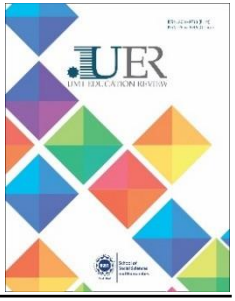
UMT Education Review (UER)
Volume 8 Issue 1, Spring 2025
ISSN$_{(P)}$: 2616-9738, ISSN$_{(E)}$: 2616-9746
Homepage: https://journals.umt.edu.pk/index.php/uer

Article QR



Title: **Use of Audiovisual Materials in Teaching and Learning Science Subjects in Air Force Secondary School, Ikeja, Lagos-Nigeria**

Author (s): Kelvin Inobemhe[1], Yahaya Dauda Gwayo[2], and Bidemi Faustina Matthew[2]

Affiliation (s): [1]Glorious Vision University, Ogwa, Nigeria
[2]National Open University of Nigeria, Abuja, Nigeria

DOI: https://doi.org/10.32350/uer.81.01

History: Received: February 25, 2025, Revised: April 24, 2025, Accepted: May 19, 2025, Published: June 05, 2025

Citation: Inobemhe, K., Gwayo, Y. D., & Matthew, B. F. (2025). Use of audiovisual materials in teaching and learning science subjects in air force secondary school, Ikeja, Lagos-Nigeria. *UMT Education Review*, *8*(1), 01–23. https://doi.org/10.32350/uer.81.01

Conflict of Interest: Author(s) declared no conflict of interest

A publication of
Department of Education, School of Social Sciences and Humanities
University of Management and Technology, Lahore, Pakistan

Use of Audiovisual Materials in Teaching and Learning Science Subjects in Air Force Secondary School, Ikeja, Lagos-Nigeria

Kelvin Inobemhe[1*], Yahaya Dauda Gwayo[2], and Bidemi Faustina Matthew[2]

[1]Glorious Vision University, Ogwa, Nigeria
[2]National Open University of Nigeria, Abuja, Nigeria

Abstract

The study was conducted to ascertain the adoption and utilisation of audio-visual materials for teaching science subjects in Air Force Secondary School Ikeja Lagos. It was motivated by the need to provide insights for a base for understanding the use of audiovisual materials for learning among young learners. The researchers adopted survey design as research method with the use of a questionnaire to elicit data from the respondents. The instruments of data collection were administered to 120 students of senior secondary school I and II offering science courses. The researchers showed that there is a prominent use of multimedia, portable and overhead projectors, posters and charts, photographs and pictures, and specimens among several other audio-visual instructional materials used for teaching and learning in senior secondary school. Additionally, the researchers revealed that benefits such as students' motivation for science subjects, lasting and meaningful learning, students' attentiveness, enhanced performance as well as learning outcomes, among others are associated with the use of audio-visual instructional materials in the teaching of science subjects in the school. Furthermore, the researchers revealed that challenges associated with the use of audio-visual materials in science teaching in secondary schools include psychological fear and lack of interest in sciences. The researchers concluded that despite the glaring challenges, the use of technology-based teaching materials such as audio-visual instructional aid has gained popularity in the 21st century and recommended that students must be motivated to become interested in science subjects through continuous and improved use of audio-visual aids for teaching.

***Keywords*:** Education, learning, Nigeria, teaching, technology

*Corresponding Author: kelvin.inobemhe@gvu.edu.ng

Introduction

Education is the bedrock of growth and development in any society. Be it formal, informal or semi-formal, education is considered as the pathway to providing the requisite knowledge for growth and development. Accordingly, sound education becomes a necessity for all of humanity and society because the values required to navigate through life can be inculcated by an exposure to the right knowledge gained through education. According to Al-Shuaibi (2014), education offers opportunities for the development of human minds, thoughts, personality and social skills. In essence, individuals become better humans with the capacity to act and cohabit with others through their exposure to the requisite education starting from the cradle till they become adults. In other words, right from tabula rasa to the point of independent reasoning they continue to evolve through education.

Quality education is achieved through the application of the right methods aided by necessary learning tools and facilities. Put in another way, quality teaching, which in itself is a direct link to students' success, can be achieved through the application of applicable methods such as the use of instructional materials and aids. Sipuka and Motala (2023) averred that quality teaching is an enabler of success in the educational journey of students. The implication is that as teachers adopt the right methods, their students are exposed to the right contents through the use of appropriate tools and learning aids like audio and visual materials. The emphasis here is the use of different types of learning materials in the form of audio and visual aid to support ease-of-teaching and learning within and out of the precincts of a classroom. This becomes pertinent to cater for all categories of learners.

Traditional verbal instructions to students in the learning environment seem boring and uninteresting to the learners. This has been buttressed with the assertion that such methods are usually painful and boring for students (Kwegyiriba et al., 2022). The boredom stems from multiple sources including the lack of tasks that are challenging to the students and repetition for which verbal instructions are known. This is supported by the Larson and Richards' under-stimulation model which explains why students are usually bored in academic environments. The scholars explained that boredom in the classroom is occasioned by absence of challenging tasks and overt repetition by teachers with the likely result being under-arousal

(Zawodniak & Kruk, 2019). This is a case of below-par motivation for the learners who require some form of motivation through lively events to become interested in learning. This is notably common among young learners.

The issues observed in the learning and teaching prompted the improvising to make learning interesting. This is also based on the knowledge of the categories of learners. The knowledge of learners' strengths and weaknesses is a critical aspect of their journey toward better learning outcomes. This makes the understanding of learners' categorisation crucial. Among learners are those with special visual learning skills also known as visual learners and those with auditory or aural skills with special attention to learning through hearing. According to Reyes (2024), the other categories of learners are the kinesthetic learners and the reading and writing learners. While those categorised as aural learners learn through listening and when exposed to materials in the form of discussions, visual learners appreciate learning when presented in the form of visual images, graphs and diagrams.

Furthermore, Reyes (2024) explained that there is another category known as writing and reading learners. Accordingly, persons under this category of learners are able to absorb learning in situations where contents are presented in text as in textbooks, handouts, manuals, essays and notes. Learners of the tactile or kinesthetic category learn through experience as they are better positioned to understanding through testing and experimenting. The foregoing is an emphasis on the importance of learning through visual materials in any educational situation. According to Reyes (20224), results from studies have shown that 75 percent of what the human brain is able to process stems from information embedded in visual formats like infographics, animations and videos, flowcharts and diagrams, illustrations and images, virtual and augmented reality, charts and graphs. Lectures are also converted to audio recordings for ease and convenience of learning.

The adoption and use of audio-visual aids in learning in Nigerian schools has modified traditional methods ultimately helping to capture the focus of learners. Leaners' attention span is sought and obtained through the use of audio-visual tools for teaching and learning in Nigerian schools (Halima, 2023). According to Ordu (2021), using teaching and learning aid in the form of the internet facilities, objects, video clips and pictures add to

the imaginative capacity of students to visualise the lesson content as delivered with the use of the various aids. However, imagining a 21st century learning space without these aids paints a picture of a difficult learning process for the students and a strenuous teaching activity for the teachers/instructors who would have to make extra efforts to illustrate and capture the attention of learners. This study therefore was conducted to ascertain the benefits derived from the use of audio-visual learning aid in science subjects while studying the challenges faced in their use.

Statement of the Problem

Traditional teaching methods of using textbooks and manually-delivered lectures have been the mainstay of knowledge transfer from teachers to their students. However, this has not been so effective considering that the students are not properly engaged and a deep comprehension of the taught subject is absent (Kahsay et al., 2024). This has prompted the introduction of different methods of aiding teaching and learning. Such methods include the adoption of digital tools in the form of e-learning and related audio-visual materials to establish a lasting impression on the minds of the young learners. Young minds are said to respond better to visual aids while learning. A study by Reyes (2024) showed that there could be a 400 percent improvement in learning when visual techniques are used for teaching and learning in the classroom.

The importance of visual learning cannot be overemphasised. According to Qureshi (2023), visual literacy can help youth develop a creative mindset. The adoption and utilisation of the materials in the classroom is considered as one that has a lasting impact on the learning outcomes of the students. However, there is an issue with the adoption of these audio and visual aids in learning in parts of sub-Saharan Africa, including Nigeria (Chomunorwa & Mugobo, 2022; Enekwe et al., 2021; Jeptoo & Mogeni, 2024; Macharia, 2021; Mutemi, 2023; Ochieng & Ngware, 2022). Regardless of whether or not these aids are useful and beneficial to the educational sector, there are, however, some challenges associated with the use of the learning aids and materials. The challenges are multidimensional and multifaceted. Therefore, this study examined the adoption of audio-visual materials in teaching science subjects in a secondary school in Lagos Nigeria with specific focus on their benefits and challenges.

Research Questions

The following research questions provided the guide for this study:

- What types of audio-visual instructional materials are available in the Air Force Secondary School Ikeja, Lagos?
- What are the benefits derived by the student in the use of audio-visual materials in learning science subjects in Air Force Secondary School Ikeja, Lagos?
- What are the challenges faced in the use of audio-visual materials in the area of the study?

Conceptual Review

The concept of audio-visual teaching and learning is reviewed under this section. Audio visual, sometimes used as "audio-visual" is a combination of two distinct words namely audio and visuals. Whereas audio refers to the sound frequencies that relate to the audible portion differentiated from the inaudible sounds (Sheldon, 2022), visual depicts images that which appeals to the sense of sight. Accordingly, audio-visual learning materials are time-based media that range from recorded sound to a variety of video formats including motion picture film (Xie & Matusiak, 2016). In 21st century teaching and learning, these materials are increasingly being utilised on the grounds of necessity.

Audio-visual materials appeal to more than one sensory channel as the teachers leverage such resource to clarify, correlate and establish concepts while also making interpretations – and they are also conceptualised as materials through which teaching and knowledge acquisition becomes clearer, while providing ease-of-interpretation and correlation established between different concepts (Waad & Younus, 2022). Overall, teachers and learners can rely on audio-visual materials for quality teaching and learning in an academic setting. Using the tools can stimulate curiosity, improve their comprehension levels, enhance imaginative thinking and above all motivate learners to learn with superior options to different other learning methods available to them.

In teaching and learning, audiovisual materials refer to educational digital materials which are effective (Hasanova, 2023). This is an indication that such materials are not just dependent on one sense but two which

include those of sight and hearing. Therefore, audio-visual learning materials are educational tools used to convey meaning through spoken symbols, and language and visuals (Ojobo et al., 2020). In modern learning and teaching, these materials are attempts to make knowledge clear to learners through the senses (Farooq, as cited in Hasanova, 2023). The terms "audio-visual" and "audio visual" are used interchangeably in this study. This is based on the assertion by Edmondson (2004) that as a single word, the word "audiovisual" has gained wide acceptance and it is used to refer to moving images and recorded sound of all kinds.

Literature Review

There is a greater impact that accompanies the use of technology for teaching and so the realisation has also attracted greater focus on their use. In reality, literature abounds in the education and pedagogy sub-field of research and much of the attention has been given to the use of instructional materials for teaching and learning in secondary level of education in Nigeria. In addition, researchers have also given significant attention to audio-visual instructional materials used in the education setting. Some of such are reviewed in this study. According to Kafayos (2023), audio-visual materials are used to pique attention of students making the task of teaching easier for instructors and teachers. Bakare (2024) identified audio-visual learning aid to include visual aids, digital learning platforms, animations, audio recordings, videos, virtual reality (VR) and augmented reality (AR). These platforms are increasingly being adopted in teaching and learning in 21st century educational settings (Okpara, 2024). This is an indication of their usefulness in education.

The much debated audio-visual learning aids fall under the broad category of non-conventional or modern teaching aids that according to Ordu (2021) may have made tasks in the classroom by teachers more challenging and enjoyable at the same time. In essence, these materials make the classroom a lot easier and dynamic for learners and teachers but also present some challenges. Some of these challenges associated with the use of audio-visual aids are that their use is effort-intensive and time-consuming in respect of the process involved in preparing and integrating materials into learning and teaching (Kahsay et al., 2024).

Using the audio-visual or technological-based learning and teaching aids present unique opportunities for persons on both sides – the students

and their teachers. According to Omojemite (2024), the use of audio-visual learning aid supports effective learning among students, deepens students' understanding of concepts, creates a dynamic and interactive learning environment while also leading to overall enhancement in students' enthusiasm and motivation. This is an indication that their use in teaching and learning leads to improvement in learning outcomes of students in modern educational setting. This has been buttressed with the assertion that the use of visual-aid materials for teaching has led to enhanced or increased abilities for learners and eventually has improved academic performance (Vishnupriya & Bharathi, 2022). Relatedly, Omuku (2024) observed that audio-visual materials application in teaching can enhance performance in secondary education setting.

Furthermore, these materials as used in teaching and learning are known to present their unique benefits such as ease-of-conveyance of subjects by instructors (Kafayos, 2023), students' improved academic achievement (Ojelade et al., 2020), effective teaching practices (Dawadi, 2022) and many more. Accordingly, these benefits can change the dynamics of education and its future. Audio-visual-oriented instruction has the capacity to influence STEM students' interest in education as well as achievements – and this was revealed in a study where findings also demonstrated that students taught with audio-visual materials showed higher interest and posted better academic records when compared to others that received lesson with the use of conventional methods (Onu et al., 2022). This is an indication that the use of technology-based materials for teaching may have greater impact on learning outcomes of students especially those in science, technology, engineering and mathematics otherwise known with the STEM acronym. There is a population gap owing to the reviewed studies' focus on other population groups outside of secondary schools in Lagos State. Therefore, this study was conducted to bridge this gap.

Empirical Review

Researchers have conducted studies into the use of audio-visual materials to enhance teaching and learning in schools across Nigeria. Some of these studies are reviewed hereunder. Adukwu and Ezechi (2021) investigated how biology is taught and learned in secondary schools in Enugu State's Enugu North Local Government Area through the use of audio-visual resources. Survey design was the research method employed. Among other things, the study's findings showed that audio-visual materials

affect students' learning by helping them retain concepts for longer periods of time, giving unambiguous concepts that have the same meaning as words, and generally improving learning effectiveness. Additionally, audio-visual aids offer chances for productive teacher-student connection, diversity in the classroom, and student interest and inspiration; the efficient utilisation of audio-visual resources by teachers is hampered by a shortage of competent biology teachers who are adequately knowledgeable about using contemporary materials. Each course has a set amount of time allocated, which makes it impossible to use the school's audio-visual resources.

Biology is a science subject and the study conducted by Byusa et al. (2020) categorised the many biology teaching tools that are available and how many pre-service biology instructors use them. A descriptive survey research design was employed in the study. Data collection was facilitated by questionnaires and observational checklists of biology teaching materials, which were then evaluated with the use of percentages and frequency counts. The findings imply that whereas materials/resources such as overhead projects, a class whiteboard, recorders, electrophoresis unit, and Polymerase chain reaction machines were not present or lacking, materials such as laboratories, classroom chalkboards, chairs, slide projectors, centrifuges, microscopes and biology textbooks were available. The findings also showed that pre-service biology teachers were using the available biology instructional tools at a low level. This suggests that future biology teachers will likely be less qualified. It was advised to supply sufficient biology teaching resources and to keep an eye on how they were being used.

Samreen and Malik (2018) investigated and contrasted the opinions of science subject instructors in the public and private sectors regarding the usage of audio-visual aids in secondary science education. Teachers in secondary schools provided the study's data. The study's findings indicate a favourable correlation between an instructor's attitude and the availability of audio-visual aids. The results show that science teachers in secondary schools are aware of the value of using audiovisual aids when teaching the subjects. Findings, however, showed that public school instructors knew more than private school teachers about the value of using audio-visual aids when teaching science subject like biology. It was determined that all instructors in public schools received training because only qualified teachers were hired for secondary positions in public schools. Additional

research revealed that appropriate audio-visual resources for biology instruction were lacking. Further analysis of the data suggested that the sole visual aid accessible in secondary schools was the blackboard, indicating that the use of audio-visual aids in science instruction was highly beneficial in raising students' levels of interest and desire for studying.

Researchers Ong'amo et al. (2017) looked at how much biology instructional resources were being used and how it impacted students' academic achievement. Using stratified random selection, the researchers picked twenty-three schools from a sample of ninety-two public secondary schools. The teachers that responded were chosen at random. Questionnaires, checklists, observation schedules, and interview guides were used to gather the data. The researchers employed observation schedules to assess how teachers and students used resources, and the tests that were administered as a result were used to calculate the achievement scores that differed between classes that were regularly taught with resources and those that were not. The information provided by teachers and students regarding resource utilisation was cross-checked through interviews with head teachers.

The study's conclusions showed that audiovisual materials were not used very often in classrooms. It was further revealed that the head teachers purchased the majority of the resources. Using observation schedules, the researchers assessed students during live lesson instruction and found that students who were trained to use resources frequently outperformed those who were instructed to use them infrequently. The study also showed that teachers' credentials, pedagogy, attitudes, and students' entry behaviour all contributed to students' improved academic performance, and that regular utilisation of instructional materials was not the sole variable determining high academic performance. This is in contrast with findings from a study conducted by Omojemite (2024) where audio-visual materials were greatly used to teach other subjects like social studies and demonstrating that various aspects of teaching and learning are influenced by the use of audio-visual materials.

Olu-Ajayi (2016) looked into how low-ability students from Ado local government area, Ekiti state, learned science and how audio-visual aids affected their learning. Its primary goal was to use audio-visual aids to raise low-ability level biology students' performance. A non-randomised pre-test, post-test, and experimental-control group system was used in the quasi-

experimental design for the study. Students from senior secondary schools in Ekiti state's Ado LGA made up the study's population. In the study, 180 science students were chosen from six high schools for the sample. Purposive and random sampling methods were employed in the sample process. The study's finding was that teachers could raise the ability level of their low-ability biology students by using audiovisual aids. Recommendations were given in light of the study's findings. Among these was the suggestion that teachers employ audiovisual tools to promote learning and raise performance levels in children with poor ability levels.

Akolo (2018) carried out an audio-visual material survey for twelve teachers' colleges in Nigeria's Plateau State and eight teacher training colleges in Kwara State. In the study, equipment and materials possessed by the individual teacher colleges, the amount of time teachers spent using their own resources, and the amount of time they spent training in audio-visual technology were all taken into account. The study found that while instructional aid was used in some places, it was not used at all in the other locations where the research was conducted. According to Kahsay et al. (2024), audio-visual materials for teaching chemistry in junior secondary school were employed and that majority of the teachers used the materials infrequently because of the lack of adequate technological access coupled with insufficient teacher training in the schools. Furthermore, the researchers revealed that audio-visual materials are effective for increasing engagement and comprehension.

Theoretical Framework

The VARK learning theory is the theory upon which this study is anchored. The theory was suggested by Fleming and Mills in 1992 (Reyes, 2024). It is based on the classification of learners into four learning styles namely visual, auditory, read/write, and kinesthetic which earned the theory "VARK" acronym. It used to be VAK before Fleming modified it to VARK. Learning is an affective, psychological and cognitive composite factor acting as an indicator on the ways learners interact and respond to their learning environment (Duff, 2000). Accordingly, the theory can be relied upon to identify the dominant and most preferred learning style of a learner.

Based on the classification, those in the visual learners' category prefer to learn through diagrams, pictures and charts, just as the auditory learners preferably learn through discussions, listening and lectures delivered

(Fleming, 2006). Read/write learners are those with preference to learn through written materials in the form of training manuals and textbooks or any other text-based materials and the kinesthetic learners are the category of learners with a focus on experimental learning and other related hands-on activities. However, students are said to possess distinct tendency and strength in accepting learning (Fleming, 2006). This theory is applied to this study to provide a framework on the preference of audio visual materials for learning science subjects in Air Force Secondary School Ikeja, Lagos.

Methodology

This study used a descriptive survey research design which was adopted to evaluate respondents' opinions. Typically, a descriptive survey study gathers data from a specific population to use the variables under investigation to describe the population's current state. The target sample population for this study includes students in SS I and SS II, while the population for this study consisted of all senior school science students at Air Force school, Ikeja, Lagos State, Nigeria. Students in SS I and SS II are thought to be the most suitable for the study because they are not under pressure to prepare for external exams and are enrolled in the first and second terminal classes in senior school, which prepares them for their senior secondary school certificate examination.

A simple random selection technique was used to select 120 from the SS I and SII classes to make up the study's sample. The population had equal opportunities and the rate error was decreased with simple random sampling. Male and female senior secondary science students (SS I and SS II) made up the respondents. Nonetheless, sixty (60) respondents were chosen from each class consisting of both male and female students, for a total of 120 respondents determined for the study. The questionnaire was the instrument of data collection and was designed with two sections. Whereas section "A" was used to elicit biographical information, "B" was about questions posed to evaluate students' perceptions of the variables. A four-point Likert scale was used to weigh the responses thusly: Agree (A), Strongly Agree (SA), Disagree (D), and Strongly Disagree (SD). The instruments were administered to the students directly and analysis was based on the use of frequency and percentages accompanied by scientific tables for presentation. The statistical package for social sciences (SPSS) version 26 was used for analysis of the data for this study. Distribution of

responses was presented using descriptive statistics such as percentages and frequency distribution tables.

Results

Table 1

Audio-Visual Instructional Materials Available for Teaching and Learning Sciences

Parameters	SD [%]	D [%]	A [%]	SA [%]	Mean	Decision
Multimedia projector is one of the types of audio-visual material	16 [13.3]	24 [20.0]	19 [15.8]	61 [50.8]	3.04	Accepted
Portable projector is utilised for sciences	15 [12.5]	25 [20.8]	25 [20.8]	55 [45.8]	3.00	Accepted
Classroom overhead projector is utilized	18 [15.0]	22 [18.3]	40 [33.3]	40 [33.3]	2.85	Accepted
Videotape for science process is utilized	36 [30.0]	46 [38.3]	20 [16.7]	18 [15.0]	2.17	Rejected
Science lessons audio recordings are the available instructional materials	48 [40.0]	47 [39.2]	12 [10.0]	13 [10.8]	1.92	Rejected
Posters and charts are utilised as materials	7 [5.8]	7 [5.8]	41 [34.2]	65 [54.2]	3.37	Accepted
Photographs and pictures are utilised as instructional materials	3 [2.5]	6 [5.0]	43 [35.8]	68 [56.7]	3.47	Accepted
Specimens are used as instructional materials	8 [6.7]	45 [37.5]	67 [55.8]	-	3.49	Accepted
Models of various types are utilised as instructional materials	27 [22.5]	48 [40.0]	15 [12.5]	30 [25.0]	2.40	Rejected

Note. KEY: SD=Strongly; D=Disagree; A=Agree; SA=Strongly Agree. Decision Rule**:** 0.00 – 2.49 = [Rejected] 2.50 – 4.00 = [Accepted]

Table 1 demonstrate that there are audio-visual instructional materials in Air Force Secondary School, Ikeja Lagos. Accordingly, the result shows that multimedia projector is one of the types of audio-visual materials used in the school (M = 3.04) and portable projector is also utilised (M = 3.00) and with a mean score of 2.85 the students indicated that classroom overhead projector was also highly utilised in the school. Furthermore,

results also showed that students identified posters and charts (*M* = 3.37), photographs and pictures (*M* = 3.47), and specimens (*M* = 3.49) as some other instructional materials used in their school. The results in the table showed that audio-visual instructional materials are available for teaching and learning in the school studied.

Table 2

Benefits Derived by Students in the Use of Audio-Visual Materials for Teaching

Parameters	SD [%]	D [%]	A [%]	SA [%]	Mean	Decision
Certain benefits are associated with the use of audio-visual materials in learning science subjects	5 [4.2]	4 [3.3]	43 [35.8]	68 [56.7]	3.45	Accepted
The availability of audio-visual materials motivates students' attitude toward learning sciences	8 [6.7]	17 [14.2]	62 [51.7]	33 [27.5]	3.00	Accepted
Audio-visual materials have the potential to make learning more lasting and meaningful	5 [4.2]	12 [10.0]	58 [48.3]	45 [37.5]	3.19	Accepted
Students are more attentive when using audio instruction aids, and this consequently improves learning outcome	9 [7.5]	9 [7.5]	53 [44.2]	49 [40.8]	3.18	Accepted
Students' performance can be enhanced by the use of audio-visual materials	4 [3.3]	2 [1.7]	42 [35.0]	72 [60.0]	3.52	Accepted
Using audio-visual instructional materials encourage students to participate fully during teaching and learning process	3 [2.5]	6 [5.0]	54 [45.0]	57 [47.5]	3.28	Accepted

Note. KEY: SD=Strongly; D=Disagree; A=Agree; SA=Strongly Agree. Decision Rule**:** 0.00 – 2.49 = [Rejected] 2.50 – 4.00 = [Accepted]

Data in table 2 above shows students' perceptions in respect of the benefits derived from the use of audio-visual instructional materials for teaching in their school. Results show that students agreed to the notion that certain benefits are associated with the use of the materials (M = 3.45), and with a mean score of 3.00, they are affirmative that the availability of audio-visual materials in learning motivates students to have a positive attitude toward the learning of science subjects. Additionally, the students are also in agreement with the notion that audio-visual materials have the potential to make learning more meaningful and lasting (M = 3.19), that students are more attentive when using audio instruction aids and that it consequently improves learning outcomes (M = 3.18), students' overall performance can be enhanced by virtue of the use of audio-visual materials for learning (M = 3.52), and a mean score of 3.28 also demonstrated that the use of audio-visual materials makes students participate fully during teaching and learning. The implication of the data in table 2 above is that the learning of science subjects in secondary schools can be enhanced through the use audio-visual materials for instruction.

Table 3

Challenges Faced in the Use of Audio-Visual Materials

Parameters	SD [%]	D [%]	A [%]	SA [%]	Mean	Decision
There are glaring challenges associated with the use of audio-visual materials	5 [4.2]	5 [4.2]	51 [42.5]	59 [49.2]	3.37	Accepted
That the students lack interest while learning science subjects is a major challenge	17 [14.2]	11 [9.2]	59 [49.2]	33 [27.5]	2.90	Accepted
The large class phenomenon common in our schools makes it difficult to use audio-visual materials	30 [25.0]	43 [35.8]	22 [18.3]	25 [20.8]	2.35	Rejected
Students' psychological fear of the science poses a problem in learning	15 [12.5]	11 [9.2]	53 [44.2]	41 [34.2]	3.00	Accepted

Parameters	SD [%]	D [%]	A [%]	SA [%]	Mean	Decision
Inadequate science teachers in term of number and quality is a challenge	39 [32.5]	35 [29.2]	19 [15.8]	27 [22.5]	2.28	Rejected
Inadequate provision of audio-visual materials by the school for practical is a challenge	12 [10.0]	6 [5.0]	56 [46.7]	46 [38.3]	3.13	Accepted

Note. KEY: SD=Strongly; D=Disagree; A=Agree; SA=Strongly Agree. Decision Rule**:** 0.00 – 2.49 = [Rejected] 2.50 – 4.00 = [Accepted]

The data in table 3 shows that there are glaring challenges associated with the use of audio-visual materials for teaching science subjects in Air Force Secondary School in Ikeja, Lagos (*M* = 3.37), and that such challenges are made manifest in students' lack of interest while learning science subjects (*M* = 2.90), students' psychological fear of the science (*M* = 3.00), and inadequate provision of audio-visual materials for practical by the school authority (*M* = 3.13). Therefore, the results from the field survey as presented in Table 3 imply that certain challenges are associated with learning and teaching of science subjects in secondary school in Nigeria

Discussion

The researchers revealed that audio-visual instructional materials are used for teaching science subjects in Air Force Secondary School, Ikeja Lagos. This is based on the notion of 50.8 percent respondents who strongly agreed and 15.8 percent who agreed to the notion. Based on the data in table 1, some of the materials identified by the students include multimedia, portable and classroom overhead projectors, posters and charts, photographs and pictures as well as specimens. This is an indication that there is a significant level of adoption of such instructional materials in the school. It also implies that there is visual and auditory form of learning in the secondary school which is in line with the VARK theory. Findings of this study are in consonance with findings from a study conducted by Kafayos (2023) where it was revealed that digital whiteboards and projected images were among the audio-visual materials used for teaching science subjects in senior secondary schools in Yobe state, Nigeria. Results from the survey revealed that videos for science teaching are not in great use in the secondary school and it sharply contrasts with findings from a study

conducted by Kahsay et al. (2024) where it was shown that videos are the commonly most utilised audio-visual materials to teach students in junior secondary school elsewhere in Nigeria.

Results from the study also showed that there are benefits derived from the use of audio-visual materials for teaching science subjects in secondary schools. Accordingly, data in table 2 shows the opinion of 51.7 percent who agreed and 27.5 percent respondents who indicate that attitudes of students toward learning are motivated by the very use of the materials just as learning can be more lasting and meaningful by their use. Furthermore, the researchers revealed that students become more attentive and are more eager to participate fully during teaching and learning. This is based on the notion of 44.2 percent who agreed and 40.8 percent of respondents who strongly agreed. Ultimately, and based on the position of 60 percent of the respondents, these instructional materials and their identified benefits culminate in enhanced academic performance and improved learning as outcomes. This aligns with findings from earlier studies such as the ones conducted by Bakare (2024), Kahsay et al. (2024), Ojelade et al. (2020), and Ojo et al. (2024). Specifically, Bakare (2024) among other things revealed that the use of audio-visual materials for teaching enhances motivation and enthusiasm among students spurring them to be open to learning. Additionally, the researchers of this current study also showed similar results that students' engagement and participation is improved on account of the use of the materials for teaching.

The researchers identified some challenges associated with the use of audio-visual materials for teaching science subjects in secondary education in Nigeria. As seen in the result in table 3, some of the challenges are lack of interest (49.2%) and psychological fear of science subjects (44.2%), as well as inadequate provision of audio-visual materials by the school authority (46.7). This is an indication that though audio-visual materials are useful for learning in an educational setting, there are certain set-backs informed by the myriad of challenges identified in this study. Researchers conducted similar studies and also found similar challenges in some schools in Nigeria and elsewhere in the African continent (Chomunorwa & Mugobo, 2023; Chukwu, 2021; Enekwe et al., 2021). Accordingly, they believed that these pose as impediments to teaching and learning in different parts of the African continent; one that is considered as educationally disadvantaged in so many ways. Specifically, Enekwe et al. (2021)

identified several challenges some of which are technical problems, lack of adequate time for teachers to prepare lessons, resistance to change, poor maintenance culture among schools, illegibility of some of the materials, inability to improve audio-visual materials and more.

Conclusion and Recommendations

It is the conclusion of the researchers that the use of audio-visual materials for teaching science subjects has gained popularity among schools in Nigeria. However, there are areas where the adoption is slow. From the findings of this study, there exists evidence that points to the use of some types of audio-visual materials to teach science subjects in senior secondary schools in Nigeria. However, challenges still persist in different aspects of teaching and learning with instructional aid/materials. Students' psychological fear and lack of interests in sciences are the most glaring. Therefore, the researchers recommended that:

- Students should be motivated to develop interest in science subjects. One of the ways this can be achieved is to maximise the potentials of instructional materials to stimulate their interests in the subjects through simulations, audio-visual contents of high quality in terms of design and many more.
- Stakeholders should continue to explore ways to develop curriculum with priority on the use of audio-visual learning materials. This is based on the assumption of VARK model and the effects on the learning process of students especially in science subjects at the secondary level as demonstrated with the results from the field survey conducted for this study by the researchers.
- Additional provisions should be made by the concerned educational authority to aid schools to acquire science subject instructional materials of audio-visual orientation. This will put the schools in a frame where they will be eager to develop interest knowing that assistance is readily available to them as offered by the educational authority. This investment must be further expanded to include privately-owned schools in order to expand the promotion of science subjects in secondary schools.

Conflict of Interest

The author of the manuscript has no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

The data associated with this study will be provided by the corresponding author upon request.

Funding Details

No funding has been received for this research.

References

Adukwu, L., & Ezechi, P. (2021). Biology teachers' methods of teaching and academic performance of secondary school students in Abia State. Nigeria. *Journal of Emerging Trends in Educational Research and Policy Studies, 8*(4), 228–231.

Akolo, O. (2018). Data to concept approach in biology teaching. *Journal of Science Teachers Association of Nigeria, 18*(1), 56–62.

Al-Shuaibi, A. (2014). *The importance of education* [Unpublished manuscript]. Community College of Qatar, English Language Center.

Bakare, B. (2024). The use of audio-visual materials in promoting the teaching and learning of French language in Ekiti-State. *International Journal of English Language and Linguistics Research, 12*(2), 1–17. https://doi.org/10.37745/ijellr.13/vol12n1117

Byusa, E., Kampire, E., & Mwesigye, A. R. (2020). Analysis of teaching techniques and scheme of work in teaching chemistry in Rwandan secondary schools. *Eurasia Journal of Mathematics, Science and Technology Education*, *16*(6), 9–15. https://doi.org/10.29333/ejmste/7833

Chomunorwa, S., & Mugobo, V. V. (2022). Challenges of e-learning adoption in South African public schools: Learners' perspectives. *Journal of Education and e-Learning Research, 10*(1), 80–85. https://doi.org/10.20448/jeelr.v10i1.4423

Chukwu, E. G. (2021). Use of audio aids in teaching and learning challenges and prospects. *ESCET Journal of Educational Research and Policy Studies*, *1*, 347–354.

Dawadi, S. (2022). Availability and use of audio-visual aids in teaching science. *Journal of Social Sciences and Management Studies*, *1*(3) 17–23. https://doi.org/10.56556/jssms.v1i3.100

Duff, A. (2000). Learning style of UK higher education students: Four studies of the reliability and replicability of the learning style questionnaire (LSQ). *Bristol Business School Teaching and Research Review*, *14*(3), 131–177.

Edmondson, R. (2004). *Audiovisual archiving: Philosophy and principles*. UNESCO. https://www.fiafnet.org/images/tinyUpload/E-Resources/Official-Documents/Philosophy-of-Audiovisual-Archiving_UNESCO.pdf

Enekwe, R. C., Mogboh, V., & Ekene, O. (2021). Challenges and solutions in the utilisation of audio-visual materials in teaching social studies in upper basic schools in Udi education zone, Enugu State, Nigeria. *British Journal of Education and Social Sciences*, *8*(4), 32–51.

Fleming, N. D. (2006). *V.A.R.K visual, aural/auditory, read/write, kinesthetic*. Bonwell Green Mountain Falls.

Halima, H. (2023). Audio-visual aids as tools for improved teaching and learning of biology in Nigerian secondary schools. *Al-Hikmah Journal of Education*, *10*(2), 108–114.

Hasanova, M. (2023). Basic concepts about audiovisual method. *Norwegian Journal of Development of the International Science*, *119*, 14–17. https://doi.org/10.5281/zenodo.10054961

Jeptoo, N., & Mogeni, J. M. (2024). Audi-visual aids utilisation frequency and its effects on Biology academic performance among secondary schools in Nandi East sub-county, Kenya. *Research Journal of Education, Teaching and Curriculum Studies*, *2*(1), 25–34. https://doi.org/10.58721/rjects.v2i1.599

Kafayos, Y. (2023). Effective use of audio-visual instrument in teaching science students in senior secondary schools Yobe State, Nigeria.

International Journal of Innovative Social & Science Education Research, 11(4), 74–80.

Kahsay, T. T., Berhe, G. G., & Tesfamariam, G. M. (2024). The extent of audio-visual material use in the teaching and learning of chemistry in secondary schools. *African Journal of Chemical Education, 14*(2), 128–159.

Kwegyiriba, A., Mensah, R. O., & Ewusi, E. (2022). The use of audio-visual materials in teaching and learning process in Effia junior high schools. *Technium Social Sciences Journal, 31*, 106–114. https://doi.org/10.47577/tssj.v31i1.6399

Macharia, J. K. N. (2021). The factors affecting the adoption of virtual learning environments (VLE) and learner management systems (LMS) by higher education students during and post-COVID-19 in Kenya. *Journal of Language, Technology and Entrepreneurship in Africa*, *12*(2), 187–207.

Mutemi, P. M. (2023). *Use of audio-visual technology and its influence on students' performance in French among secondary schools in Nairobi city county, Kenya* [Master's thesis, Kenyatta University]. Kenyatta University Library. https://ir-library.ku.ac.ke/items/13665df0-8b9c-47a3-9aee-fbd3bd72c538

Ochieng, V. O., & Ngware, M. W. (2022). Adoption of education technologies for learning during COVID-19 pandemic: The experiences of marginalised and vulnerable learner populations in Kenya. *International Journal of Educational Reforms*, *2*(4), 464–487. https://doi.org/10.1177/10567879221076081

Ojelade, I. A., Aregbesola, B. G., Ekele, A., & Aiyedun, T. G. (2020). Effects of audio-visual instructional materials on teaching science concepts in secondary schools in Bwari Area Council Abuja, Nigeria. *The Environmental Studies Journal: A Multidisciplinary Journal, 3*(2), 64–76.

Ojo, O. D., Bidemi, O. O., & Peter, O. O. (2024). Effects of audio-visual usage on upper basic school students' performance in Christian religious studies in Federal Capital Territory Abuja, Nigeria. *Ilorin Journal of Business Education*, *5*(1), 238–248.

Ojobo, R. C., Babarinde, E. T., & Fagbemi, V. O. (2020). *Audio-visual resources in library: An enhancing tool for effective teaching and learning in primary schools in Nsukka L.G.A.* Digital Commons @ University of Nebraska - Lincoln. https://digitalcommons.unl.edu/libphilprac/4361

Okpara, G. C., Ezeador, C. N., & Ezeanolue, A. (2024). Philosophy of teaching: Exploring various teaching methods for improved education in Nigeria. *Nnadiebube Journal of Philosophy*, *7*(3), 15–24.

Olu-Ajayi, I. (2016). Resources for teaching secondary school biology in Bayelsa State of Nigeria. *Information and Knowledge Management*, *1*(2), 45–62.

Omojemite, M. D. (2024). The impact of audio-visual resources on the teaching and learning of social studies in Ekiti-State, Nigeria. *Journal of Educators, Teachers and Trainers*, *15*(5), 570–579. https://doi.org/10.47750

Omuku, P. A. (2024). A meta-analysis on audio-visuals in educational enhancement and teaching in secondary schools. *International Journal of Innovative Language, Literature and Art Studies*, *12*(3), 26–31. https://doi.org/10.5281/zenodo.13379027

Ong'amo, B. L., Ondigi, S. R., & Omariba, A. (2017). Effect of utilisation of biology teaching and learning resources on students' academic performance in secondary schools in Siaya District – Kenya. *International Journal of Education and Research*, *5*(1), 2–20.

Onu, W., Uzoigwe, A. U., Ayodele, F. B., Oluwatosin, O. C., & Dele, D. (2022). *Efficacy of audio-visual aided instruction for improving students' interest an achievement in STEM subjects: Implications for library practice*. Digital Commons @ University of Nebraska – Lincoln. https://digitalcommons.unl.edu/libphilprac/7147/

Ordu, U. B. -A. (2021, June 20–24). *The role of teaching and learning aids/methods in changing world* [Paper presentation]. Conference Proceedings at BCES Conference of 2021, Virtual.

Qureshi, A. (2023). Engaging youth through visuals. In A. Kárpáti (Ed.), *Arts-based interventions and social change in Europe* (pp. 39–50). Routledge. https://doi.org/10.4324/9781003376927-7

Reyes, S. (2024, March 21). The role of visual learning in improving student performance. *Puppetry*. https://www.puppetry.com/posts/the-role-of-visual-learning-in-improving-student-performance

Samreen, L. & Malik, E. (2018). *The use of resources.* Longman.

Sheldon, R. (2022, December 2). Audio definition. *TechTarget*. https://www.techtarget.com/whatis/definition/audio

Sipuka, P. B., & Motala, S. (2023). Higher education policy, governance, and practice. In R. J. Tierney, F. Rizl, & K. Ercikan (Eds.), *International encyclopedia of education* (pp. 504–512). Elsevier Science.

Vishnupriya, S., & Bharathi, R. (2022). The impact of audio visual aids in teaching. *International Journal of Health Sciences*, *6*(S3), 7847–7859. https://doi.org/10.53730/ijhs.v6nS3.7877

Waad, M. A., & Younus, R. Z. (2022). The role of audio visual aids in teaching English. *International Journal of Health Science*, *6*(S5), 10616–10622. https://doi.org/10.53730/ijhs.v6nS5.10840

Xie, I., & Matusiak K. K. (2015). *Discover digital libraries: Theory and practice*. Elsevier.

Zawodniak, J., & Kruk, M. (2019). Boredom in the English language classroom: An investigation of three language learners. *Konin Language Studies*, *7*(2), 197–214. https://doi.org/10.30438/ksj.2019.7.2.5