure shows that adding respondents' university (labelled X in Figure 3) to the 3-factor model does not distort the model (χ^2 (1125) = 1196.296, P = 0.0686); RMSEA= 0.020 (90% CI = 0.000 – 0.029, probability of RMSEA ≤ 0.05 = 1.000), CFI= 0.95, TLI=0.94). Therefore, the consistency of factors underlying the English test among students of state and federal universities was assessed. The results are presented in Table 5:

Table 5:
Model result of Exploratory Factor Analysis with covariate (university type: federal and state) of English MCQ test among examinees having low test anxiety

Factor	Covariate		Estimate	S.E.	Est./S.E.	Two-Tailed P-value
F1		ON				
	X1		-0.068	0.236	-0.288	0.774
F2		ON				
	X1		0.11	0.248	0.445	0.656
F3		ON				
	X1		-0.92	0.207	-4.448	0.000

Table 6 shows that Factor 1 and factor 2 underlying the English test were consistent among Federal and State universities' students (-0.068, p > 0.05; 0.11, p > 0.05 respectively). The results also show that factor 3 was inconsistent among students of federal and state universities. The results showed that most of the traits measured by the English MCQ test among examinees having low test anxiety in the federal university sample were consistent with the traits measured by the test in the state university sample.

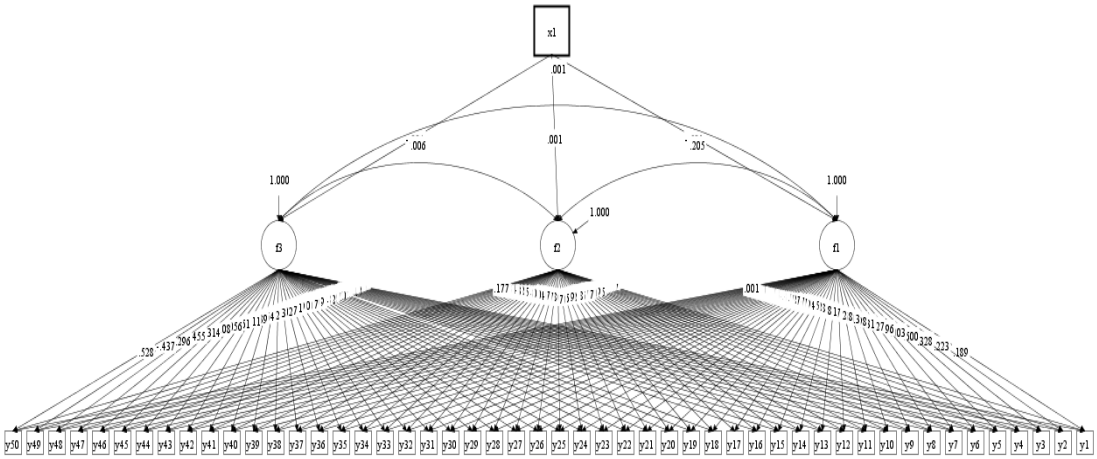

Figure 4: Exploratory Factor Analysis with covariate (university type: federal and state) of English MCQ test among examinees having high test anxiety

χ^2 (1125) = 1266.559, P = 0.0020); RMSEA= 0.025 (90% CI = 0.016 - 0.032, probability of RMSEA ≤ 0.05 = 1.000), CFI= 0.98, TLI=0.96

Figure 4 shows Exploratory Factor Analysis with covariate (university type: federal and state) of English multiple-choice test among examinees having high test anxiety. The model tests the null hypothesis that the extracted three factors underlying the English multiple-choice test among examinees having high test anxiety were consistent in samples of federal and state universities. The figure shows that adding respondents' university (labelled X1 in Fig 4) to the 3-factor model did not distort the model (χ^2 (1125) = 1266.559, P = 0.0020); RMSEA= 0.025 (90% CI = 0.016 - 0.032, probability of RMSEA ≤ 0.05 = 1.000), CFI= 0.98, TLI=0.96). Therefore, the consistency of factors underlying the English test among students of state and federal universities was assessed. The results are presented in Table 6.

Table 6: ***Model result of Exploratory Factor Analysis with covariate (university type: federal and state) of English multiple-choice test among examinees having high test anxiety***

Factor	Covariate	Estimate	S.E.	Est./S.E.	Two-Tailed P-value
F1	ON				
	X1	-0.531	0.194	-2.73	0.006
F2	ON				
	X1	0.001	0.189	0.005	0.996
F3	ON				
	X1	-0.804	0.17	-4.722	0.000

Table 6 shows the consistency of the factors underlying the English multiple-choice item among students of federal and state universities whose level of test anxiety were high. The table shows that Factor 1 and factor 3 underlying the English test were inconsistent among federal and state universities' students (-0.531, $p < 0.05$; -0.804, $p < 0.05$ respectively). The table also shows that factor 2 was consistent among students of federal and state universities (0.001, $p > 0.05$). The results showed that only one of the traits measured by the English multiple-choice test among examinees having high test anxiety in the federal university sample were consistent with the traits measured by the test in the state university sample. Therefore, the hypothesis that there is no significant difference in the validity of cognitive test scores based on level of test anxiety was rejected. Hence, there was significant difference in the validity of cognitive test scores based on level of test anxiety with the cognitive test scores from examinees with the low level of test anxiety being more valid that its counterparts with high level of test anxiety.

Hypothesis 2: There is no significant difference in the reliability of cognitive test scores based on test anxiety.

To test this hypothesis, the reliability estimates of the cognitive tests in examinees groups with low- and high-test anxiety were compared using independent alpha formula. The equality of alpha across two populations, are tested using the null hypotheses: $H0$: α dif = 0, where α dif = $\alpha_1 - \alpha_2$, and α_1 and α_2 are the alpha coefficients for a test score in Populations 1 and 2, respectively. The test statistics is given as:

$$Z = \frac{a_{diff}}{\phi_{diff}} = \frac{a_1 - a_2}{\sqrt{\phi_1{}^2 + \phi_2{}^2}}$$ ---------- eqn 1

where $\hat{\phi}_1$ and $\hat{\phi}_2$ are the standard errors for the estimates $\alpha\hat{}1$ and $\alpha\hat{}2$. For this two-tailed alternative, the p value of the test is obtained as twice the area under the standard normal curve to the left of |z|. And the standard error is given by the relation

$$\phi = \frac{SD_r}{\sqrt{(\frac{1}{2} * k * (k-1))}}$$ ----------eqn2

Where SD_r is the standard deviation of item inter-correlations and k is the number of items. The independent alpha formula is implemented in the cocron statistical package. Thus, cocron package was used for the comparison of the reliability

estimates obtained from two independent groups (group of examinees having low anxiety and the group having high test anxiety). The results are presented as follow:

Table 7: ***Comparison of reliability coefficients estimate of the English language test scores among examinees having low test anxiety and those having high test anxiety***

					95% confidence interval	
	Alpha	χ^2	df	p-value	lower bound	upper bound
LOW	0.729	0.0040	1	0.9497	0.67	0.79
HIGH	0.726				0.67	0.78

Table 8 shows that the reliability estimates of test scores of English among examinees having low test anxiety (α_{low} = 0.73) was approximately the same as the reliability of the test scores of the group of examinees having high test anxiety (α_{high} = 0.73). Dependent alpha formula showed no significant in the reliability estimates of the tests' scores in the two identified groups based on level of test anxiety ($\chi^2(1) = 0.0040, p > 0.05$). Therefore, the hypothesis which stated that there is no significant difference in the reliability of cognitive test scores based on test anxiety was not rejected. Hence, there was no significant difference in the reliability of cognitive (English language) test scores based on test anxiety.

Discussion of findings

Hypothesis one stated that there is no significant difference in the validity of cognitive test scores based on level of test anxiety was rejected.

The cognitive test scores validity among the group of examinees having low- and high-test anxieties were compared. This was done for English language achievement test and it was found that the test scores validity of the English test among examinees having low test anxiety was significantly different from the test scores validity of the English test in the sample of examinees having high level of test anxiety. It was further found that the test scores of English test in the sample of examinees having low test anxiety was more valid than the test scores of the English test in sample of examinees having high level of test anxiety.

The findings suggest that English language test scores validity in samples of examinees having low level of test anxiety differs significantly from the test scores validity of the test in the sample of examinees with high test anxiety. This finding is consistent with a study that used 187 purposely selected sample of undergraduate students confirmed a result that students with high academic achievement tend to experience low level of test anxiety and vice versa (Khalid & Hassan, 2009). The study is also supported by a study carried out by Oludipe (2009), whose findings revealed that test anxiety contributes the major influence on student's under-achievement and low performances at different levels of their educational life. The study was equally in line with Gaudry and Spielberger (1971) with a study conducted

and reports revealed that high test anxiety is considered as one of the main factors for low performance of students at university level.

The implication of the findings is that test scores validity of cognitive test varies significantly with respect to examinees level of test anxiety. However, validity of test scores of cognitive tests is at its best among examinees with low level of test anxiety.

Hypothesis two which stated there is no significant difference in the reliability of cognitive test scores based on test anxiety was not rejected.
Series of analysis were advanced based on the comparison of the reliability estimate of test scores of English language achievement test among the group of examinees having low level of test anxiety and groups of examinees having high level of test anxiety. Result showed that the reliability coefficient of English Language test scores based on low level and high-level test anxiety were the same. The findings in this study was consistent with Vogel and Collins (2009), in their findings, it was reported that high and low levels of test anxiety did not affect performance in the study carried them. These findings suggest that reliability of English achievement tests do not vary irrespective of the level of test anxiety of examinees responding to the test questions. It therefore implies that reliability of cognitive test scores remains unchanged irrespective of the level of test anxiety of students responding to the tests.

Conclusion

The general goal of all test users is to ensure a better and enhanced test score validity and reliability. Scores should be able to measure objectively the intended construct it was meant for and consistently too. Therefore, based on the findings of this study, the cognitive tests level of test anxiety effect on score validity and reliability, the English Language achievement tests scores produces a better test scores validity in the samples of examinees with low level of test anxiety than in the samples of examinees with high level of test anxiety. Therefore, it was concluded that examinees should be at a low level of test anxiety before tests is administered to them for a higher validity. However, the level of test anxiety with respect to cognitive tests has no effect on score reliability.

Recommendations

Low level of test anxiety has been considered the best for test scores validity and reliability. Examiners and test administrators should make sure that the procedure for test administration should be such that it will lower the level of test anxiety in the examinees before, during and after the test administration. Issuing of threats by some examiners before, during and after examination should be prohibited.

Examiners should prepare the minds of examinees ahead of time before test takes place. The usefulness of prognostic test cannot be undermined. Conducive environment for test administration is highly recommended. Trained proctors who are skilled in examination ethics and procedure are recommended. Good test items that have undergone refinement analysis will reduce the level of text anxiety because it would have taken care of level item difficulty, content validity and other factors that may increase the level of test anxiety.

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