

Impact of Audio – Visual Materials on Students’ Academic Performance in Physics in Secondary Schools in Ekiti State, Nigeria

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Abstract

This study investigated the Impact of Audio – Visual Materials on Students’ Academic Performance in Physics in Secondary Schools in Ekiti State, Nigeria. A descriptive research design was adopted which seeks to find out the application and usage extent of usage of audio-visual materials in the teaching of Physics in Senior Secondary School in Ikere Local Government. The population for the study consists of all Senior Secondary School Physics Students in Ikere-Ekiti. The schools used for the study were randomly selected from all the Senior Secondary Schools in Ikere-Ekiti, the sample used in this study were SSS 2 students from the some selected Senior Secondary Schools in Ikere-Ekiti. Four schools were sampled from all the secondary schools in Ikere Local Government Area of Ekiti State and one hundred (100) SSS 2 students from the four selected schools were selected as participants for the study. The students were to provide responses to the questionnaire items. The only instrument to be used for data collection was questionnaire. The instrument was subjected to validity and reliability mechanism. In analyzing the collected data, the researchers used descriptive statistics of frequency counts and percentage to analyse respondents’ demographic data, to answer the research questions while inferential statistics of Chi-square analysis was used to test the formulated research questions. Based on the findings, appropriate recommendations were made.

Keywords: Audio, Visual, audio-visual materials, Junior Secondary school.

Introduction

According to Nacino-Brown, Oke & Brown (2005) for effective teaching to take place, a good method must be adopted by a teacher. Teachers are aware that students learn in different ways and have different ways of absorbing information and of demonstrating their knowledge (Tamahloe, Atta & Amedahe, 2005). Teacher employ a variety of teaching strategies and methods to ensure that however be stated that methodology in education is not a new concept in the teaching and learning process. New methods and techniques evolve almost every day to supplement existing ones in teaching. Notable among them is technology – supported ones. Kochlar (2004) observes that more recently technology has been successfully introduced in the field of education to make education more productive and more individual.

Kochlar (2004), the most outstanding development in modern education is the increase in the use of supplementary devices by which the teacher through the use of one sensory channel helps to clarify, establish and correlate accuracy, concepts, interpretation and appreciation increase knowledge, rouses interest and even evokes worthy emotions and enriches the imagination of students Fillmore (2008) have also recommended that in education we should appeal to mind chiefly through the visual and auditory sense organs since it is possible that 85% of our learning is absorbed through these senses. Science has been regarded as the bedrock of modern day technology countries all over the world especially the developing ones like Nigeria are making a lot of effort to develop technologically and scientifically. This has become necessary because the world is turning “Scientific”. And the situation in schools is no exception. At the core we can say science comprises three disciples: Biology, chemistry and Physics. Oladajo, Olasunde & Isola (2001) stated that science is a dynamic human activity concerned with understanding the workings of the world. This understanding, he says, help people to know more about the universe without have been difficult for man to explore that other planets of the universe. Investigations however, have shown that physics education is in crisis as the number of students studying physics at all levels of declining rapidly (Fillmore 2008: Smithers & Robinson, 2007). It has also been found that of all the sciences, physics is the subject in which the increase in number involved has been particularly low (Barbosa, 2003 : Donnellan, 2003). The reason may include lack of specialist physics teachers and the perception that physics is a difficult subject (Buabeng & Ntow, 2010); (Fillmore, 2008; Isola, 2010). Other researchers (Paas & Sweller, 2004; Prow, 2003) have also reported that Physics is a difficult subject to learn where maximum effort is required and the resulting grade may not always reflect the effort that students (need to learn) studies have also revealed that the performance of students I physics in most African countries was generally and consistently poor over the years (Oladajo, et. al, 2001). Tamakloe Atta & Amadahe (2005) observed that it is not all those who teach student that are considered in the traditional sense as teachers. In their opinion, the teacher is the one who understand what his or her students need to learn and their capabilities of learning. Thus the teacher is the one understands what his or her student needs to learn and their capabilities of learning. Thus the teacher must be able to judge just how much intervention students will require in their learning process of learners. He/she ought to be a professional who will make use of any available resource to enhance teaching and learning. The use of audio-visual material in education has been found to be an effective way of communicating ideas and concepts to students (Quallette, 2004). Literature has also established that audio-visual aided instruction has greatly improved the performance of students in physics especially those with special needs and slow learners abilities (Osokoya, 2007). However, many teachers in senior secondary schools in Nigeria do not use audio-visual material when teaching physics. Although there are a few notable exceptions, others either feel these materials are inappropriate for instruction or use them poorly.

Some teachers find it quite complex to use audio-visual material to complement the traditional lecture of time with respect to instruction, student achievement and attitude toward learning research has not only proven the efficacy of technology related materials but has also found the result overwhelmingly positive (Dabbagh, 2011). Teaching and learning with audio-visual resources play an important role in the teaching – learning process. Students often benefit

from the visual/sound appeal of audio-visual material because it tends to focus their on the topic when teachers present material in various manners such as providing students with both a summary statement and a chart on a given topic, the visual material enhances the written materials. King (2010) indicated that audio-visual resources, wisely selected and intelligently used, arouse and develop intense and beneficial interest and so motivate students to learn; and properly motivated learning means improved attitudes, permanency of impression and rich experience and ultimately more wholesome living, since most students consider physics as an abstract subject the use of audio-visual resource should be a requirement for every physics teacher if the aim of the teacher is to guide the student to master concepts in the subject (physics). Quellette (2004) sums up tenaciously that word may easily be forgotten but mental pictures will long be remembered. It is therefore important to prepare illustrative materials and short demonstrations or other visual material which are effective means of helping student to understand and thereby facilitating learning.

The study is motivated by the fact that students do not retain for long or understand what they are taught without audio-visual materials, such learning does not encourage participation and lacks interest or stimulation. It is not based in sense experience nor does it extend their experience. Above all, such learning cannot be permanent. Yet there is also evidence of low utilization and non-availability of audio-visual materials in schools. This study will there investigate the impact of audio-visual materials on student academic performance in physics in senior secondary school in Ikere Local Government.

Research Questions

The following research questions are raised to guide the study:

1. Does audio-visual materials impact students interest in physics in secondary schools?
2. Does audio-visual material impact students' academic performance in physics in secondary schools?

Importance of Physics

Physics is a model for thinking, for developing scientific structure, for drawing conclusions and for solving problems. It is a subject that deals with facts. As a result, Olademo (2010) opined, "this subject-Physics should be given much consideration and let no man think of it as abstract or as untrue". As posited by Balogun et al (2002), "Physics instruction is a training of logical thinking. It is a means of solving many problems. It is confronted with finding solutions to problems that have not been provided by a similar type. Its greatest virtue is its flexibility and the high esteem at which it is held as a tending discipline is partly due to its illustrious pedigree". People who have become more and more skeptical towards Physics saw it as discipline that pursues needless complications, inventing unrealistic problems and prescribing solving methods within the frame of elementary Physics. To this end, Adenegan (2003) highlighted Physics importance under four broad functions-utilitarian, cultural, social and personal functions.

- Utilitarian functions: It is useful in everyday life that is it serves as a functional tool in studying individuals everyday problems; it is useful as a tool to other discipline, that is, serves as a hand maiden for explanation of quantitative situations in other subjects such as economics, physics, navigation, finance, biology and even the arts. This service of Physics is exceedingly important to future scientists, engineers, technologists, technicians and skilled mechanics; it is useful for national income and budgeting and useful for laying foundation for further education.
- Cultural functions: It is useful for calculation in local languages and useful for naming objects.
- Social functions: It is useful in voting, games and lotteries, birth and death rates and population census.

- Personal functions: It encourages correct or accurate thinking, allows for cooperation with others to achieve common goals, allows for character building (patience, persistent and perseverance) and remarkably, it makes one to be happy.

In a nutshell, "Physics is now an enormously useful science which, in order to attain this status, has had to cross a desert of usefulness where Physics was nursed tenderly as a science of mind (Balogun et al, 2002). Astronomy is a practical science of Physics. It is used to foretell the calendar, feast, eclipses, wars, pestilence, whirlwinds, storms and the future of nation and even of individuals. It is a useful application of Physics and would link on for at least the next two millennia. The diverse applications of Physics abundantly establish that Physics, as a discipline, is fit for purpose, as Physics continually drives the expansion of the frontiers of other disciplines through their progressive formalization and symbolization and the building of mathematical paradigms of real world systems. In Nigeria, a credit in Physics is required for admission to countless programmes of study at the tertiary level of education. Ekhuagere (2010) asserted that in view of this fate-determining place of Physics in the nation's educational system, a policy must be formulated and implemented toward ensuring that no child is left behind in Physics at the pre-tertiary level of education.

Types of Audio-Visual Materials

There are different ways of classifying audio-visual materials. As listed by (Doosuur & Sandra, 2013) together with the necessary related equipment for putting them to work in the classroom, audio-visual materials include the following: These materials, situations, and the people have to be visited, studied, observed, reacted to and worked with, right in their natural environment. The study of relia may then demand field trips, demonstration, experiments and other direct experiences as processes for getting the meaning. They may come into the class in display cases or attached on bulletin boards. Dramatic performances (portrayal of people, events, procedures) dolls and puppets are produced for use as dramatic models. Models, Mock-ups Globes, and Relief Maps. These can be purchased or produced by the teachers and students jointly. Exhibits and dioramas made up of models can be borrowed, purchased or constructed. Television programmes: This requires television receivers and antenna systems. They can be produced jointly by students and teacher as learning experiences. Motion pictures: Projection equipment for accommodation either optical and/or magnetic sound tracks and projection screens are required. Still pictures projection materials include transparencies and micro-projector materials (microscopic slides and microscopic slides and microscopic objects). Study prints and pictorial illustrations Radio and Audio programmes, as found in tapes or disk recordings and radio broadcasts (Doosuur & Sandra, 2013). Graphic materials such as maps, graphs, cartoons, diagrams and charts.

According to Aina & Olutade (2006), the chief visual tools which can be used by the teacher may be classified as follows: Pictorial and Graphic Materials Chalkboard Textbooks illustrations Charts Pictures (a) Drawing (b) Reproductions (c) Photographic Maps of various types Diagrams. Picture language (Isotype, etc).

Teachers' perception of the use of Audio Visual materials in teaching

Though funding, equipment, lack of time, and knowledge are known obstacles to successful technology integration (Lam, 2000), a critical component in meeting teachers, critical component in meeting teachers, technology needs is responding to teacher's beliefs toward technologies.

Hope (2007) wrote, "Teachers basically had to contend with two factors (with technology adoption); (a) the psychological effect of change and (b) learning to use microcomputer technology". Understanding teachers' beliefs towards technology play an essentials role in successful technology adoption. Previous studies employed a variety of methods and perspective to assess in-service teachers' technology beliefs. These methods included: Likert-scale questionnaires (Ross, Hogaboam-Gray & Hannay, 2009) case study methodology (Ertmer, Gopalakrishnan, & Ross, 2001).

Teachers who participated in a two-year technology integration program improved their technology self-efficacy and their interest in learning more about how technology could impact the curriculum. Ross, Hogaboam-Gray & Hannay (2009) reported that access to technologies increased teachers' "opportunities for successful teaching experiences, thereby contributing to greater confidence in their instructional ability". In addition, they also noted, "teachers who interpret their interactions with computers as indicative of high growth in self-confidence, regardless of their experience".

Research also reveals that before teachers use technology for instruction, they must be personally convinced of its benefits and must see the utility of using a particular technology (Lam, 2000). Before technology is used in the classrooms, teachers focus attention upon their students. They want to know what impact it will have on students' learning outcomes (e.g., Higgins & Moseley, 2001). Teachers use technology because it motivates students and offers a different mode of presentation. Instead of using computers for drill and practice, more confident teachers use technology as an instructional tool to enhance students' learning (Lam, 2000).

Successful technology adoption in teachers' classrooms is dependent upon school administrators providing an individualized, differentiated process of training and implementation (Gray, 2001). Glean (2007) commented, "Often districts rely upon a 'one size fits all' approach that meets the needs of only a few participants". Teachers must see how technology fits within their localized classroom setting (Stein, Smith, & Silver, 2009). Teachers' technology beliefs are influenced by their philosophy. Resistance to adopting new technologies stem from teachers' existing teaching beliefs (Norton, McRobbie, & Cooper, 2000).

For technology adoption to be successful teachers must be willing to change their role in the classroom. When technology is used as a tool, the teacher becomes a facilitator and students take a proactive role in learning. Niederhauser & Stoddart (2001) noted a "consistent relationship between teachers' perspectives about the instructional uses of computers and the types of software they used with their students". Often, this change of teaching philosophy and methods focuses on learners-centered teaching and constructivist teaching practices (Rakes et al., 2009).

In fact, Ertner, Gopalakrishnan & Ross (2001) found that exemplary technology-using teachers exhibit more constructivist teaching practices. Successful integration of technology into teaching depends on transforming teachers' belief and philosophy concurrently (Windschitl & Sahl, 2002).

Pros and Cons of Audio-Visual Materials

An old Chinese proverb goes like one picture had more worth than thousand words, indeed if teacher uses words along with pictures students are better able to grip the crux of the concept earlier. When an audio-visual aid is practiced by the teacher, there must be some benefits and advantages of using it. Some commonly known pros of using audio-visual materials are expressed in opinions of following scholars: Helps in comprehension by bringing the child in a direct contact with the concept and how it actually works in real life situations (Kinder, 2009).

Student is more attentive, motivated and interested as compared to that classroom session that is in function without the use of audio-visual materials (Sampath, Pannneerselvam & Santhan, 2008). Conceptualizing is clearer and concrete as the use of audiovisual materials appeals, activates and utilizes the five senses of individual student i.e. see, hear, touch, taste and smell (Prasad, 2005). While use of audio-visual materials provide freedom to the students i.e. students discuss, comment and express their opinion which they cannot while a typical teacher lecture is in progress; at the same time this discussion helps them in developing language other, then mother tongue, gaining confidence by probing and showing tolerance to opposite opinions (Doosuur & Sandra, 2013).

Using audio-visual materials improves teachers' performance by saving time and energy. Prasad (2005) advocates that audio-visual materials provide basic means of planning, organizing and invigorating the curriculum. The basic aim of education must be to lead students towards self-learning and life long learning and this aim can be achieved through the use of audio-visual

materials as it improves the learning capacities of individual students i.e. learning experience that is worth memorable (Singh, Sharma & Upadhya, 2008).

Retention rate of the students increases by the use of audiovisual materials (Prasad, 2005). Activity based learning leads to critical thinking, reasoning, creativity and the development of inquisitive mind which is the real aim of education. Audio-visual materials entail activity for teacher as well as for students that keep them attentive and motivate them to think and inquire resulting in deep comprehension about what is being taught (Mangal, 2008).

Handling and manipulating of audio-visual materials by students help them develop working habits. Use of audio-visual materials provides students with opportunities to think speak and interact without fear and hesitation with teacher and peers resulting in students' personality development. Audio-visual materials help in maintaining the class discipline as every of the student is focused and attentive towards learning. When teacher lecture the students they get bored and start whispering that brings indiscipline in the classroom (Prasad, 2005).

Using of audio-visual materials seems very essential in today's education; individuals of 21st century belong to virtual age brackets. They experience video games, online learning and computerized programming ranging from classroom learning to every shopping mall. It is often experienced in daily life that children love to watch an educational movie than to read a book. To meet this end teacher incorporate audio-visual materials i.e. models, video presentation, power point slides show etc in the classroom sessions. But all these and other teaching materials carry along with them many disadvantages, therefore along with merits one must keep the demerits of using audio-visual materials in mind. By an effective and timely use of audio-visual materials one can better able to eliminate following deserting aspect of using audio-visual materials in classroom: While any specific audio-visual aid is in operation for say, Over Head projector; any technical problem may hit all of sudden. Projector bulb may burn out. Desired sound and color missed while using a multimedia or if using a Digital Video Disc (DVD) or Compact Disc (CD) they may not well-match your players. Therefore possibility of technical problems is higher (Prasad, 2005). Critiques believe that audio-visual materials carry high rate of attractiveness that results in child being diverted from desired path of learning and lost in recreation and fantasy (Mangal S, 2008). Most of the schools suffer budget constraints and as the fact is clear i.e. audio-visual materials are expensive; it is impossible to make adequate availability of such materials in every classroom.

Brown, Lewis & Harclerod (2005) states that activity supplemented by audio-visual materials is completely mere waste of time and resources if choice of desired audio-visual materials is not possible. Suppose a teacher is to teach about specific culture of a particular area using a map is a waste full activity rather charts with pictures of traditional dresses, food and life style etc can be beneficial. Preparing audio-visual materials require substantial amount of time. Making your very own transparencies, slides, films, posters, charts or any other teaching aid is very time taking. While arranging them teacher totally overlooks the importance of developing clear and well-organized lesson plan (Sampath, Pannneerselvam & Santhan, 2008). Displaying too many of audio-visual materials simultaneously in a single class can be very confusing for students and even for teachers' as well. Concepts can overlap and can lead to misunderstanding and poor retention (Sampath, Pannneerselvam & Santhan, 2008). Mangal (2008) describes that selection of appropriate audio-visual materials in relation with the age group of students is very rare. Often teachers are not aware about particular audiovisual materials that are most suitable for young kids, grown-ups and higher grade students. Teachers when use audio-visual materials overlook the aspect of explanation rather consider audio-visual materials as self-explanatory. But explanation at every level of learning is a must. Suppose if a diagram of heart is shown to the students and if it is wrongly labeled, instead of passing concrete concept it will lead to misinformation (Prasad, 2005). The human being is curious by nature so as student too. Students are always enthusiastic and eager to see, touch and hear new things. When a teacher chooses to supplement the lecture with audio-visual aid; managing the class happened to be very difficult task. Suppose if a teacher is to show model of atom then controlling the excitement of the students is must, and if not the teachers' effort go in vain (Prasad, 2005). Using

inappropriate audio-visual films creates aggression and develops destructive behaviors in students. A common practice at toddlers' school is to use cartoon films. Childs' adopt maximum of violence from those cartoon movies. Therefore the uses of such audio-visual materials are strongly criticized by psychologist and educationist (Kinder, 2009).

The importance of audio-visual materials in the teaching and learning processes cannot be over emphasized. Below are some of the roles of audio-visual materials. Basing learning in sense experience, Extending experience, Encouraging participation, Stimulating interest, Individualizes instructions, serves as a source of information, making leaning permanent.

Research Methodology

A descriptive research design was adopted which seeks to find out the application and usage extent of usage of audio-visual materials in the teaching of Physics in Senior Secondary School in Ikere Local Government.

The population for the study consists of all Senior Secondary School Physics Students in Ikere-Ekiti. The schools used for the study were randomly selected from all the Senior Secondary Schools in Ikere-Ekiti, the sample used in this study were SSS 2 students from the some selected Senior Secondary Schools in Ikere-Ekiti.

Four schools were sampled from all the secondary schools in Ikere Local Government Area of Ekiti State and one hundred (100) SSS 2 students from the four selected schools were selected as participants for the study. The students were to provide responses to the questionnaire items.

The only instrument to be used for data collection was questionnaire. The Section A contained information designed to get the students biographic data of individual respondents such as name, sex, school while Section B contained items developed from the purpose of the study to elicit data for analysis on the application and usage extent of usage of audio-visual materials in the teaching of Physics in Senior Secondary School in Ikere Local Government.

For internal consistency of the questionnaires, split-half reliability was determined by pilot testing with questionnaires using 20 students at a school that did not form part of the sample.

The questionnaire was administered on the subjects. The administration was conducted by the researchers with the aid of one (1) trained research assistant.

In analyzing the collected data, the researchers used descriptive statistics of frequency counts and percentage to analyse respondents' demographic data, to answer the research questions while inferential statistics of Chi-square analysis was used to test the formulated research questions.

Test of Research Questions

Research Question 1

Does audio-visual materials impact students interest in Physics in secondary school?

Table 1: Chi-square analysis of data on the impact of audio-visual materials on students interest in Physics in secondary school.

S/N	Items	X ² – cal	X ² – table	df	Remark
1	Television adds interest but teaches little in teaching of Physics.	20.30	7.82	3	*
2	The use of audio-visual per se makes teaching redundant.	18.20	7.82	3	*
3	Audio-visual materials help me to have better interest in Physics.	18.84	7.82	3	*
4	Audio-Visual like television, Radio, Video cassette etc assists better academic performance in Physics.	41.04	7.82	3	*

5	It is against the interest of our children education as a matter of experiment.	11.40	7.82	3	*
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$P < 0.05$, * = Significant

Research Question 2

Does audio-visual materials impact students’ academic performance in Physics in secondary schools?

Table 2: Chi-Square analysis of data on the impact of audio-visual materials on students’ academic performance in Physics in secondary schools.

S/N	Items	X^2 - cal	X^2 -table	df	Remark
1.	Audio-Visual material assists me in the understanding some topics in Physics.	21.04	7.82	3	*
2.	Course of instruction taught by radio, tapes and record assist me in learning Physics.	36.72	7.82	3	*
3.	Use of charts and television assist me to understand Physics better.	38.84	7.82	3	*
4.	The use of audio-visual materials helps my better performance in Physics.	30.02	7.82	3	*
5.	Listening to Physics programmes through radio assists me to understand Physics better.	24.42	7.82	3	*

$P < 0.05$, *= significant

Discussion

The results in table 1 (i.e Chi square analysis of the data on the impact of audio-visual materials on students’ Interest in Physics in secondary school) revealed that X^2 – calculated value of 20.30, 18.20, 18.84 41.04 and 11.40 for items in serial numbers 1,2,3,4 and 5 respectively in the questionnaire at $P < 0.05$ and if $df=3$.

A cursory look at the values showed that all the calculated values (i.e X^2 - cal) is greater than the critical values of 7.82 (i.e X^2 – table value). This shows that all the items are significant. This implies that the use of audio-visual and audio-visual materials stimulates students’ interest in physics in secondary schools in Ikere local government area of Ekiti state.

Similarly, the result in table 2 (i.e Chi-square analysis of data on the impact of audio-visual materials on students’ academic performance in physics in secondary schools) revealed that X^2 – calculated value of 21.04, 36.72, 38.84, 30.04 and 24.42 for items in serial numbers 6,7,8,9 and 10 respectively I the questionnaire at $P < 0.05$ and $df=3$. A good look at the values revealed that all the calculated values (i.e X^2 – cal) is greater than the critical value of 7.82 (i.e X^2 – table). This shows that all the items are significant. This implies that the use of audio-visual and audio-visual materials influences students’ academic performance in Physics in secondary schools in Ikere Local Government Area of Ekiti State, Nigeria.

Conclusion

This study has shown that when appropriate media (i.e audio-visuals) are integrated into the curriculum to complement the traditional method, higher learning outcomes in terms of achievement scores would probably result. Secondary students taught with the audio-visual materials achieved better than student taught with the traditional method.

Performance was significantly improved by the use of audio-visual materials approach in teaching physics. The mean achievement of both male and female students were significantly improve by the use of audio-visual materials.

This study has shown that the use of audio-visual materials assists students’ achievement in Physics better.

Recommendations

Based on the results from this study, it is thereby recommended that:

1. States school management should encourage the use of audio visual materials by inculcating them in the Physics syllabus in all levels of education.
2. Students and teachers alike should get involved in their various roles in the improvisation and utilization of audio-visual materials when necessary
3. Secondary school teachers should be encouraged to adopt the method in their teaching.
4. Also, it is suggested that secondary school Physics teachers should explore the use of audio-visual materials to teach Physics areas not covered by this in order to determine its effectiveness and possible adoption as a major instructional strategy.

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