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AUDIO-VISUAL INSTRUCTION AND LEARNING OUTCOMES IN PHONETICS: EVIDENCE FROM SENIOR SECONDARY SCHOOLS IN KADUNA STATE

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Abstract

This study investigated the effects of audio-visual instruction on students' learning outcomes in phonetics among Senior Secondary School students in Kaduna State, Nigeria. A quasi-experimental pre-test and post-test control group design was employed. The sample comprised 120 students drawn from two public secondary schools in Giwa and Zaria Educational Zones out of a population of 21,600 students. Data were collected using the Phonetics Performance and Retention Test (PPRT), with a reliability coefficient of 0.82. Descriptive statistics and t-tests were used for data analysis at the 0.05 level of significance. The findings revealed that students exposed to audio-visual instruction performed significantly better than those taught using conventional methods. The study concludes that audio-visual instruction enhances students' understanding of phonetic concepts and improves academic performance. It recommends the integration of multimedia instructional strategies into phonetics teaching in secondary schools.

Keywords: Audio-Visual Instruction; Learning Outcomes; Phonetics; Secondary Education; Teaching Methods; Kaduna State; Nigeria

Introduction

Phonetics plays a critical role in English language learning, particularly in developing accurate pronunciation and effective oral communication. However, secondary school students in Nigeria, especially in Kaduna State, continue to experience difficulties in mastering phonetic concepts such as vowel and consonant sounds, stress, and intonation. Traditional teaching methods, which rely heavily on theoretical explanations and rote learning, have proven inadequate for teaching phonetics effectively. These methods often fail to provide learners with the necessary auditory and visual exposure required for sound production and perception. Consequently, students demonstrate poor performance in oral English components of national examinations. Audio-visual instruction offers a promising alternative by integrating sound and visual elements such as videos, animations, and speech demonstrations. This approach aligns with modern instructional practices that emphasize learner engagement and multimodal learning. Despite its potential, there is limited empirical evidence on its effectiveness in phonetics instruction within Kaduna State. This study therefore examines the impact of audio-visual instruction on students' learning outcomes in phonetics.

Audio-visual instruction involves the use of materials that combine auditory and visual elements to enhance learning. These include videos, animations, and multimedia presentations, which facilitate better understanding of abstract concepts. Audio-visual (AV) materials combine sound and visual components to support learning and enhance meaning-making. According to Mayer (2020), integrating auditory and visual elements helps learners process information more effectively by reducing cognitive load and promoting dual-channel processing. This aligns with contemporary multimedia learning theories, which argue that students understand and retain information better when presented through complementary sensory modalities (Clark & Mayer, 2016; Mayer, 2021). AV materials such as educational videos, animations, recorded lectures, and interactive simulations boost learner engagement, motivation, and comprehension by making abstract content more concrete. They are especially beneficial in diverse classrooms where students may require visual cues, auditory reinforcement, or multimodal representations to fully grasp concepts (Issa et al., 2020). AV instruction therefore supports inclusivity and improves overall learning outcomes.

Phonetics is a critical component of English language learning, serving as the foundation for correct pronunciation, intelligible speech, and effective oral communication. However, Nigerian secondary school learners continue to struggle with basic phonetic concepts. According to Olaniyi (2024), many Nigerian students

mispronounce English vowel sounds due to limited phonemic awareness and interference from mother-tongue structures. Similarly, Adejumo and Ogungbe (2024) found that high-school learners frequently display articulation problems such as consonant substitution, epenthesis, and syllable reduction, which negatively affect speech clarity. This concern is even more prominent in northern Nigeria where exposure to standard spoken English is limited and L1 influence is dominant. According to Eme and Okakpu (2023), many students replace unfamiliar English sounds with phonemes from their local languages, leading to persistent pronunciation errors.

The cognitive theory of multimedia learning originated by Richard Mayer (1947) the theory presumes that mixed mode of delivery (texts, graphics, audio, video, and animation) affects the level at which learners employ cognitive processes to acquire knowledge. The theory therefore places the learner at the centre of learning process with the role of knowledge constructor who select and connect visual and verbal knowledge. Mayer's Cognitive Theory of Multimedia Learning posits that people learn more effectively when they receive information through both visual and auditory channels rather than a single mode. The theory emphasizes three core principles: the dual-channel principle, the limited capacity principle, and the active processing principle. These principles are highly relevant which examines the effects of an instructional audiovisual package on students' performance and retention in phonetics.The principle known as the multimedia principle stated that people learn more deeply from words and pictures than from words alone Mayer (1997). However, simply adding words to pictures is not an effective way to achieve in multimedia instruction; the goal is to use instructional media in the light of how human mind works. Human can only process a finite amount of information in a channel at a time and they make sense of incoming information by actively creating mental representations.

Previous studies have shown that audio-visual materials improve student engagement, comprehension, and academic performance. However, limited studies have focused specifically on phonetics instruction in Nigerian secondary schools. Nwafor and Okafor (2021) Conducted a study on the Effects of Multi-media Package on Students' Academic Performance and Retention in Oral English in Anambra State, Nigeria. The study found that students taught using audiovisual media performed significantly better and had higher retention scores than those taught using traditional methods. Schools should adopt audiovisual media in teaching Oral English and other subjects where listening and speaking skills are crucial, as it enhances both performance and retention. This study aligns closely with this research on the effect of instructional audiovisual packages on performance and retention in phonetics. Adebayo (2019) conducted a research on the Impact of Instructional Multi-Media on Students' Achievement in Phonetics in Lagos State, Nigeria, the results revealed that students exposed to audiovisual instruction had significantly higher scores in both the post-test and the retention test compared to the control group. Akinola and Ibrahim (2017) Conducted a research entitle Effects of Audio-Visual Aids on Students' Performance in English Language Phonetics in Secondary Schools in Ogun State. Students exposed to audio-visual aids showed significantly better performance and retention in phonetics compared to those who received traditional instruction. Ojo and Ojo (2018) conducted a research on Influence of Multimedia Instructional Materials on Secondary School Students' Achievement and Retention in English Phonetics. The study found that students who were taught using multimedia instructional materials had significantly higher achievement and retention scores in English phonetics compared to those who received traditional instruction. Mohammed and Aliyu (2021) Conducted a research entitle Impact of Audiovisual Learning Materials on Student Achievement and Retention in English Phonetics.

Objectives

1. To determine the difference between pre-test and post-test performance of students taught phonetics using audio-visual package in Kaduna State.
2. to determine the difference between pre-test and post-test performance of students taught phonetics using traditional teaching method in Kaduna State.
3. to assess the difference in post-test performance between students taught phonetics using audio-visual package and those taught using traditional teaching method in Kaduna State.

Research Questions

The following research questions were raised to guide the study

1. What is the difference between the pre-test and post-test performance of students taught phonetics using an audio-visual package in Kaduna State?

2. What is the difference between the pre-test and post-test performance of students taught phonetics using a traditional teaching method in Kaduna State?
3. How does the post-test performance of students taught phonetics using an audio-visual package differ with those taught using a traditional teaching method in Kaduna State?

Hypotheses

In line with the research questions, the following null hypotheses were raised and tested at 0.05 level of significance

$H0_1$: There is no significant difference between the pre-test and post-test performance of students taught phonetics using an audio-visual package in Kaduna State.

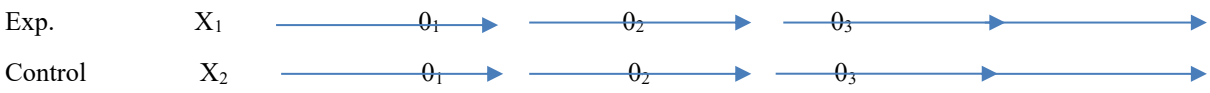
$H0_2$: There is no significant difference between the pre-test and post-test performance of students taught phonetics using a traditional teaching method in Kaduna State.

$H0_3$: There is no significant difference in the post-test performance of students taught phonetics using an audio-visual package compared to those taught using a traditional teaching method in Kaduna State.

Methodology

The study used pre-test and post-test (quasi-experimental) design, specifically this design is used when there is non-randomization of research subjects (Isiaq et al., 2026; Yusuf et al., 2026). The treatment was assigned into two intact classes, with one class receiving the treatment using instructional audio-visual package and the other using traditional method. The use of intact classes aims to prevent disruption to normal class activities in the participating schools. The symbolic representation of this study is as follows:

Figure 1: Quasi-Experimental Design Illustration



The explanations of the symbols are as follows:
X_1 = Control 1 Using Audio-Visual Package
X_2 = Conventional Group
0_1= Pre-test
O_2 = Posttest
O_3 = Post-post Test (Retention test)

The population for this study consisted of twenty-one thousand six hundred (21,600) SS II English Language Students from thirty-two (32) Government Senior Secondary Schools in Giwa and Zaria Educational Zones. Based on the statistical information collected from the Zonal Offices in Giwa and Zaria Educational Zones, there are 19 Senior Secondary Schools in Zaria 13 Senior Secondary Schools in Giwa Educational Zones respectively. The sample for this study was one hundred and twenty (120) SS II Students drawn from two Government Secondary Schools in Zaria and Giwa Educational Zone of the Kaduna State. Thus, the sample size is sufficient for an experimental design, as recommended by Fraenke, Wallen, and Hyun (2015) who recommended that a minimum of 50 respondents and above be in the intact class for the experimental study of this type. Purposive sampling technique was first used to select two co-educational schools with similar characteristics (in terms of facilities, staffing and location). Secondly, simple random sampling techniques was used to select two intact classes from each school. Finally, treatment was assigned into two intact class, that is, one class was assigned audio visual packages and the other class was assigned Traditional Teaching Method (TTM). In line with this, Babbie, E. (2016) stated that the use of intact classes in the research can be advantageous as it allows for a more realistic and naturalistic setting. The classes selected for this study are labeled as class A and B respectively. The breakdown of the sample size is presented in

Treatment Package

The video package was structured into ten-minute lessons focused on phonetics, utilizing audiovisual materials to enhance learning. High-quality visual and audio output was ensured by using a professional recording device. The

treatment group received video instruction that demonstrated educational processes, facilitating dynamic and interactive learning experiences.

The video package was developed collaboratively by the researcher and a media specialist. It was produced from carefully prepared scripts and storyboards, which ensured that the content was aligned with the learning objectives and delivered clearly. Supplementary topics, such as vowel sounds, consonant sounds and rhyme, were incorporated. These topics were selected from the Senior Secondary II (SS II) English curriculum, ensuring that the video adhered to the prescribed scheme of work.

Video package development

The procedure for producing the video involved several stages. First, the content was selected based on curriculum requirements, followed by the development of scripts and storyboards. The recording sessions were then carried out using a recording studio, where each lesson was recorded in a classroom simulation, ensuring it reflected a typical learning environment. After recording, the video was edited to enhance the instructional flow, with visual aids and subtitles added where necessary for clarity.

Materials used in the production included a professional camera, microphones for clear sound capture, a video editing suite, and relevant teaching materials, such as charts and diagrams to aid in visual learning. The goal of the video was to compare the effectiveness of this audiovisual approach with the traditional teaching method, focusing on improving student engagement, comprehension, and retention.

Test instrument

The test instrument for the data collection in this study was Phonetics Performance and Retention Test (PPRT). It consisted of thirty (25) multiple choice questions with four options (letter a,b,c,d) and only one correct answer. Each question was worth of five (4) mark, resulting in a total of one hundred (100). The researchers drafted some of the test questions, while other were drawn from previous exam questions. The test items are designed to measure the SS II Students performance in phonetics. The performance test is essentially the same as the retention test, except that some of the questions in the performance test were modified and re-organized for the retention test.

Validation of research instrument

Phonetics Performance and Retention Test (PPRT) was validated by experts from measurement and evaluation. This team of experts ensured the appropriateness of both content and construct validity to determine the relevance of the items statement, whether the instrument could measure what it was designed to measure, and whether it covered the full scale of the content being measured. This is in line with Shahril's (2015) view that the validity of an instrument is its capability to measure what it is designed to measure, in terms of both construct and content validity. Construct validity establishes the logical link between the items and the answers while content validity establishes whether the items cover all that is to be measured (Shahril, 2015).

Reliability of research instrument

To test the reliability of the (PPRT) a random sample of 2 intact classes of (SSII) students who were part of the research population but not part of the sample for the study were selected from Day Secondary School Bomo Zaria. The test was administered on the pilot sample. The data collected was tested using the test-retest method. The reliability of the PPRT were measured using the split-halp method. The reliability coefficient of the test-retest scores was computed using the Pearson Product-Moment Correlation Coefficient (PPMCC) with the Statistical Package for Social Sciences (SPSS). The result was found at 0.82 reliability index.

Method of data collection

The cooperation of the students and staff in the two selected schools were sought. Orientation were conducted for one week followed by administration of the pre-test. Instructional videos of the package were played on the screen via a multimedia projector in the classroom. Treatment on the experimental group and at the same time teaching the control group with the conventional method of teaching lasted for six weeks.

Experimental Procedure

The treatment plan were implemented over a 6-week period to cover the phonetic topics: vowel sounds, consonant sounds, and rhyme. The study involved two groups: an experimental group and a control group. The experimental group received instruction using audiovisual materials, while the control group were taught using traditional methods according to the school's timetable.

Results

The PPRT was administered to the experimental and control group as pre –test and post-test. The data obtained from the schools was subjected to inferential statistics using Analysis of Variance (ANOVA).

Hypothesis One HO_1: There is no significant difference between the pre-test and post-test performance of students taught phonetics using an audio-visual package in Kaduna State.

The pre-test and post test data collected were analyzed using paired t-test. The summary of the analysis is presented in Table 11.

Table 1: Paired Sample t-test on Difference between Pre-test and Post-test Performance of Students taught Phonetics using Audio-visual Package in Kaduna State

Variables	N	Mean	Sd	Mean difference	Df	t-computed	t-critical	p-value
Pretest	57	11.87	2.726					
				7.68	56	26.80	1.96	0.001
Posttest	57	19.56	3.33					

p-value =0.001 < 0.05, t-computed = 26.80 > 1.96 at df 56

Table 1 revealed that significant difference is exist between the pre-test and post-test performance of students taught phonetics using an audio-visual package in Kaduna State. Reasons being that the calculated p-value of 0.001 is lower than the 0.05 alpha level of significance, and its t-computed value of 26.80 is greater than the 1.96 t-critical value at df 56. Their mean performance scores were 11.87 and 19.56 at their pre-test and post-test performance respectively, indicating a mean performance increase of 7.68 at the post test value. Therefore the null hypothesis which state that There is no significant difference between the pre-test and post-test performance of SS II students taught phonetics using an audio-visual package in Kaduna State, is consequently rejected

Hypothesis Two HO_2: There is no significant difference between the pre-test and post-test performance of students taught phonetics using a traditional teaching method in Kaduna State.

The pre-test and post test data collected were analyzed using paired t-test. The summary of the analysis is presented in Table 2.

Table 2: Paired Sample t-test on Difference between the Pre-test and Post-test Performance of Students taught Phonetics using Traditional Teaching Method in Kaduna State

Variables	N	Mean	Std	Mean difference	Df	t-computed	t-critical	p-value
Pretest	63	11.95	2.69					
				0.25	62	1.451	1.96	0.067
Posttest	63	12.20	2.70					

p-value =0.067 > 0.05, t-computed = 1.451 < 1.96 at df 62

Table 2 revealed that there is no significant difference between the pre-test and post-test performance of students taught phonetics using a traditional teaching method in Kaduna State. Reasons being that the calculated p-value of 0.067 is above the 0.05 alpha level of significance, and its t-computed value of 1.451 is below the 1.96 t-critical value at df 62. Their mean performance scores were 11.95 and 12.20 at their pre-test and post-test performance respectively, indicating a that their pretest and post test scores were statistically not different when taught with the Traditional teaching method . Therefore the null hypothesis which state that There is no significant difference between the pre-test and post-test performance of SS II students taught phonetics using a traditional teaching method in Kaduna State, is hereby retained

Hypothesis Three HO_3: There is no significant difference between the post-test performance of students taught phonetics using an audio-visual package compared to those taught using a traditional teaching method in Kaduna State.

The pre-test and post test data collected were analyzed using independent t-test. The summary of the analysis is presented in Table 3.

Table 3: Independent t-test Statistics on the Difference between Post-test Performance of Students taught Phonetics using Audio-visual Package and those taught using a traditional teaching method in Kaduna State.

Variable	Groups	N	Mean	Sd	Mean difference	Df	t-computed	t-critical	p-value
Post test performance	Experimental	57	19.56	3.33	7.35	118	13.33	1.96	0.000
	Traditional	63	12.20	2.70					

p-value =0.000 < 0.05, t-computed = 13.33 > 1.96 at df 118

Table 3 revealed that significant difference exist between the post-test performance of students taught phonetics using an audio-visual package compared to those taught using a traditional teaching method in Kaduna State. Reasons being that the calculated p-value of 0.000 is lower than the 0.05 alpha level of significance, and its t-computed value of 13.33 is greater than the 1.96 t-critical value at df 118. Their mean post-test performance were 19 .56 and 12.20 students taught phonetics using an audio-visual package and those taught using traditional teaching method respectively , indicating a mean post test performance increase of 7.35 in favour of those taught using an audio-visual package. This shows that the using an audio-visual package has positive effect on students level of post test performance. Therefore the null hypothesis which state that There is no significant difference between the post-test performance of SS II students taught phonetics using an audio-visual package compared to those taught using a traditional teaching method in Kaduna State, is consequently rejected.

Discussion of Findings

The findings of this study are discussed in alignment with the stated hypotheses, and compared with the results of previous empirical studies. The use of an audio-visual package improves the phonetics academic performance of SS II students in Kaduna State. This finding contradicts the null hypothesis one, which stated that there is no significant difference between the pre-test and post-test performance of SS II students taught phonetics using an audio-visual package. Hence, one was rejected. The implication is that audiovisual tools stimulate learners' interest, clarify abstract phonetic concepts, and enhance comprehension. This result is consistent with Nwafor and Okafor (2021), who found that students taught Oral English using audiovisual media performed significantly better than those taught through the conventional method. Similarly, Adebayo (2019) reported that audiovisual instruction significantly enhanced phonetics achievement in Lagos State. Eze (2018) also demonstrated that multimedia instruction improved students' English pronunciation achievement, while Johnson and Williams (2020) confirmed that digital video enhanced students' understanding and retention of phonetic concepts. Collectively, these findings reinforce the idea that audiovisual instruction is more effective than text-based or lecture-based methods in teaching phonetics.

The use of traditional teaching methods does not improve the academic performance of SS II students in phonetics in Kaduna State. This finding supports the null hypothesis two, which stated that there is no significant difference between the pre-test and post-test performance of SS II students taught phonetics using the traditional method. Therefore, H_o2 was retained. This aligns with Ojo and Ojo (2018), who discovered that students taught phonetics using conventional instruction performed poorly compared to those taught with multimedia methods. Likewise, Akinola and Ibrahim (2017) found that students exposed only to traditional teaching approaches recorded lower achievement scores and retention levels compared to those exposed to audiovisual instruction. These convergent results suggest that the chalk-and-talk method is inadequate for teaching phonetics, a subject that requires auditory and visual modeling for effective comprehension.

The use of an audio-visual package improves the academic performance of SS II students in phonetics in Kaduna State. This reinforces the first finding and further invalidates the null hypothesis three, which stated that there is

no significant difference between the performance of students taught phonetics using an audiovisual package and those taught with the traditional method. Thus, three was rejected. This finding is supported by Akinola and Ibrahim (2017), who found that students taught phonetics with audiovisual aids achieved significantly higher performance compared to their counterparts taught using the lecture method. Similarly, Ojo and Ojo (2018) established that multimedia instruction provided students with better exposure to authentic speech sounds, thereby improving learning outcomes. Johnson and Williams (2020) also observed that digital video significantly enhanced students' performance in phonetic tasks. Therefore, this study confirms that audiovisual instruction yields superior performance outcomes than conventional methods.

Conclusion

This study examined the effect of an instructional multi-media package on senior secondary school students' performance and retention in phonetics in Kaduna State. The findings revealed that students taught phonetics with the audio-visual package performed significantly better and retained the concepts longer than those taught with the traditional method. In contrast, the traditional teaching approach showed little or no meaningful improvement in students' performance or retention, confirming its limitations in handling abstract and sound-based linguistic concepts. Additionally, Audio-visual instruction provides a more engaging, interactive, and effective learning experience than conventional methods. It not only enhances immediate understanding of phonetic concepts but also strengthens long-term retention, thereby addressing one of the persistent challenges in phonetics learning. These results highlight the potential of integrating audio-visual packages into classroom instruction as a means of improving the quality of phonetics education in secondary schools in Kaduna State and, by extension, other parts of Nigeria.

Recommendations

Based on the findings of this study, the following recommendations are made to enhance the teaching and learning of phonetics in secondary schools through the use of audio-visual instructional packages:

1. It is recommended that secondary school teachers incorporate audio-visual instructional materials into their regular classroom delivery. School administrators and curriculum implementers should also encourage and support this instructional approach, as its continuous use will enhance students' comprehension and overall performance.
2. Teachers are encouraged to reduce sole reliance on the traditional method and instead integrate interactive and technologically-supported teaching strategies. Curriculum planning bodies and heads of departments in schools should play a supervisory role to ensure that more innovative methods are adopted, since improved student outcomes depend on more active participation and engagement in the learning process.
3. Kaduna State Ministry of Education, parent-teacher associations, and school governing councils need to invest in educational technologies. Provision of projectors, laptops, phonetic software, and standard instructional videos will make implementation easier and ensure that more schools can benefit from the positive effect of audio-visual instruction.

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