

## Impact of Videotape Instructional Package on Achievement and Retention in Primary Science among Primary Pupils in Niger State, Nigeria

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### Abstract

*The study investigated the impact of videotape instructional package on the teaching, learning and retention of primary science in some selected primary schools in Minna, Niger State, Nigeria. It further investigated the gender differences in the achievement of the subjects. Twenty primary two pupils were randomly selected from two primary schools in Minna metropolis. Each school was assigned to experimental and control groups respectively. Three hypotheses were formulated and tested. The researcher-developed videotape instructional package on primary science was used as treatment for the experimental group while the control group had the traditional method. A 30-item Primary Science Achievement Test (PSAT) was the instrument used to collect data for both the pretest and posttest. The instrument was prepared by the researchers and duly validated. The data collected were analyzed at 0.05 significant level using statistical measures of means, standard deviation and t-test. From the analysis of data, it was discovered that students taught with videotape instructional package performed better and had high retention than those taught with chalkboard drawings and sketches. Also, it was discovered that there was no significant gender difference in the performance of pupils taught using videotape instructional. From these findings, the implications to education in Nigeria were highlighted. It was concluded that the use of videotape instructional package in teaching enhances effective learning, higher performances and better retention. Also, the male and female students performed equally which implies that as well as induce gender. It was then recommended that videotape instructional package be used in teaching science concepts at primary schools level in Minna and that in-service training, seminars and workshops should be organized for teachers to equip them with skills needed for application of instructional media for classroom teaching.*

### Introduction

Primary education is the foundation of educational structure and the key to the success or failure of the whole education system. If the foundation of any building or project is faulty, the building/project is doomed to collapse. Hence, the need for a solid and dependable foundation (Gbodi, 2004). Science as a systematic knowledge based on observation and test lead to the formation of laws and principles (Nwosu, 2002). The introduction of science at the primary school is fundamental in that it will inculcate scientific ideas into the learners at the early stage. This concurs with one of the goals of national policy on education that stipulates that science is to be taught as a core subject to all the pupils at the primary school level in order to provide a sound basis for scientific and reflective thinking. One of the specific ways educational institutions could contribute to societal evolution and development is to develop indigenous instructional materials especially in science learning. And if teaching

and learning process are to be successful in class, teachers must improve on communication by preparing some instructional materials for motivational purposes.

On a general note, most media have the capacity to diffuse information, to show colour, motion, systematic representation, simultaneous picture and sound. In Gbodi (2004) Davies (1974) noted that, all media to varying degree help in perception, understanding, transfer of training, provision of reinforcement or knowledge of results and retention. Thus, use of media will help improve learning, the greatest problems facing the Nigerian educational system today.

Videotape is a step up from audiotape. Playing pre-recorded tapes provides the audiovisual information that helps students to observe, understand, and imitate oral communication from language expressions and sentence structure to lip shape, facial expressions, gestures and distance between speakers. Videotape films are instructional

materials used to stimulate both sight and hearing. They are used to depict motion and sound on a television screen. The use of films in instruction owes its legacy to Thomas Edison who invented the first motion picture camera called Kinetograph, which used film rolls in the early 1920s. According to Edison (1920) the films were used in schools to revolutionize education and even to take the place of books in schools. They were also meant to motivate students to learn more, an attribute that has been maintained up till today. They are also used to sustain attention of students as well as heighten reality (Onyegegbu, 1999).

Videotape films are the best instructional media that can hold the attention of learners because they add motion to the projected visual image. Videotape film can be used to achieve educational objectives in the areas of cognitive, affective and psychomotor domains of education. Videotapes films can present information that involves motion, describe processes, and show relationship in order to convey knowledge, teach skills or affect an attitude through individual study or group viewing. Ojogan (1997:2) also talked about the usefulness of videotape as: a means of instruction. According to him, television is a rich medium because it has a multisensory focus, and that television makes it possible for one to effectively conceptualize much content within the allotted constraint of time and place. Television and associated visual materials appeal to the senses of sight and hearing. Goff (1979:33) has stressed the importance of the senses in the selection and structure of learning methods in his conclusion that "75% of what we learn is through sight, 13% through hearing, 6% through touch, 3% through taste, and 3% through smell".

Research findings by Onyegegbu (1999), Ayogu (2000), Ikwuka (2005), Nwaorgu (2005), Otegbayo (2005) and Gbodi and Laleye (2006) have shown that videotape recordings, which are audiovisual materials contribute to learners' understanding, factual learning and permanence of learning, then, motivation and interest. Videotape films motivate students to learn and widen their experience, which makes

them to participate fully in the learning process. Videotape packages are instructional materials that employ the stimuli of sight and hearing. They are used to depict motion and sound on screen. Onyegegbu (1999) and Ayogu (2000) observed that motion and sound attract the viewer, and held their attention, making learning more meaningful and permanent. It is very useful in moulding characters and instruction. It seems that the use of effective and appropriate videotape recordings results in more learning in a short time and lead to better retention of what is learned, especially when the materials being learned is repeated to the learners (Onyegegbu, 1999). Agusiobo (2000) confirms videotape recording as having a strong effect on learning. Videotape recordings have made tremendous contribution to learning as suggested by (Bassey, 1997). Some of these contributions are summarised below: Videotape recordings make education more individual oriented through providing many alternative paths to learning with varieties of resources. This makes it possible for learners to learn at their own pace, and is particularly more useful to slow learners. They make learning more immediate through bridging the gap between the world inside and outside the classroom by means of its various actions such as microphotography, animation, stop motion and the like.

Videotape recordings make the process of learning uniform for all learners wherever they are, through the portability of various forms of instructional videotape recordings. This enables students to see other parts of the world they have not been to by viewing videotape recording. Videotape recordings can be used to recreate a real or imagined event, actions or processes that have occurred, that may possibly occur, or that may not even be capable of occurring in real life. Videotape recordings can be used to reduce and enlarge the actual size of an object. Objects that are too small to be seen by naked eyes can be photographed by combining a camera with a microscope and enlarged.

Videotape recording gives the learner the ability to see and hear an instructor; such as in pronunciation of Oral English sounds, offers

opportunity for behaviour modelling, demonstration, and instruction of abstract concepts. Almost all students have access to a videotape machine at home and they are used in some schools. Videotapes can also be used for documentaries, and it is quite easy to videotape a lecture for a student who is unable to attend class. Achebe (2005) conducted a research on students' retention and found that the retention level of students taught concept of food and nutrition with instructional package was very high compare with those taught without instructional videotape package after four weeks of the study.

Ayogu (2000) stated that when videotape is used to compliment instruction, it can:

- (i) reduce abstractions in class lesson;
- (ii) reduce boredom among students and teacher;
- (iii) conserve the teacher's energy;
- (iv) allow moral learning autonomy among students;
- (v) restructure the learning environment;
- (vi) make learning interesting and motivating to students;
- (vii) minimize the problems of large class size;
- (viii) promotes students' participation in Oral English lessons;
- (ix) reduce problem of insufficiency learning resources, and materials.
- (x) encourage individualized learning.

Teacher may thus be responsible for the reinforcement of primary gender socialization, discrimination against girls in school and thus creating gender inequalities in education. An array of authors, who believe in the superiority of male to the female counterparts in science performance Choisse (1991), observed that professionally there are few women in science, technology and mathematics (STM). Some of the factors that attributed to this were: cultural variable, social expectations. The attitude of teachers towards girls teaching science subjects, peer group attribute, task role assignment, inferiority complex and, traditionally induced submissive attitude of girls. Awe (1990) made observation on sex differences in

educational achievement at upper secondary school level shows different patterns across countries, this indicates that this sex differences in achievement arise in part from societal and cultural factors. The study carried out by Ikwuka (2005), Nwaorgu (2005), Otegabayo (2005) and Gbodi and Laleye (2006), found no significant main effect of sex on students' achievement in disciplines like Oral English, Biology, Phonetics and Integrated Science respectively.

This study investigated the effects of videotape instructional package for teaching and learning of primary science, retention of scientific concepts and gender disparity in the subject among primary schools pupils in Minna metropolis, Niger State, Nigeria.

### **Statement of the Problem**

The purpose of this research was to find out if videotape instructional package could be effectively used in teaching scientific concepts in primary schools to improve academic performance and retention of primary pupils.

### **Objectives of the Study**

The main objectives of the study are to find out if:

- (i) the use of videotape instructional package would improve the teaching and learning of primary science among primary school pupils in Minna metropolis.
- (ii) the use of videotape instructional package would improve the retention capabilities of primary school pupils.
- (iii) gender has effects on the academic performance of primary pupils using instructional video package to teach primary science.

### **Research Hypotheses**

The following null hypotheses were formulated and tested at 0.05 level of significance:

- (i) There is no significant difference in the performance of pupils taught with videotape instructional and those taught without it.
- (ii) There is no significant difference between the mean achievement scores

in the retention of pupils taught primary science with videotape instructional package and those taught without package.

- (iii) There is no significant difference between the mean achievement scores of male and female pupils taught with videotape instructional package.

### **Significance of the Study**

The findings from this study would hopefully improve the teaching and learning of basic scientific concepts through the use of videotape instructional package. It would motivate and arouse pupils' interest towards learning; and create teachers' awareness on the versatility of videotape instructional package in teaching and learning of scientific concepts at primary school level.

### **The Research Design**

The study employed a pretest-posttest experimental control group design. It investigated the effect of videotape instructional package on learning of basic scientific concepts in selected primary schools in Minna. Four primary schools in Minna metropolis were randomly selected. Two schools each were randomly assigned to experimental and control groups. Ten (10) primary two pupils (5 boys and 5 girls) were randomly selected from each school and a total of 20 pupils took part in the study.

### **The Instrument**

The research instrument used in collecting data was the Primary Science Achievement Test (PSAT). The instrument developed by the researcher and made up of 30 items prepared based on the primary two pupils curriculum on primary science. The 30 items were multiple – choice question based on Bloom's taxonomy of educational objectives. The instrument was scored over 100. The instrument was subjected to both the face and content validation by experts. This was further subjected to field testing. The test-retest method was used for the reliability of instrument. A reliability coefficient of 0.75 derived from Kuder Richardson 21 (KR 21) was recorded,

showing that the instrument is reliable for the study.

### **The Treatment**

The treatment given comprised of videotape instructional package on primary science. The following four topics were covered (sources of water, living and non living things, classification of animal, and plants). Videotape instructional package is a systematic instructional design package that could be used for group or individualized study. It could also be used for instruction and remediation purposes. It is researcher-developed and dully validated for content by experts in curriculum and educational technology for its technicalities. Interesting and motivating science activities (such as colour effects, background, audible sounds, etc. ) were incorporated into each lesson of the package. This was also field tested and necessary corrections were made.

### **Method of Data Collection and Analysis**

This study was conducted with Primary two pupils from two selected Nursery and Primary schools in Minna Metropolis. In each of the schools, ten (10) pupils comprising five males and five females were randomly selected for the study. The two Nursery/Primary schools used for the study were selected because they were owned by privately individuals and are well equipped with teaching facilities and manpower. Before the commencement of the treatment, the PSAT was administered to sampled pupils as pretest. The control group was taught using the ordinary chalkboard drawing and sketches method while the experimental group had videotape instructional package on the topics treated. The test was 30 item multiple choice objectives type administered, marked and scored. After three weeks of administering the posttest, the same instrument was administered as post-posttest in order to determine the pupils' level of retention. Both the pretest and post-posttest were scored over one hundred percent. The score formed the basic data for testing the hypotheses. The study lasted for four weeks of three periods per week.

T-test inferential statistics were used to analyze the data.

### Results and Discussion

A summary of the data analysis and results are presented below. Table 1 shows the

pretest performance of experimental and control groups. The purpose of the pretest was to establish the previous knowledge of the two groups on the topics to be taught before the teaching started. t-test statistics was used to analyses the pretest data.

**Table 1: t-test Comparisons of the Mean Scores of Experimental and Control Groups on The Pre-test**

Variable	N	df	Mean	SD	t-value Calculated	t-value Critical	Significant level
Experimental Group	10	18	20.00	1.33	1.00 <sup>ns</sup>	1.73	0.14
Control Group	10		20.00	2.11			

ns – Not Significant at 0.05 level of significance

From the table, the calculated t-value (1.00) is lesser than the critical t-value (1.73). This indicates that there is no statistical significant difference in the mean scores of experimental group (20.00) and control group (20.00) at 0.05 level of significance ( $t_{cal} = 1.00$ ,  $df = 18$ ,  $p > 0.05$ ). This implies that the pupils in

the two groups were equivalent in terms of their academic experience of the subject before the teaching commenced.

**HO<sub>1</sub>:** There is no significant difference in the performance of pupils taught with videotape instructional package and those taught without it.

**Table 2: t-test Comparisons of the Mean Scores of Experimental and Control Groups on The Post-test**

Variable	N	df	Mean	SD	t-value Calculated	t-value Critical	Significant level
Experimental Group	10	18	79.60	18.99	3.34*	1.73	0.21
Control Group	10		70.50	15.30			

\* - Significant at 0.05 level of significance

Table 2 shows the t-test comparison of the mean scores of experimental group. From the table, the calculated t-value (3.34) is higher than the critical t-value (1.73). This indicates that there is statistical significant difference in the mean scores of experimental group (79.60) and control group (70.50) at 0.05 level of significance ( $t_{cal} = 3.34$ ,  $df = 18$ ,  $p > 0.05$ ). Therefore, hypothesis 1 is rejected. Hence, there is statistical significant difference in the

performance of experimental group who were taught primary science with videotape instructional package.

**HO<sub>2</sub>:** There is no significant difference between the mean achievement scores in the retention of pupils taught primary science with videotape instructional package and those taught without package.

**Table 3: t-test Comparisons of the Mean Scores of Experimental Group and Control Group on the Post – post-test**

Variable	N	df	Mean	SD	t-value Calculated	t-value Critical	Significant level
Experimental Group	10	18	75.60	5.87	5.304*	1.73	0.001
Control Group	10		64.00	3.65			

\* - Significant at 0.05 level of significance

Table 3 shows the t-test comparison of the mean scores of experimental and control groups. From the table, the calculated t-value (5.304) is higher than the critical t-value (1.73). This indicates that there is statistical significant difference in the mean scores of experimental group (75.60) and control group (64.60) at 0.05 level of significance ( $t_{cal} = 5.304$ ,  $df = 18$ ,  $p > 0.05$ ). The mean post-posttest score of pupils dropped by a mean of (4.00) for the experimental group and (6.50) for the control group. However greater proportion of the

concept of primary science was retained by the experimental group taught with videotape instructional package. The result indicates that the videotape instructional package enhanced retention of some basic scientific concepts of primary science. Therefore, hypothesis 2 is rejected.

**HO<sub>3</sub>:** There is no significant difference between the mean achievement scores of male and female pupils taught with videotape instructional package.

**Table 4: t-test Comparisons of the Mean Scores of Male and Female Pupils in Experimental Group**

Variable	N	df	Mean	SD	t-value Calculated	t-value Critical	Significant level
Male	5	8	73.60	4.77	1.08 <sup>ns</sup>	1.86	0.308
Female	5		77.60	6.69			

Ns: Significant at 0.05 level of significance

Table 4 shows the t-test comparison of the mean scores of male and female pupils in experimental group. From the table, the calculated t-value (1.08) is lesser than the critical t-value (1.86). This indicates that there is no statistical significant difference in the mean scores of experimental group (73.60) and control group (77.60) at 0.05 level of significance ( $t_{cal} = 1.08$ ,  $df = 8$ ,  $p > 0.05$ ). Therefore, hypothesis 3 is not rejected. Hence, there is no statistical significant difference between the performance of male and female pupils of experimental group who were taught primary science with videotape instructional package. This implies that videotape instructional package is gender friendly.

### Discussion of Results

From the results in Table 2, there was significance difference between pupils taught

primary science with the videotape instructional package and those taught without it. In other words, this study showed that the use of videotape instructional package in teaching primary science at primary schools has positive effects on the pupils' performance. This is because those taught with videotape instructional package performed significantly better than those taught without it. The findings was in agreement with Onyegbegu (1999), Ikwuka (2005), Nwaorgu (2005), Otegabayo (2005), and Gbodi and Laleye (2006), who found that videotape instructional package improved students performance in Social Studies, Oral English, Biology, Phonetics and Integrated Science respectively at secondary schools level.

From the results in Table 3, there was significant difference between retention level of

pupils taught primary science with videotape instructional package and those taught without it. This study confirmed the research carried out by Achebe (2005) that the retention level of students taught concept of food and nutrition with instructional package was very high compare with those taught without instructional videotape package after four weeks of administering posttest.

From the results in Table 4, gender had no effect on the performance of pupils in Primary Science Achievement Test. In other words, videotape instructional package packaged for teaching concepts of primary science is gender friendly. This is in agreement with Onyegegbu (1999), Ayogu (2000), Ikwuka (2005), Nwaorgu (2005), Otegabyo (2005) and Gbodi and Laleye (2006), who conducted similar studies and their findings, were in support of this study. They found no significant difference between male and female students' achievement in disciplines like social studies, Oral English, Biology, Phonetics and Integrated Science respectively. It is hoped that with further encouragement of female education, they (female pupils) could performed even better than their male counterparts.

### **Implications for Nigerian Education System**

Pupils with positive attitude to science at early life derives joy and satisfaction from knowing and discovering scientific ideas and finds scientific concepts more interesting. Therefore the teachers in primary schools should strive to achieve this in pupils and there is no other way to do this than effective design, development and use of instructional media for classroom teaching. Pupils in primary schools are likely to do better if videotape instructional package of the type used in this study are employed in teaching them. Also the use of videotape instructional package for teaching some scientific concepts at primary level has the potential to make learning more interesting and permanent and could also serve as a motivator for learning. In addition, the use of instructional media such as the videotape instructional package used in this study could minimize gender differences in the science achievements

of primary school pupils and hence improve the performance of the students (especially the females) in science.

### **Conclusion**

From the findings of this research work, the following conclusions were drawn:

- (i) It is an interesting and useful experience to develop a videotape instructional package using various Artists package like charts, cutout from calendar and almanacs, pictures from computer software such as Instant-artists, Harvard-graphics, Clip Art and many others for teaching some scientific concepts at primary schools.
- (ii) Instructional strategies that teachers employ in teaching science subjects at primary school level have significant effects on pupils' achievement. The findings of the present study showed that better performance and high retention in primary science was achieved through the use of videotape instructional.
- (iii) The male and female pupils were affected positively and equally by the use of videotape instructional package in teaching primary science. This showed that the effect of videotape instructional package is not gender dependent.

### **Recommendations**

- (i) The use of videotape instructional package for teaching and learning in primary schools should be encouraged.
- (ii) Teachers should try their best to use instructional media like videotape instructional package for their lessons.
- (iii) Emphasis should be shifted from acquiring instructional materials to development and improvisation, since this encourages deeper content mastery, flexibility and versatility.
- (iv) Universal Basic Education should endeavor to provide necessary infrastructure (power supply, desk and benches, chalkboards and other

instructional materials) to public primary schools in Niger State.

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