

Assistive Technology and Learning Outcome of Students with Visual Impairment in Social Studies among Inclusive Schools in Nigeria

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Abstract

Social Studies was introduced into Nigerian schools to solve some social ills. Students with visual impairment as part of the society cannot be exempted. Students with visual impairment make use of audio and non-optical devices while learning social studies concepts without which outcomes in this seemingly important subject area may be impeded thereby negating the objectives in which

the subject area was introduced into the school system. Many authors had dwelt on utilisation, availability of assistive technology. There is a scant study on social studies learning outcomes. Therefore, this study examined audio and non-optical devices and learning outcomes of students with visual impairment among some inclusive schools in Lagos State, Nigeria. Survey research design of the correlational type was employed. Three hundred students with visual impairment were randomly selected from 3 Inclusive Secondary Schools from each of the 16 Local Educational Districts in Lagos State. The instrument includes the use of Audio and Non-optical Devices for the Students with Visual Impairment Questionnaire (r.0.8.4). Data were analysed using Descriptive Statistics, Mean, parametric Statistics of Correlation and multiple regression models at 0.05 level of significance. It was revealed that there was a positive correlation ($r=0.363$) among the two independent variables (use of audio and non-optical devices) on the dependent variables (Social Studies Learning outcome) of the students with visual impairment. Also, it revealed that audio devices strongly determined the social studies learning outcomes of the students with visual impairment ($\beta:200$). It was found that non-optical devices also had a strong link with the social studies learning outcomes of students with visual impairment. Audio and non-optical devices are very potent in the determination of social studies learning outcomes of students with visual impairment in Lagos State, Nigeria. Therefore, the use of audio and non-optical devices be encouraged in the Nigerian Secondary Schools.

Keywords: Assistive Technology, Visual Impairment, Learning outcome, Social Studies, Inclusive Schools.

Introduction

Social Studies as a school discipline came into being to correct the abnormalities in the society as well as create new reactions to the inadequacies of past educational practices. It is a problem-solving discipline which focuses on human issues and challenges with the sole aim of proffering a plausible solution to them all (Ajiboye, Adu & Amosun, 2005). The pride of social studies as one of the school subject is in its ability to develop learning capacity and societal values in learners, irrespective of their challenges and backgrounds, to learn and acquire certain basic skills, including listening, speaking, reading, writing, calculating as well as making observations, analysing and inferences which are essential to the forming of sound judgment. Thus, a good learning outcome, most notably in this discipline, is the end product of high academic performance which depicts how well a student is accomplishing his or her tasks and studies irrespective of social differences. As much as there is a dare need to have this subject proffer solution to the identified societal challenges, its teaching requires instructional materials in pictorial form to help convey to

core lesson to the students. These pictorial materials are not appreciated by learners with visual impairment.

Inclusive Social Studies envisions a socially-democratic educational setting that fosters the development of the community of learners, while attempting to balance the unity and diversity of democratic citizenship, and adopts a curriculum that is flexible, participatory, and accessible to learners of all abilities (Federal Government of Nigeria 2004, Omodan 2019). There is a growing recognition that including students with disabilities in general education can provide them with the opportunity to learn conveniently with increased acceptance and appreciation of their differences. In the same vein, there has also been a long time debate on the efficacy of inclusion and conventional system of education among educators, local, state and federal policymakers, parents, and even person with disabilities in Nigeria. However, 21st century Social Studies classroom is designed to be social, stimulating and inclusive. Hence, when needed assistive technologies and resources such as audio and non-optical devices are provided for students with disabilities especially, students with visual impairment, within a conventional classroom.

Visual impairment means different things to different people. This is why the term has been viewed by various scholars based on their perceptions. Adetoro, (2012) and Eskay and Chima, (2013) described students with visual impairment as those individuals with an ophthalmological challenge. That is, they are the students with little or non-functional vision. Consequently, one or more parts of their eyes become damaged causing loss of vision, whether severe or mild. This, in my view is the reason why the concept of visual impairment has been seen as an umbrella word. It has been categorized into (a) the blind; (b) the partially sighted and (c) the low vision (Eniola, 2008). The person with blindness is that individual that cannot see at all. The person with blindness cannot read or write print after all corrective optical measures must have been taken; he uses Braille as a medium of expression. Also, the partially sighted, although they are with bad sight, can be optically corrected. They are with some form of refractive errors. The third category is the individual having minimal functioning and usable residual vision which may not be useful for classroom work. Therefore, specialised services are used to alleviate problems that may arise from such vision loss. This loss of vision may be caused by many factors, known and unknown (Komolafe, 2016). Some of these known factors, according to Ayoku (2006) are cataracts, infections, congenital disorders glaucoma, albinism and retinopathy. The low vision indicates a more serious visual impairment where reading at normal distances is not possible (Komolafe, 2016). However, they can read with low vision aids of various types and sizes. An individual with total blindness has no vision at all. Their eyes are defective to be able to process images and information. Experiences have shown that they enjoy listening to audio devices which can be used to aid learning and supported with other non-optical devices or assistive technological devices.

Audio devices are those materials that enable an individual with visual impairment to learn how to utilize hearing and excellent listening skills. Auditory devices are often used in conjunction with visual and or tactual aids. Some of these are Kurzweil Reading Machine, speech Compressor, Synthetic Speech, Talking Books, Talking Calculators, Clocks, Tapes to mention just a few. Non-optical devices do not incorporate lenses. Do not need to be prescribed by a specialist. Non-optical devices include large prints, Braille and Braille writer, Braille books and so forth. Students with

visual impairment, especially those with blindness and low vision, have their vision functionally defective.

Consequently, they depend on some of these devices (audio and non-optical devices) to access and process information during learning for an improved learning outcome. It can also give students with visual impairment unhindered access to the printed and electronic words. This is perhaps, the reason the American Foundation for the Blind established a National Technology Center at its New York City headquarters where detailed information on all types of devices, basic as well as sophisticated, is available on request (American Foundation for the Blind 2016).

Ahmad (2015) identified the speech output system as an ICT device adapted for teaching students who are with total blindness. The device (non-optical) can be used to read screen text, while the screen readers or the text-to-speech software like Job Access with Speech (JAWs) can help the user in adjusting the volume, pitch and speed of reading and in choosing or adjusting to a male or female voice according to their preference. Screen readers, including navigation tools that allow users to skip from headline to headline or category to category while reading. Using synthetic speech, the computer can read text passages (Audio). The use of earphones for individuals using speech output systems can reduce and limit the distractions for other individuals present. Audio materials like talking books and audio cassettes of recorded lessons can be used by students with visual impairment. Sophisticated audio devices, CD players, cassettes players and recording machines can be used to record lectures, books and other study materials and help students in submitting their assignments in audio format and ultimately improve their learning outcome. The descriptive video service with a narrative verbal description of the visual elements displayed on the screen enables the students to automatically hear the descriptions of all the visual elements, providing the students with visual impairment an opportunity for better learning outcomes (Petty, 2012).

Studies such as Bouck (2011), Hallahan and Kauffman (2011) have documented the essence of audio and non-optical and other technological devices to improve learning outcome. They reiterated that the audio and non-optical assistive technological devices have opened up doors to formal education and employment. This is assumed to further integrate the students with visual impairment into the school system and ultimately improve learning outcomes. By the aid of non-optical devices, students with visual impairment can read, understand and retain knowledge better and in the end enhance their learning outcome (Simon, 2010). Audio assistive technological devices like screen readers for persons with visual impairment take the visual content of a computer or mobile phone screen and convert it to perceived auditorially (text-to-speech) (Komolafe, 2015). American Foundation for the Blind (2016) further submitted that most of the audio materials work with the MP3 which is a very convenient, retrievable, usable and portable device. Willings (2016) argued that although, the hearing devices can help students with visual impairment access information easily, but insisted that listening to books on tape is not the same as literacy. Willings (2016) consequently advised that auditory devices should be used in conjunction with print or Braille instruction as listening is not a form of literacy. The Braille, according to the author, is essential for a student to be as literate as their cognitive skills allow.

Hence, the education system has the responsibility of preparing future citizens, workers and leaders. Schools are expected to influence students' learning, socialisation and especially the vocational preparedness of students are tied to their learning outcome. This applies even more to students with visual impairment. Blackerby, Chorost and Guzman (2014) were of the opinion that the best way of knowing that schools and their students are successful in any curriculum is to look at what they accomplish, that is learning outcome. They maintained that for schools to achieve results, students need to be taught using a variety of teaching approaches that support life-long learning and keep students motivated to learn. Willings (2016) noted that achieving a lot in teaching and learning, especially when dealing with learners with visual impairment, requires the services of well trained and motivated teachers who can handle specialised tools. Busari (2014) noted that although the importance of learning outcome is unquestionable, the measurement of academic performance, particularly for students with visual impairment is shrouded in controversies especially among policy-makers, measurement experts and educators. Measuring learning outcome can occur at multiple levels and serves numerous purposes. For example, classroom teachers often conduct a formative and summative test to evaluate students' mastery course content and provide grades for students and parents. State tests are designed primarily to measure progress at the school district level. In particular, graduation tests are used to determine whether a student has mastered the minimum content and competencies required.

It must be noted that the above development can also be linked with inclusive schools. Inclusive education was the product of a World Conference on Education for All (EFA) which took place in Thailand in 1990. The objectives were to consider the fundamental policy shifts required to approach inclusive education which is how to enable schools to serve all children, especially those with special needs. In my argument, the major thrust of inclusive education is that the child with special needs is given the right to be educated under the same environment with their peers without special needs. The implication is that inclusive learning is made more participatory. Some of the followings are features of inclusive education as identified by Komolafe (2014) placement into the closest school to the child's home; no rejection; no special class or block; disability-friendly environment; method of teaching is modified according to the needs of these children, support personnel and caregivers among other features. The movement for fully inclusive education is part of a broad human right agenda that argues that all forms of segregation are usually wrong and that all children need an education that will help them improve their learning outcome and ultimately develop relationships and prepare them for life in the mainstream. In the same vein, Adebowale and Makinde (2012) stated that advocates for inclusive education say that the long term effort of inclusive learners is that it has a higher sensitivity to the challenges of its learners. Also, it increases empathy, compassion and improved leadership skills which, in my view, benefits the society. With the perceived strength inherent in inclusive education, Lagos State Keyed into the system.

The aim of inclusive education in Nigeria is to build a society that promotes equality in participation in and contribution to the development of the nation. Therefore, inclusive education is crucial to driving Education For All (EFA) goals to which the Federal and State government in Nigeria are committed to. Rather than just sending all children to school and putting them in the

class, preparatory to receiving lessons, the aim of EFA, also emphasizes that all students with or without disabilities facilitate and improve their learning outcome through use of information and communication technology (ICT) facilities such as audio devices and other optical and non-optical assistive devices. In line with the above, the use of ICT devices such as audio cassettes and the compact disc does not only arouse the interest of students but also deepen their understanding of class subjects, improve learning outcome, especially through the playback advantage that most of the devices have (Lidstrom and Hemmingsson, 2014). Despite the effects of the organisations and government on the education of students with disabilities in the country, only little achievement is evident. Following the failed attempts of the organisation and government to improve the learning outcome of the students, attention has been shifted to the teaching methods adopted by the teachers in inclusive school (Siebers, 2008). The principle of inclusive education demands that the teaching techniques should be flexible to meet the diverse needs of students in an inclusive classroom (Morley, 2010). There seems to be a correlation between the use of audio and non-optical devices and learning outcome of students with visual impairment in inclusive secondary schools in the country.

Statement of the problem

Social Studies is a conglomeration of various concepts forms different subject areas introduced into the Nigerian Schools to curb some societal ills. It is one of the major subjects at the secondary school level. In Learning Social Studies, Students with visual impairment because of loss of vision, make use of some assistive technology devices such as audio and non-optical assistive technological devices to improve their learning outcome. Research work with respect to the information on the use of assistive technologies and the learning outcome of students with visual impairment is scant. Very many previous works focused on persons without disabilities (sighted). This study, therefore, investigates the use of audio and Non-optical devices as nexus of learning outcomes of students with visual impairment in inclusive secondary schools in Lagos State, Nigeria.

Objectives of the study

The general objective of this study was to investigate the connection between audio and non-optical devices on the Social Studies learning outcome of students with visual impairment in some inclusive schools in Lagos State, Nigeria. The specific objectives are to:

- i. establish the relationship between audio and non-optical devices and visually-impaired Social Studies students' learning outcomes in some inclusive schools in Lagos state.
- ii. investigate the relative contribution of audio and non-optical devices on with visually-impaired Social Studies students' learning outcome in some inclusive schools in Lagos state.; and
- iii. find out whether audio and non-optical devices significantly correlate with visually-impaired Social Studies students' learning outcome in some inclusive schools in Lagos state.

Research questions

The following research questions were raised and answered

- i. Is there any correlation between independent variables (audio and non-optical devices) and the dependents variables with visually-impaired Social Studies students' learning outcomes in some inclusive schools in Lagos state?
- ii. What is the joint contribution of audio and non-optical devices towards the with visually-impaired Social Studies students' learning outcomes in some inclusive schools in Lagos state?
- iii. What is the relative contribution of independent variables on with visually-impaired Social Studies students' learning outcomes in some inclusive schools in Lagos state?

Methodology

The descriptive survey design of correlation was used because the variables involved were not manipulated. Descriptive statistics and mean were used where appropriate. The parametric statistics of correlation and multiple regression models were also used for the relationships. The participants in this study were 300 students with visual impairment which were randomly selected from 30 inclusive secondary schools from each of the 16 Local Educational Districts in Lagos. Ten students with visual impairment were picked from each school to make the 300 participants. Their mean age (Mean= 23.62, SD:9.4). The ethical approval to conduct the study was obtained from each school. Also, the consent of the students with visual impairment was sought through a consent form designed by the researcher. The content was read to them and their consent was gotten through thumb printing before the data was collected. The instruments used for the study were; Use of Audio and Non-optical Devices for the Students with Visual Impairment Questionnaire. This was self-developed by the researcher. There were two sections A and B. The section A contains questions on Audio while the B part contains questions on the Non-optical aspect. On the whole, there were 21 items of four-point ratings Likert format ranging from 1 to 4. 1= Strongly Disagreed (SD), 2= Disagreed (D), 3= Agreed (A), 4: Strongly Agreed (SA). The questionnaire was subjected to test-retest method and its psychometric properties were given as coefficients of 0.84.

Results and Data Analysis

Below is the result of the analysis.

Research question 1: Is there any correlation between independent variables (audio and non-optical devices) and visually-impaired Social Studies students' learning outcomes in some inclusive schools in Lagos state?

Table 1: Descriptive statistic and correlation among the variables

	1	2	3
Audio Devices	1.000		
Non-optical devices	0.252*	1.000	
Learning Outcome	0.173**	0.355**	1.000
Mean	69.90	19.92	33.82
Standard deviation	9.74	2.37	4.57

Table 1 revealed that the correlation between audio and learning outcomes of students with visual impairment was $r=.173$ and $p<.05$, while the correlation between non-optical devices and learning outcomes of students with visual impairment was $r=.355$ and $p<.05$. This implies that there is a significant relationship between audio and non-optical devices on the learning outcome of students with visual impairment.

Research Question 2: What is the joint contribution of audio and non-optical devices towards students with visual impairment's Social Studies learning outcome in some inclusive schools in Lagos state?

Table 2: Summary of regression showing the effect of independent variables on learning outcome of students with visual impairment

Model	R	R.Square	AdjustedR Square	Std error of the estimate
1	.363	.132	.134	4.26727

The results on table 2 revealed that there are positive multiple correlations ($r=0.363$), $p<.05$ among the two independent variables (Use of audio and non-optical devices) on the dependent variables (learning outcome of the students with visual impairment). This indicates the relevance of the use of the devices to the determination of the dependent measure. The adjusted R=square value of 0.134 revealed that the two independent variables accounted for 13.4% of the total variance in the dependent measure (learning outcome of the students with visual impairment). The remaining 86.6% could be due to the effect of errors and factors that were not moderate or considered in the study.

Table 3: Multiple regression showing the effect of independent variables on the learning outcome of students with visual impairment

Model	Sum of square	Df	Mean square	F	Sig.
Regression	915.23	2	511.25	26.24	.000
Residual	6112.12	293	19.40		
Total	7027.35	299			

Table 3 showed that the F-value 26.24 tested the significance at df (F_2 293). Hence, audio and non-optical devices have a significant predictable joint effect on the learning outcome of students with visual impairment.

Research question 3: What is the relative contribution of independent variables on students with visual impairment's with Social Studies learning outcomes in some inclusive schools in Lagos state?

Table 4: Relative contribution of independent variables on the learning outcome of students with visual impairment

Model	Unstandardized coefficients		Standardized coefficient		Sig.
		Std Error	Beta (β)	t-stat	
Audio Devices	.022	.413	.200	12.385	.000
Non-optical	.790	.042	.959	18.611	.000
Residual	.156	.108	.083	1.526	.148

The result from the table above revealed the relative contribution of the two independent variables (audio and non-optical devices). The result indicated that audio devices positively correlated the learning outcome of the students with visual impairment (β :.200, $p < .05$). Also, it was found that non-optical devices also had a strong relationship with the learning outcome of the students with visual impairment positively ($\beta = .959$, $p < .05$). This result thus implies that the independent variables (audio and non-optical devices) significantly and positively determined the learning outcome of students with visual impairment relatively.

Discussion of Findings

Technology, as a tool, may unlock learning and ultimately improve the learning outcome of students with visual impairment. There is a significant relationship between audio and non-optical devices on the learning outcome of students with visual impairment. Hence, the result revealed that audio and non-optical devices have a significantly predictable joint effect on the learning outcome of students with visual impairment. The implication is that audio and non-optical devices jointly contributed to the learning outcomes of students' visual impairment. This finding was in line with that of HEFCE/HEFCW (2009); Johnson and Thurloro, (2003); Lidstrom and Hemingsson (2014). These authors believed that assistive technologies such as audio and non-optical devices among students of different learning capacities and needs, in an inclusive classroom, proves to be effective in promoting learning outcome, positive attitude towards the subject and improving social interaction among students.

Students with visual impairment derive feelings of belongingness and participation while using audio and non-optical devices. The use of these devices keeps them (students with visual impairment) busy. In some cases, while making use of these devices. Simultaneously these students are studying. Studying boosts students' confidence, increase self-efficacy and self-esteem and ultimately their learning outcome (Ahmad, 2015). Everybody in the society and especially students with special needs in inclusive schools need to feel that they are allowed to participate in the various activities in the school to heighten learning outcome (American Foundation for the Blind, 2016).

The result of Research question 3 revealed that there is a significant relative contribution of independent variables on the learning outcome of students with visual impairment. Although the result also indicated that audio devices made a higher contribution to the learning outcome of students with visual impairment, use of Braille and magnifying glasses also produce better learning outcome for students with visual impairment (Ahmad, 2015). Therefore, both audio and non-

optical devices are effective depending on the context which learning occurs. The context in which learning occurs influences the learning outcome of students with visual impairment (Morley).

Conclusion

Based on the above analysis and discussion, one could conclude that Social Studies is the study of human being which came into being as a corrective study. It celebrates oneness and provides leverage for every learner to thrive irrespective of challenges or needs. This conclusion is not in isolation; it depicts the necessity of democracy and inclusivity in the classroom process, where all learners are equal by treatment and collaboratively ensure that all learning differentials are taken care of (Omodan, 2016). That is, with audio and non-optical devices and indeed, all assistive technologies have the capacity of increasing the level of participation of students with visual impairment in classroom activities which in my conclusion enhances students' learning outcome. The learning outcome is sustained when stakeholders in the education of special needs, especially, students with visual impairment avail the students with the opportunity to use assistive technology devices to ease learning. Therefore, the use of audio and non-optical technological devices should be strongly encouraged among learners with visual impairment in Nigerian Secondary Schools.

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