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Effect of Video-Based Mobile Learning on Distance Learners' Academic Performance in Logarithms Concepts in Mathematics

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ABSTRACT

Abstract

The study was carried out to examine the effect of video-based mobile learning on distance learners' academic performance in Mathematics. The study adopted pre-test, post-test control group quasi-experimental design. The study used two intact classes for the experiment and 34 respondents from 100 level NCE students were randomly selected from the two intact classes from Alayande College of Education Iseyin and Kajola study centres.Three research questions and three research hypotheses were generated to guide the study. The treatment for the study was the video-based mobile learning package and the test instrument used was Mathematics Achievement Test (MAT). Both the instrument and the treatment were subjected to content and face validation. Reliability of the test instrument was carried out using split-half method during the pilot study and its value yielded 0.83. Data collected from the respondents were analyzed using descriptive statistics of mean, standard deviation and inferential statistics of t-test and thus answered both research questions and research hypotheses raised in the study. Findings of study showed that students taught with video based mobile learning performed better than their colleagues taught using lecture method (t (33) = 2.03; sig (2-tailed) = 0.001 and p > 0.05. There was no significant difference between the mean scores of the male and female students in the experimental group t (32) = 0.76; sig (2-tailed) = 0.22 and p >0.05). Finally, the study recommended diffusion of video based m-learning package and replication of the approach used in this study to develop other content areas of mathematics and other courses in distance learning system of education.

Keywords: Video-based Mobile Learning, Academic Performance, Gender, Mathematics Achievement Test

Aims Research Journal Reference Format:
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1. INTRODUCTION

The use of technology is now made easy in education as a result of advent of mobile devices commonly used by students majorly from secondary school to tertiary institution in Nigeria. Mobile phones have become property owns by the rich, average, poor, young, old and students respectively in Nigeria and it has several relevant roles to play in the education of 21st Century. Observations made by the researchers confirmed that mobile phones have potential of improving the teaching and learning processes because they are cheaper, mostly owned and used by tutors and learners. Many students in higher institutions use various kinds of mobile phones like iphone, Tecno, Blackberry, Samsung, Nokia and various kinds of android phones for chatting on social media such as Facebook, Tweeter, Whatsapp, Skype, Google+, LinkedIn, Myspace and so on to communicate with one another on the internet.

Onasanya, Ayelaagbe & Laleye (2012) opined that mobile phones have been seen as the most popular among younger and adult learners, and probably the most widely handheld device in Nigeria. Mobile devices as noted by Nasser (2013) can be an effective educational platform, due to the fact that mobile devices are easily accessible by students and provide adequate support for standard Internet technologies. Using modern methods and techniques integrated in M-learning, it can help in making the learning of students to be more interesting, interactive, widely available and flexible. M-learning is cost-efficient style that can help students to learn more without traditional restrictions. Furthermore, the possibility to integrate M- learning systems into existing e-learning systems makes it easy to stay in touch with the newest advances made in teaching and in research.

Mobile devices are expected to be a part of every class activity both inside and outside lecture rooms, rather than being limited to a few assigned functions in rarely visited computer laboratory. Arrigo & Cipri (2010) opined that mobile phones add new educational opportunities because they are personal, portable and permit new forms of interactions among all that is involved in the learning process and their perspective surrounding environment. Also, present day mobile phones are complete multimedia that combines the capabilities of a still camera, a video camera, a personal organizer and a web browser in one device (Marriott, 2005). The use of a mobile phone is not limited to speaking alone; it is being used in making video, recording information and transmitting it to a phone or a computer as was being done by a computer, mobile banking and payment, surveillance services, ticket booking etc. Students can discuss their assignments or project works over phone which otherwise can be lengthy and boring. Over two-thirds of the university students in their study used electronic media (including cell phones) while in class, studying, or doing homework (Jacobsen & Forste, 2011).

The Advantages of M-learning as reported by Nasser et.al (2013) include:

- Ability to enhance student centered learning.
- Flexibility in accessing content anywhere at any time.
- Great for just in time training.
- Support differentiation of student learning needs.
- Learner control as in directing learners in their learning activities.
- Good management and use of M-learning during dead time and while travelling or waiting for a meeting to start.
- Suitability for many different learning styles: reading, writing, video, animation, collaboration, discussion, listening, exams, research etc.
- Easy evidence collection using writing, audio or video.
- Cost-effective, that is, it is cheaper than booking the resources required for face-to-face training or supplying laptops and other computing devices for eLearning.
- Reduce cultural and communication barriers between faculty and students by using communication channels that students like.
- Context sensitive learning: with the use of quick responses (QR) codes learning can become specific to location awareness or a real life QR code marker.
- Personalized learning in which the user can do the training on his personal device and
- Improves social learning and eliminate technological barriers.

Mohamed & LailaElgamel (2012) defined the term mobile as possibility of taking place in multiple locations, across multiple times, and addressing multiple content areas using either static or portable equipment such as wireless laptops, Personal Digital Assistants (PDAs) and smart phones. As Internet and computers become very important educational tools, the modern technologies become more effective, portable and easy to use. Mobile devices are much more reasonably priced (phones and PDAs) than desktop computers, and have a less expensive method of Internet access. Currently, the tablet PCs allows mobile internet access with equal or more functionality than desktop computers.

The term mobile learning or in short M-Learning refers to the use of mobile and handheld IT devices, such as mobile telephones, laptops, PDAs and tablet PC technologies, in training, learning and teaching. The mobile learning can be considered as the third wave of learning with mainframe and desktop computers as the first and second waves.

1.1 Why Using Video-based Learning Resources?

When used appropriately, video can be a powerful teaching medium. A survey on the use of benefits of video as noted by Nipan, Emily & George (2008) are:

- Video can help students visualize how something works.
- Video can show information and detail that is difficult to fully explain using text or static images.
- Video can grab students' attention, thus motivating them and engaging them with the subject.
- Video can provide concrete real life examples, thus demonstrating the relevance of the subject to the real world.
- Video can simulate discussion.
- Video can cater for different learning styles, specifically students who are visual learners.

1.2 When can Video be an Effective Teaching Medium?

Oishi (2007) asserted that video do not provide content alone, but it can stimulate the interest that makes the curriculum relevant or jumpstart lessons. A video-based learning resource with running time of 30 seconds up to 10 minutes can stimulate the interest that makes the curriculum relevant or jumpstart lessons. Video can be used to grab students' attention and motivate them to learn. A video-based learning resource engage students in conversation and debate on the subject matter and in some cases video can highlight theoretical concepts when teaching specific subjects. It was further noted by the same author that video can be used to demonstrate a highly realistic depiction of reality. This could be when it is necessary to expose students to things they would not otherwise have the opportunity to see such as medical procedures, showing dramatizations or films when teaching about the war. This is exemplified by Deleng, Dolmans & Van deWiel (2000) who used video case studies to improve medical education. The video cases enabled students to create realistic mental pictures of disorders, provided integrated pictures of patients as people, who challenged them to elaborate the cases seriously and were more memorable than text-based cases.

1.3 Statement of the Problem

The future of M-learning seems bright since students could be tempted to involve in the learning process enthusiastically if the medium is appealing to them in term of the devices' weight which is multiple times lighter than their mathematics textbooks. Besides, everybody likes to stay connected with their devices at any time and at any place in order to ease their work. In a research carried out on the use of mobile phones in Japan to teach English as a Second Language (ESL) by Thornton & Houser (2004), it was reported that mobile phones in Japan outnumber PCs five to one and that, while 43 per cent of Japanese students use a computer to send email, 99 per cent of their subjects transmitted email on their mobiles.

Study carried out by Chong (2005) showed that presentation apparatus and courseware have been used extensively in teaching and learning Mathematics. The teachers still need more time to learn other advanced applications and how to integrate ICT tools in their lesson. This problem could be solved with portable communication devices as their mobility allows teaching and learning to be more flexible and provides new opportunities for interaction. M-learning may make it possible for students to learn everywhere at any time. Students who are on holiday could still read their lecture notes on mobile phone and do the exercises. Collaborative learning could be possible even if the learners are not in the classroom. Majority of students in higher education levels constantly carrying web capable mobile devices. These students are extensively using their mobile devices to send short email messages, watch latest Nollywood videos from YouTube during their waiting time between lectures.

A study conducted by Utulu (2012) revealed that mobiles phones were used by students for communicating with lecturers in- charge of the courses, collecting data (recordings), sending emails to lecturers, accessing Online Public Access Catalogue and sharing knowledge. Indeed, some studies suggest that mobile learning applications can facilitate students' learning in various ways like learning contents easily and interacting with others anytime and anywhere at convenience. Hence, the development of M-learning as a new strategy for education has implications for the way students and tutors in educational institutions interact (Huang, 2010). Findings of a recent study by Javid (2011) showed that mobile phones are helpful for the students for study purposes. Therefore, based on this, this current study is set to investigate whether the use of Video-based mobile learning on distance learners will improve their academic performance in Mathematics. This is the gap this current study is out to fill.

1.4 Research Questions

The following research questions were formulated to guide the study:

1. Is there any difference in the pre-test mean achievement scores of students in experimental and control group before commencing the experiment?
2. Is there any difference in the post-test mean achievement scores of students in experimental and control group after applying the treatment?
3. Is there any difference in the post-test mean achievement scores of male and female students in experimental group after applying the treatment?

1.5 Research Hypothesis

Hoi: There is no significant difference between the pre-test mean achievement scores of the experimental and control group before applying the treatment.

Hoii: There is no significant difference between the post-test mean achievement scores of the experimental and control group after applying the treatment.

Hoiii: There is no significant difference between the post-test mean achievement scores of the male and female students in the experimental group after applying the treatment.

2. METHODOLOGY

The study adopted pre-test, post-test control group quasi-experimental design for the purpose of evaluating the effects of video-based mobile learning on distance learners' academic performance in Mathematics in Nigeria. The target population for this study was all 100 levels NCE 1 students enrolled in sandwich programme of Emmanuel Alayande College of Education Iseyin and Kajola study centres of Oyo State.Two intact classes were used for this study, one from Iseyin study centre and one from Kajola study centre. Simple random sampling technique was used to select 34 students for experimental and 34 students for control group from each study centre because this Mathematics course was a general course.

Experimental group and control group were pre-tested before commencing the experiment and the scores kept separately after marking. Treatment instrument (Mobile video) was used to teach experimental group logarithms and the control group was taught the same topic using conventional method. At the end of four weeks' experiment, both experimental group and control group were post tested using Mathematics Achievement Test (MAT). The test instrument consists of forty items multiple choice objectives test items with (4) options A, B, C, D; per item and students were required to pick the correct option from the options provided. A pool of 80 items was developed following the principle of test construction; the draft copy of the pool of items was revised by two Mathematics experts and lecturers at Emmanuel Alayande College of Education study centre, each of whom was given a copy of the draft. Based on their reactions, some of the items were substituted with new ones and some had either stem or options modified.

The reliability coefficient using the slit-half approach and the Kuder Richardson formula 21(KR-21) yielded a value of 0.83 which indicated a high correlation and reliability of the instrument. At the end of the experiment, post-test were coded with a unique identifier as appropriate for each group and was later marked and scored. The data collected were analyzed using descriptive statistic of mean, standard deviation and inferential statistics of t-test analysis and thus answered the research questions and hypotheses in this study. The level of significance adopted for the analysis was 0.05, which formed the basis for accepting or rejecting each of the hypotheses.

3. RESULTS OF FINDINGS BASED ON RESEARCH QUESTIONS AND RESEARCH HYPOTHESES

Research Question 1: is there any difference in the pre-test mean achievement scores of students in experimental and control groups before commencing the experiment?

Hypothesis 1: There is no significant difference between the pre-test mean achievement scores of the experimental and control groups before applying the treatment.

Table 1: Pre-test mean achievement scores for both experimental group and control group

Group	N	X	SD	t	df	Sig. (2-tailed)	Decision
Experiment	34	14.32	3.71	2.03	33	0.83	Not Significant
Control	34	14.5	3.09				

Significant at 0.05 Alpha levels.

Table 1 shows that the pre-test mean achievement score and standard deviation of the experimental group was 14.32 and 3.71 respectively while the mean achievement score and standard deviation of the control group was 14.5 and 3.09 respectively. The result in Table 1 indicated no significant difference at 0.05 level of the pre-test mean scores of the experimental and control group. This is because t (33) = 2.03; sig (2-tailed) = .083 and p > 0.05.This therefore implies that both groups were of equal ability. The result supports hypothesis one and also answers research question 1.

Research Question 2: Is there any difference in the post-test mean achievement scores of students in experimental and control groups after applying the treatment?

Research Hypothesis 2: There is no significant difference between the post-test mean achievement scores of the experimental and control groups after applying the treatment.

Table 2: Post-test mean achievement scores of experimental and control groups.

Group	N	X	SD	t	df	Sig. (2-tailed)	Decision
Experimental	34	36.73	1.67	2.03	33	0.001	There is significant difference
Control	34	14.76	4.20				

Significant at 0.05 Alpha levels.

From the table 2 above, the post-test mean achievement scores of the experimental and control groups were 36.73 and 14.76 respectively. A significant difference existed between the post-test mean achievement scores of the experimental and control groups. The experimental group apparently performed better than the control group. This is upheld because t (33) = 2.03; sig (2-tailed) = 0.001 and p < 0.05.The result answered research question two and null hypothesis two, therefore, null hypothesis two is rejected.

Research Question 3: Is there any difference in the post-test mean achievement scores of male and female students in experimental group after applying the treatment?

Research Hypothesis 3: There is no significant difference between the post-test mean achievement scores of the male and female students in the experimental group after applying the treatment.

Table 3: Post-test mean achievement scores of male and female students in the experimental group.

Group	N	X	SD	t	df	Sig. (2- tailed)	Decision
Male	10	37.1	1.85	0.76	32	0.22	No significant difference
Female	24	36.58	1.37				

Significant at 0.05 Alpha levels.

Table 3 answers research question 3 and hypothesis 3. The post-test mean achievement scores of male and female students in the experimental group were 37.1 and 36.58 respectively. At 0.05 level of significance the result in table 3 shows that t (32) = 0.76; sig (2-tailed) = 0.22 and p > 0.05 hence; there was no significant difference between the post-test mean achievement scores of male and female students in the experimental group. Therefore, gender influence on the performance of the students in the experimental group was insignificant. The null hypothesis three is accepted.

4. DISCUSSION

The findings indicated no significant difference in the pre-test mean scores of both experimental and control group before the commencement of the experiment. This is in support of the study conducted by Dauda (2007) on the effect of audio-photographic illustration on the performance of students in Introductory Technology where the pre-test showed no significant difference. The findings equally revealed that there was a significant difference in the mathematics achievement of students taught with the video-based mobile learning (VML) package. The students in experimental group performed far better in the Mathematics Achievement Test compared with those who were taught with lecture method. The result collaborates the earlier studies which concluded that students who were taught using the video based mobile learning on writing skills performed better than students who learn writing through explanation (Asra, Alfitiriani, Saedah & Siti 2013). The findings of the study indicated that there was no significant difference between the performance of male and female students who learnt mathematics with the video-based mobile learning.

The male and female students performed equally. The finding is in agreement with that of (Asra, Alfitiriani, Saedah & Siti 2013) who also reported no statistical difference in the performance of male and female students exposed to video-based mobile learning. This therefore indicated that gender plays no major role in students' achievement in the subject.

5. CONCLUSION

From the findings of this research work, the following conclusions were drawn: M-learning could, therefore, be seen as a tool for effective teaching and learning of Mathematics. Video based m-learning can also be seen as effective tool for developing individual cognitive structure, psychomotor and affective abilities. Innovative instructional strategies as advocated by the Nigerian policy on information technology can be implemented in teaching Mathematics through m-learning at all level of education which will significantly improve students' achievement. More so that findings from this study showed better performance in mathematics was achieved through the use of video-based m-learning package. The video-based m-learning proved to be beneficiary and effective in teaching mathematics to students at the higher institution level which If properly integrated, it will surely improve the current system of open and distance learning education and its quality at an affordable cost.

6. RECOMMENDATIONS

From the findings of the present study, the following recommendations are made:

- Diffusion of video based m-learning package and replication of the approach used in this study to develop other content areas of mathematics and other courses in distance learning system of education is necessary.
- Curriculum planners should encourage the use of m-learning in higher institutions.
- Lecturers and colleges of education staff generally should be sensitized and trained in the use of mobile devices for teaching and learning purposes.
- Mathematics lecturers should adopt the use of video-based mobile learning to enhance anywhere, anytime access to learning materials and consequently improve learners' performance in the course.
- Training programmes should be encouraged for continuous update on any new technological development and innovations in mobile usage for academic purposes.

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