

Comparative Effects of Video Projection, Powerpoint Instructional Package and Traditional Teaching Methods on Students' Performance in Basic Science

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ABSTRACT: *This paper investigates the effects of video projection, PowerPoint instructional package and traditional teaching methods on the academic performance of basic science students in Uyo Local Government Area, Akwa Ibom State. Two experimental groups (taught using video projection and PowerPoint instructional package) and one control group (taught using traditional teaching method) were used for the study. Two research questions, two objectives and one hypothesis were formulated to guide this study. The post-test only experimental design approach was adopted to teach and examine 205 out of 8,475 basic three students in six sampled schools out of the forty-seven public basic schools in the study area. The instrument for data collection was the Basic Science Performance Test (BSPT) with twenty five multiple choice items. Data collected were analysed using Mean, Standard Deviation, Analysis of Variance (ANOVA) and Scheffe Multiple Comparison Test. Findings revealed that video projection and PowerPoint instructional packages yielded higher performances than traditional teaching method. On the basis of the findings, it was recommended that modern technology should be employed in teaching and be enforced through appropriate capacity building in terms of infrastructure and teacher training and retraining.*

Keywords: *PowerPoint technology, Instructional package, Basic science, Video projection*

INTRODUCTION: The quest for quality education by nations throughout the world is paramount as education forms the bedrock of economic, social and technological developments. Quality of education depends on many variables but to a large extent on the quality of technologies involved in its delivery and development. Use of technology during instruction is fundamental to success or failure of the educational system as it can help schools meet the needs of the diverse student population.

According to The Federal Government of Nigeria (2009), basic education comprises primary education (six years) and lower secondary education (three years). Universal Basic Primary Education is regarded as a priority for developing countries as it includes the whole range of educational activities that aim to meet basic learning needs. Teaching of basic science as

reported by National Research Council (2013) shall be practical, exploratory and experimental. It recommends the use of modern technology and instructional media for communicating science and scientific concepts to the learners.

Instructional media are classified by Etim (2008) according to the sensory stimulus mode that a learner is exposed to learn. Instructional media are audio when they stimulate the sense of hearing only, visual when they stimulate the sense of seeing only and audiovisual when they engage the senses of seeing and learning simultaneously. They do this by combining sound and vision at the same time. Video films and PowerPoint technologies in any instructional situation present instruction in sight and sound simultaneously (audiovisuals). The United States Department of Education is of the view that the use of audiovisual technology in teaching and learning

has high potentials for more effective, more efficient and more convenient learning (USDE, 2014).

The most suitable instructional method should be one that relates to real life for easy understanding and comprehension of the subject matter based on predetermined instructional objectives so that the learner can see that the lesson is beneficial. The most appropriate technology for instruction should go a long way to hold the learners' interest and attention until the lesson is over. Hence, the need to investigate educational and instructional technologies like video film and PowerPoint instructional packages for meaningful teaching and learning experiences.

Another name for traditional teaching method according to Ajelabi (2005) and Nwosu (2014) is a lecture method, telling strategy or expository method. It is the oldest, well known, most popular and widely used teaching method often used by teachers during instruction. Wikipedia (2016) describes traditional teaching method as a strategy where the teacher talks continuously on the subject matter providing all the necessary facts about a concept to the student. Kelly (2014) describes traditional or lecture method as a teaching strategy where an instructor is the central focus of information transfer. Typically, the teacher stands before a class and presents information for the students to learn. Students are expected to take notes while listening.

Video projectors are image projectors that receive video signals, use bright light and project the corresponding image on a projection screen using a lens system. Video projectors are the most common type of projectors used today. They are digital replacements of older types of projectors like slide projectors and overhead projectors. Modern video projectors correct curves, blurriness and other inconsistencies through manual settings. Video projectors are widely used in many educational settings and schools to enhance learning and classroom experiences. With a video

projector the students can view and hear presentations at the same time (Department of Instructional Technology, 2005 and Wikipedia 2015). Iboke (2004) explained that video instruction reduces abstractions as well as boredom among students in the classroom.

PowerPoint technology is described in Kunkel (2004) as a presentation which consists of a number of individual pages or slides. These slides may contain text, graphics, sound, movies and other objects which may be arranged freely and displayed live on a computer, navigated through the command of the presenter or projected using a video projector in cases of a large audience. Marko and Jernega (2012) researched on 120 students in their ability to utilise PowerPoint as a tool in developing digital competence in Physics for a class. The result showed that both male and female students from the five different secondary schools were well acquitted with PowerPoint technology. It was also observed that the PowerPoint increased the learners' ability to retain and remember information.

The students in Bartsch and Cobern (2003) preferred PowerPoint presentations to other teaching methods. Students reported a preference for PowerPoint presentations which have this added advantage of colours to add emphasis. Students noted that the use of PowerPoint during instruction entertained, fascinated, delighted, reassured and attracted them most. Most students reported that the use of PowerPoint technology enhanced key details of the subject matter thus improving their classroom experience. They concluded that PowerPoint may be highly effective in attracting and sustaining students' attention during instruction.

To examine the efficacy of digital PowerPoint on grades in undergraduate physical education courses Szabo and Hastings (2000) conducted several studies. A sample of 155 students were administered a 10-itemed questionnaire to measure their opinion on the use of presentation

graphics (PowerPoint technology) as compared to a traditional lecture format in the classroom. In the first study students were taught using either PowerPoint slides, PowerPoint slides with lecture notes or traditional lectures. Ninety percent (90%) of the respondents believed that presentation graphics were more interesting and attention capturing than traditional methods. Eighty five percent (85%) of the students reported being more motivated to attend the lecture when presentation graphics were used. This study however showed no significant difference in grades.

In addition to teaching with and without PowerPoint to the same set of students in one course. Szabo and Hastings (2000) also presented one lecture with a digital overhead projector, one lecture with PowerPoint and a third lecture with PowerPoint and handouts of the PowerPoint slides to the same group of students in a physical education class. Results computed after a mock test showed that the use of PowerPoint technology during instruction satisfied the need to involve many sense organs during instruction. The students taught with PowerPoint lectures had higher grades than overhead lectures but no significant difference was found in both PowerPoint lectures with or without notes.

In the third study, Szabo and Hastings (2000) taught two groups two different sections of the same course. In the first group, students were taught with PowerPoint in the first week and without PowerPoint the second week. The second group of students were taught without PowerPoint in the first week and with PowerPoint the second week. Students were given a mock test one week after each set of lectures. The results showed that PowerPoint improved academic performance of the two groups. Students believed that PowerPoint enhanced the instructor's delivery and more importantly their credibility. It is reasonable to conclude that they may also find the course instructor using PowerPoint more engaging and more competent.

Statement of Problem: Due to the importance of basic education in laying a solid foundation upon which other higher levels will be built, the report of the task team for review of implementation of Nigerian curriculum in National Research Council (2013) stipulates the use of technology and practical instructional methods. There however seems to be in practice the use of instructional methods by teachers that encourage regurgitation of facts by learners especially in basic science.

The fundamental question that can be asked is which instructional method yields best performance of basic science students in Uyo Local Government Area, Akwa Ibom State? Put differently, is there any difference in the performance of Basic Science Students when video film, PowerPoint and traditional teaching methods are used? This study thus compares the effectiveness of three instructional strategies: video film projection, PowerPoint instructional packages and traditional teaching method.

Objectives of the Study: The following objectives were developed for this paper

1. To compare the mean performance scores of basic science students in Uyo Local Government Area, Akwa Ibom State when taught using video projector, PowerPoint instructional package and traditional teaching method.
2. To compare the order of effectiveness of teaching methods on the performance of basic science students in Uyo Local Government Area, Akwa Ibom State when taught using video projector, PowerPoint instructional package and traditional teaching method.

Research Questions: Based on these objectives, the following research questions were asked to guide the paper.

1. What is the difference in the mean performance scores of basic science students in Uyo Local Government Area, Akwa Ibom

State when taught using video projector, PowerPoint instructional package and traditional teaching method?

2. What is the order of effectiveness of teaching methods and the direction of significance in the performance of basic science students in Uyo Local Government Area, Akwa Ibom State when taught using video projector, PowerPoint instructional package and traditional teaching method?

Hypotheses: The following hypotheses were formulated to direct the paper.

1. There is no significant difference in the mean performance scores of basic science students in Uyo Local Government Area, Akwa Ibom State when taught using video projection, PowerPoint instructional packages and traditional teaching method.

Methodology: The post-test only control group design was used for the study. Pre-test was not administered so that the students will not be aware of the testing. A lesson on living things (plants) was prepared and presented to basic three science students by their class teachers in their intact class settings. The experiment consisted of three groups; two experimental groups taught using video projection and PowerPoint instructional packages and one control taught using traditional teaching method. This design was considered suitable since intact class setting provided equal opportunities for all the students to participate.

The population of the study was made up of the 8,475 basic three science students in the forty-seven public basic schools in Uyo Local Government Area of Akwa Ibom State during the second term of the 2014/2015 academic session. List of students and schools in Uyo Local Government Area was obtained from the Akwa Ibom State Basic Education Board, Uyo Local Education Authority.

The sample size comprised 205 basic three students in six intact classes in six randomly selected public basic schools in Uyo Local Government Area of Akwa Ibom State. The simple random sampling technique of drawing with replacement was used.

The instrument used for collection of data was the researchers-made Basic Science Performance Test (BSPT). It consisted of twenty-five multiple choice items/questions. Each item had four options (A-D) with only one correct answer. Each correct answer attracted 4 marks giving a total of 100 marks. Students' performance scores were then graded as thus: 0-49 (which is below 50%) low performance; 50 and above (above 50%) high performance.

Three lesson packages were prepared by the researchers and used for teaching based on video projection, PowerPoint instructional packages and traditional teaching methods. The researchers trained the class teachers for one week. At the end of the training the class teachers taught the students using pre planned lessons prepared by the researchers. The researchers trained the teachers on how to teach using KP100 Pico video projection and PowerPoint technology.

The lesson packages contained the same concepts but different with respect to approach and structure depending on each teaching method. In the first group students were taught living things (plants) using video film projection. This involved viewing, reviewing, transmitting, and retrieving audio visual information on the topic taught. The video file was downloaded into the in-built memory of the Video Projector which also has an in-built battery that makes it very convenient to transmit without the use of a computer system. The video projector's audio output was connected to an external speaker so that the students could listen to the audio output of the video file with much ease since the projector's speaker was not loud enough. The visuals were projected on the

levelled surfaced wall of the classroom directly before the students.

The second group was taught the same topic living things (plants), but using PowerPoint technology. The PowerPoint Slide file was also downloaded into the in-built memory of the projector so that it could also be transmitted without the use of a computer system. The slide had no audio output so there was no essence of connecting it to an external speaker so the students watched the pictorial slides while listening to the narration from the teachers. The projection also was displayed on the levelled surfaced wall of the classroom directly before the seated students. Hence viewing, reviewing, transmitting and retrieving was based on visual information only on the lesson taught.

The control group was taught the same topic living things (plants) but with traditional teaching method. These students were taught with the aid of their recommended textbook.

Validation of the Basic Science Performance Test (BSPT) was ascertained by three lecturers in

Measurement and Evaluation, Science Education and Educational Technology in the University of Uyo, Akwa Ibom State. They ensured that questions were appropriate, clear and unambiguous. They also ensured that there was adequate coverage of the overall topic: Living Things (Plants). The instrument had a reliability co-efficient of 0.73.

Analysis and Result: Descriptive and inferential statistical methods were employed for the study. Two tables showing mean and standard deviation were used to answer the research questions. Inferential statistics of Analysis of Variance (ANOVA) and Scheffe multiple comparism tests (Post Hoc Analysis) were used to test the hypotheses at an alpha level of 0.05 as shown in tables below.

- 1. Research Questions 1:** What is the difference in the mean performance scores of basic science students in Uyo Local Government Area, Akwa Ibom State when taught using video projection, PowerPoint instructional packages and traditional teaching method?

Table 1: Summary of Mean and Standard Deviation of Post-Test Scores of Basic Science Students Taught using Video projector, PowerPoint instructional package and traditional teaching method.

Teaching Method	N	Mean (\bar{x})	Standard Deviation
Video projector	68	63.65	12.06
PowerPoint instructional package	70	59.79	13.39
Traditional teaching method	67	48.60	8.04
Total	205	57.47	13.04

As shown in the table 1, video projection group recorded a mean performance score of 63.65, students taught using PowerPoint instructional package recorded a mean performance score of 59.79 while those taught using traditional teaching method recorded a mean performance score of 48.60. This result shows that students taught using video projection performed best, followed by students taught with PowerPoint instructional package and the least were students taught with traditional teaching method.

Still, from the table, the mean performance scores of the electronic groups can be graded as high performance since they have mean performance scores above 50%. While the group taught using traditional teaching method is graded as low performance since they have a mean performance score of less than 50%.

2. **Research Question 2:** What is the order of effectiveness of teaching methods and the direction of significance in the performance of basic science students in Uyo Local Government Area, Akwa Ibom State when taught using video projection, PowerPoint instructional package and traditional teaching method?

To ascertain if the mean difference was of significance, the post-test scores were subjected to Scheffe Multiple Comparism Test for a post Hoc analysis as shown in table 2.

Table 2: Results of Scheffe's Post Hoc Test for Multiple Comparison of Teaching Strategies and Student's Performance in Basic Science.

Teaching Strategies	Teaching Strategies	Mean Difference (i – j)	Post-Test Scores Std. Error	Sign at P<0.05
Video projector	PowerPoint instructional package	3.68	1.95	.171
	Traditional teaching method	15.05*	1.97	.000
PowerPoint instructional package	Video projector	-3.68	1.95	.171
	Traditional teaching method	11.37*	1.95	.000
Traditional teaching method	Video projector	-15.05*	1.97	.000
	PowerPoint instructional package	-11.37*	1.95	.000

Mean difference is significant at P<0.05.

As shown in table 2, the mean difference between video projection and PowerPoint instructional package was 3.68, between video projection and traditional teaching method was 15.05 and between PowerPoint instructional package and traditional teaching method was 11.37. This implies that the teaching method using video projection was most effective in facilitating students' performance in basic science, followed by PowerPoint instructional package, while traditional teaching method was the least effective.

Table 2 also shows that significant difference existed between the performance of students taught with video projection and those taught with traditional teaching method since the calculated probability P-value .000 for their mean difference 15.05 was less than the alpha level 0.05. Significant difference also existed between PowerPoint instructional package and traditional teaching method because the calculated P-value .000 for the mean difference 11.37 was less than the alpha level 0.05. A non-significant difference existed between video projection and PowerPoint instructional package because the calculated P-value .171 for the mean difference 3.68 was greater than the alpha level 0.05.

Hypothesis One: There is no significant difference in the mean performance scores of basic science students in Uyo Local Government Area, Akwa Ibom State when taught using video projector, PowerPoint instructional package and traditional teaching method.

TABLE 3: Analysis of Variance (ANOVA) of post-test scores of basic science students taught using video projector, PowerPoint instructional package and traditional teaching method.

Source Variation	Sum of Square	df	Mean Square	F	Sign at P<0.05
Corrected Model	8307.51	2	4153.76	31.80	.000
Intercept	675323.90	1	675323.90	5169.68	.000
Strategies	8307.51	2	4153.76	31.80	.000
Error	26387.59	202	130.63		
Total	711844.00	205			
Corrected Total	334695.10	204			

R-Squared = 0.239

Table 3 shows that the calculated probability value (P-value) .000 of strategies is less than declared probability value (alpha level 0.05). Therefore, the null hypothesis 1 is rejected. This implies that there exists a significant difference in the performance of basic students taught with video projection, PowerPoint instructional packages and traditional teaching method in Uyo Local Government Area of Akwa Ibom State. The table also shows a regression squared of 0.239 which implies that 23.9% of the total variance in the performance of students is attributed to the influence of teaching methods.

Discussion of the Findings: The basic aim of this study was to find out the effects of teaching using video projector, PowerPoint instructional packages and traditional teaching methods on the academic performance of basic science students in Uyo Local Government Area of Akwa Ibom State. Findings from in tables 1, 2, and 3 indicate that basic science students taught using video projection and PowerPoint instructional package performed better than those taught using traditional teaching method. This report supports the findings of Bartsch and Cobern (2003), Marko and Jernega (2012) and Szabo and Hastings (2000).

It was also found that 23.9% of the total variance of the performance of students in basic science was attributed to the influence of teaching methods. The findings from the Scheffe Multiple

Comparison Analysis Test indicated that the most effective in facilitating students' performance in basic science was the video projection method, followed by PowerPoint instructional package and the traditional teaching method was the least. It was also found that significant differences were found to exist between video projection & traditional teaching method; PowerPoint instructional package & traditional teaching method. Non-significant difference was found to exist between video projection and PowerPoint instructional package. This report supports the report from the United States Department of Education in USDE (2014) which stipulates the use of audiovisual technology during instruction for more effective, efficient and convenient learning.

Implications of Findings: This study has shown clearly that teaching with modern technology instructional media enhance the learning experiences of the learners. These interesting and captivating experiences will make for active involvement of the learners for reflective thinking to enhance better understanding and higher performance of basic science school students in Uyo Local Government Area of Akwa Ibom State.

Conclusion: Based on the findings a radical shift in teaching and learning of basic science should be made with emphasis on instructional methods using modern technology instructional media like video projection and PowerPoint instructional

packages. These exciting instructional media would promote reflective thinking, understanding and higher performance for qualitative science education of both male and female basic school students in Uyo Local Government Area of Akwa Ibom State.

Recommendations:

1. Capacity building programmes for basic science teachers to enhance the use of activity-based modern technology instructional media like video projector and PowerPoint instructional packages.

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