Effect of Video Modules E-Learning Approach on the Academic Achievement of Students in the Face of COVID-19 Pandemic

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

This study investigated the effect of Video modules e-learning approach on the students' academic achievement in Basic Sciences in Imo State. Two purposes, two research questions and two hypotheses guided the study. The study is a quasi-experiment pre-test, post-test, control group design, involving two groups with analysis of covariance as post-hoc control. The population of the study consisted the entire year two students in Alvan Ikoku Federal College of Education, Owerri in Imo State, which are 2,063. The sample consisted of 80 Economics and Political Science students, drawn from two classes in a school within the population. Purposive sampling technique was used to select the 40 students in each class and assigned the classes to experimental and control groups. Video Modules Instructional Package (VM-IP) and the Basic Sciences Achievement Test (BSAT) were used as the instrument for data collection, while mean rating, standard deviation and

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analysis of covariance (ANCOVA) were used to answer the research questions and test the hypotheses. The content and face validities of the instruments were established by two (2) experts in Educational Measurement and Evaluation, two (2) lecturers teaching Basic Sciences, who after due corrections, fine-tuned them and certified them fit for administration. Pearson product moment correlation coefficients method was used to determine the reliability of the results obtained with the instrument; and to establish its construct validity that is inter correlations among items which yielded a reliability coefficient value of 0.88. Findings from the study indicated that Video Modules E-learning approach method had effect on the academic achievement of students in Basic Sciences. Conclusions were drawn and recommendations made from the findings of the study which includes that there is need for the incorporation of this e-learning approach into the teaching and learning of Basic Sciences in tertiary institutions in Imo State.

1. INTRODUCTION

In the 21st century, at the end of 2019 in Wuhan, the high technology business hubs of China experience an epidemic of an entirely distinctive coronavirus appeared that had killed a few thousand Chinese within the fifty days of spreads and thousands of other citizens are suffered. The novel virus was nominated as COVID-19 novel coronavirus by the Chinese scientists (Shereen et al. 2020). Later on, in a shorter period, this COVID-2019 spread worldwide. Several country's economies are severely affected due to COVID-2019. Further, the outbreak has changed the operating conditions all over the globe within a month. The consequences of a pandemic are unstoppable and uncontrollable for many industries of the world. Later on, almost 120 countries have stopped face-to-face learning; approximately a billion students' education is effected worldwide with COVID-19. Most of the higher education system is operating through the E-learning [1,2].

Over the years, tertiary institution lecturers adopted the lecture method of teaching. In this approach, the teacher is seen as an expert who masters the subject matter while the learners are presumed to acquire the knowledge from the instructor. It is a lecture method in which learners have little or no involvement in the teaching process and is called "closed-ended" [3-5]. This method consists of seven components: developing activities used to guide the students for the lesson, teaching of new material, identifying an objective, questioning the students to get feedback from them regarding their understanding, giving feedback to the student in the needed area of improvement, and giving assignment to students. It is worthy to not that students continue to perform below expectations in their external examinations. Many researchers have been wondering the cause of this dwindling in the academic achievement of students [6,7]. They attribute this to the teaching method adopted over time which is teacher-centered instead of a student centered teaching method.

Technologies have changed the traditional way of education to the modern way of learning, like artificial intelligence [8]. Thus E-learning is covered under a larger term of technology-based learning through websites, learning portals, video conferencing, YouTube, mobile apps, and thousand types of free available websites for blended learning tools. Currently, E-learning is enhancing students' knowledge, even the academic staff and professional and industry people skills through the internet [9,10]. Most of the higher education universities are providing online courses for their students within and off campuses.

Internet technologies facilitate the distribution of content at the same time, to a large number of users; E-learning platforms offer many advantages to learners such as control over the content, control over the time spent learning, and thus the process can be adapted according to the learner needs and objectives of learning [11]. This might contribute to better communication with the students and in spite of some inherent challenges brought by this time of crisis, E-learning might enhance the learning process for students. However, when using E-learning platforms there are also some elements that might be considered obstacles in students' process of learning, such as decreased motivation in students, delayed feedback or help due to the fact that teachers are not always available at the time students may need help while learning, or feelings of isolation due to lack of physical presence of classmates [12]. Nonetheless, these obstacles can be overcome

with the help of teachers who should adapt their teaching strategies to the needs of students.

In order to do so, experience and knowledge about teaching in the online environment are necessary. Thus, we believe that these challenges and disadvantages could be more prominent while the educational process takes place exclusively online. This might happen due to the lack of teachers' experience in using E-learning and due to the short time in which they had to adapt their teaching style to the new conditions. Relevant in this way are the results of a study conducted by School Education Gateway at the beginning of the pandemic which showed that 66.9% of respondents affirmed that they used online platforms for teaching for the first time [13]. Thus, it can be inferred that students and teachers were not ready for an entirely online experience.

Tertiary institutions also struggle with keeping the content of the course consistent and relevant, with communicating clearly with the academic community, and also with acquiring and recruiting students [14] On the other hand, students also had to face challenges and a study focusing on students' perspective on E-learning identified that among the main challenges that students encountered were accessibility, connectivity, lack of appropriate devices, social issues represented by the lack of communication and interaction with teachers and peers [15].

Paavizhi et al. [16] studied effectiveness of video assisted learning module and proved that the usage of these short clip videos allows more efficiency in thinking and recall process. The visual and the audio combination in the videos have allowed for most of the users for the process of information in natural way. Gambari et al. [17] studied the effects of video-based cooperative, competitive and individualized instructional strategies on the performance of senior secondary schools students in geometry and posited that there was significant difference in the performance of the groups in favour of cooperative group. In addition, students' gender had no influence on students' performance in cooperative and individualized groups. However, male performed better than female in competitive instructional strategy. Based on the findings, it was recommended that mathematics teachers should employ video-based cooperative instructional strategy for improving students' performance in the subject.

2. PURPOSE OF THE RESEARCH

The purpose of the research is to assess the effect of Video Modules (VM) and academic achievement of students in the face of covid-19 pandemic in tertiary institutions in Imo State, Nigeria. The objectives are to:

1. ascertain the effect of VM on academic achievement of students in tertiary institutions in Imo State, Nigeria;
2. assess the academic achievement of male and female students taught using VM and conventional teaching method

3. RESEARCH QUESTIONS

The following research questions were asked:

1. What is the effect of VM on academic achievement of students in tertiary institutions in Imo State, Nigeria?
2. What is the academic achievement of male and female students taught using VM and conventional teaching method?

3.1 Hypotheses

The following hypotheses were formulated and tested on a 0.05 level of significance:

$H0_1$ There is no significant difference between the academic achievement of students taught using VM and those taught using conventional teaching method in tertiary institutions in Imo State, Nigeria.

$H0_2$ There is no significant difference in the academic achievement of male and female students using the on the use of VM.

4. METHODOLOGY

The design of this study is quasi-experimental, pre-test, post-test, control group design. The study adopted a 2X2 factorial design. The students were assigned to treatment and control groups without randomization. The treatment was administered for one hour after school in order not to disrupt the academic program of the school. The study was carried out in Imo State. The State is in the South-eastern Geopolitical zone of Nigeria. The population of the study is 2,063, comprising the entire year two students offering General Studies (Basic Sciences) in Alvan Ikoku Federal College of Education,

Owerri. The sample for this study consists of 80 year two students from two departments (Economics and political Science). Video Modules was used to treat the Economics students while conventional teaching method was used to treat Political Science students. Purposive sampling technique was used to assign the two classes to experimental and control groups. Two instruments were used for data collection namely; Video Modules Instructional Package (VM-IP) and the Basic Sciences Achievement Test (BSAT). The researcher administered these instruments to 24 year two students from another school (Federal Polytechnics Nekede) which were not be part of the study. The same test was re-administered to the same students after two weeks. The pre-test and post-test scores were compared using the Pearson Product Moment Correlation Coefficients method to determine the reliability of the results obtained which yielded a reliability coefficient value of 0.88.

4.1 Procedure Used for the Video

When utilizing video cuts in the study hall, shorter clasps (around five to 10 minutes) assist understudies with learning the data without being over-burden or losing their core interest. Longer recordings are likewise powerful — in any case, their absolute length ought to ordinarily be restricted to close to 30 minutes. Demonstrating video cuts in short sections and keeping the complete length contained to a compact running time keeps watchers locked in. Utilizing inscriptions and captions with recordings has additionally demonstrated powerful in helping students' access and procedure data. This is

particularly significant when thinking about assorted understudy populaces and those with exceptional needs. The utilization of video in educator instruction classes gives a simple, inventive, and easy to use approach to connect the present instructor understudies.

5. RESULTS AND DISCUSSION

5.1 Research Question One

What is the effect of VM on academic achievement of students in tertiary institutions in Imo State, Nigeria? The summary of the analyzed data is contained in Table 1.

The mean and standard deviation were computed to answer research question one. The pre-test mean score of the VM gave 15.73 with a standard deviation of 3.29, while the post-test mean score gave 20.20 with a standard deviation of 2.63 with the higher mean in the post-test and a lower standard deviation, it means that video modules to a great extent affect achievement in Basic Sciences. When a comparative analysis was made between the mean gains of the VM, it was observed to have a mean difference of 5.68. The researcher therefore concluded that the Video Modules affects student's achievement to a high extent in Basic Sciences achievement.

5.2 Research Question Two

What is the academic achievement of male and female students taught using VM and conventional teaching method? The result of the data analysis has been summarized in Table 2.

Table 1. Summary of Mean and Standard Deviation of the VM and Control Group by Achievement

Variable	Pre-test			Post-test	
	N	$\bar{x}$	SD	$\bar{x}$	SD
Video Modules	40	15.73	3.29	20.20	2.63
Lecture method	40	13.89	4.4	14.52	3.57
Total	80				

Table 2. Summary of Mean and Standard Deviation of the Treatment Groups by Achievement and Gender

Variable	Video Modules		
	N	$\bar{x}$	SD
Male	44	19.52	8.19
Female	36	20.9	2.25
Total	80		

Table 2 shows the ($\bar{x}$) and standard deviation of male and female students in the treatment groups. The females had a superior mean of 20.9 over the males, with a mean of 19.52 in the VM, with standard deviations of 8.19 and 2.25 for male and female respectively. The difference in mean here was 1.38. The mean of both genders in the treatment group show only slight variation. The researcher therefore, concluded that the gender mean difference in achievement in both treatment variables is low.

5.3 Hypothesis One

There is no significant difference between the academic achievement of students taught using VM and those taught using conventional teaching method in tertiary institutions in Imo State, Nigeria. The result of the data analysis has been summarized in Table 3.

The Analysis of Covariance was computed to examine the differences in mean between the VM and the lecture method of teaching. The calculated F was 199.85 while the critical F value remain 3.91 at 0.05 alpha level of significant given 1 and 78 degrees of freedom. Since the calculated F is greater than the critical F, the null hypothesis was rejected. The $\bar{x}$ of the VM was 20.2, while that of the control group was 14.68. The 5.52 difference in mean was statistically strong to be significant at the 0.05 alpha level; hence, the rejection of the null hypothesis. The

researcher therefore, concluded that the effect of the treatment yielded positive gains in the academic achievement of students in Basic Sciences.

5.4 Hypothesis Two

What is the academic achievement of male and female students taught using VM and conventional teaching method? The result of the data analysis has been summarized in Table 4.
The Table 4 showed that when the male and female students were given treatment, a significant f was obtained. The calculated f gave 0.057 while the critical f remains 3.91 given 1 and 76 degrees of freedom. The null hypothesis was therefore retained. The researcher therefore concluded that there is no difference in achievement by treatment under study.

The Table also showed a significant f of 10.24 while the critical f gave 3.91 by gender. The females had an overall mean ($\bar{x}$) of 20.75 while the males had an overall mean of 19.68. The 1.07 difference was statistically strong to be significant at the 0.05 alpha level. The researcher therefore concluded that the treatments have more positive impact on the female students than male students. Interaction occurred between the gender. The Table also gave a no difference interaction in both independent variables population and their mean performance in Basic Sciences achievement.

Table 3. Summary of ANCOVA showing Mean Difference between Video Modules and Lecture Method in Basic Sciences

Source of Variation	Df	Sum of Squares	Mean Square	F Cal	F Crit.	Decision
Between groups	1	16,779	16779	*199.85	3.91	P<0.05
Within groups	78	16,624.45	83.96			Reject H$_0$
Total	79	33403.45				

Significant, P<0.05; Calculated f= 199.85, critical f = 3.91 given 1 & 78 degrees of freedom

Table 4. Summary of ANCOVA Showing the interaction effect by gender and treatment in Basic Sciences

Source of Variation	Df	Sum of Squares	Mean Square	F Cal	F Crit.	Decision
Treatment (Factor A main effect)	1	0.6	0.06	*0.057	3.91	P<0.05 Retain H0
Sex of students (Factors B main effect)	1	108.04	108.04	*10.24		P<0.05 Retain H0
Sex of students x treatment	1	41.1	41.1	*3.9		P<0.05 Retain H0
Within groups	76	2068.05	10.55			
Total	79	2135.59				

The calculated f for interaction is 3.90 while the critical f value gave 3.91 given 1 and 76 degrees of freedom. The researcher therefore retained the null hypothesis of no interaction effect in the two variables under study, that is, treatments and sex of students. This means that there was no significant relationship/interaction in Basic Sciences achievement, whether or whether the student was a male or a female. Consider the following mean scores by gender.

6. CONCLUSION AND RECOMMENDATION

The Video Modules method positively impacted on the students' academic achievement in Basic Sciences to a very high extent. Students' performance increased using this method. From the findings, the following recommendations are made:

1. There is need for the incorporation of modern instructional methods like Video Modules into the teaching and learning of Basic Sciences and other courses in the higher institutions. This will ensure that students are abreast with global best practices which enhance achievement.
2. Basic Sciences teachers must train and retrain themselves continuously on the use of Video Modules and other online based teaching methods; they should at least understand the organization of content. This will enable students to participate actively in the lesson and arouse the interest of the students.
3. Government on its part should provide adequate, effective and functional internet facilities that will enable smooth running of the online based teaching methods which make lessons easy to deliver, interesting and successful.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Azzi-Huck K, Shmis T. Managing the impact of COVID-19 on education systems around the world:How countries are preparing, coping, and planning for recovery; 2020.
2. Shahzad A, Chin HK, Altaf M, Bajwa FA. Malaysian SMEs performance and the use of e-commerce: A multi-group analysis of click-and-mortar and pureplay E-retailers. Pakistan Journal of Commerce and Social Sciences (PJCSS). 2020a;14(1):1–33
3. Ashman M, Ongwae M. Trainer's Handbook - A 14 days Teaching Methodology Course, Trainer's Handbook, Kenya; 2001.
4. Barau S. Enhancing teaching and learning of electrical power engineering in the Nigerian Tertiary Institutions. International Journal of Learning and Teaching. 2015; 1(1): 55-58.
5. Benson K. *International trends in higher education 2015.* "University of Oxford, The International Strategy Office. 2015;5.
6. Mezieobi, K.A. and K.C. Mezieobi, (2013). *Primer of Social Studies trends and teaching patterns in Nigeria*. Owerri: Acada peak publishers.
7. Obinna-Akakuru, Annabel Uchechukwu, Maduagwu Beatrice Chinomso, Nelson-Okartar Ezinne, Onyeka Gospel-Tony Influence of Foreign Language Anxiety on the Academic Achievement of Senior Secondary School Students in French in Imo State. *Language, Literature and Culture. 2019;*2(3):123-126.
8. Alvino F, Di Vaio A, Hassan R, Palladino R. Intellectual capital and sustainable development: A systematic literature review. Journal of Intellectual Capital; 2020 Available:https ://doi.org/10.1108/JIC-11-2019-0259
9. Adams D, Sumintono B, Mohamed A. Noor NSM. E-learning readiness among students of diverse backgrounds in a leading malaysian higher education institution. Malaysian Journal of Learning and Instruction. 2018;15(2):227–256
10. Chopra G, Madan P, Jaisingh P, Bhaskar P. Effectiveness of E-learning portal from students' perspective: A structural equation model (SEM) approach. Interactive Technology and Smart Education. 2019; 16(2):94–116. Available:https://doi.org/10.1108/ITSE-05-2018-0027

11. Anwar K, Adnan M. Online learning amid the COVID-19 pandemic: Students perspectives. J. Pedagog. Res. 2020;1:45–51.

12. Suresh M, Priya VV, Gayathri R. Effect of e-learning on academic performance of undergraduate students. Drug Invent. Today. 2018;10:1797–1800.

13. Yusuf N, Al-Banawi N. The Impact of Changing Technology: The Case of E-Learning. Contemp. Issues Educ. Res. 2013;6:173–180.

14. Ali W. Online and Remote Learning in Higher Education Institutes: A Necessity in light of COVID-19 Pandemic. High. Educ. Stud. 2020;10:16–25.

15. Aboagye E, Yawson JA, Appiah KN. COVID-19 and E-Learning: The Challenges of Students in Tertiary Institutions. Soc. Educ. Res. 2020;1–8.

16. Paavizhi K, Palanisamy P, Saravanakumar AR. Effectiveness of video assisted learning module. *International Journal of Control and Automation*. 2019;12(6), 268-275.

17. Amosa Isiaka Gambari, Ahmed Tajudeen Shittu, Florence Olutunu Daramola , Moses James. Effects of video-based cooperative, competitive and individualized instructional strategies on the performance of senior secondary schools students in geometry. Malaysian Online Journal of Educational Sciences. 2016;4 (4).

18. Abou El-Seoud S, Seddiek N, Taj-Eddin I, Ghenghesh P, Nosseir A, El-Khouly, M. E-Learning and Students' Motivation: A Research Study on the E_ect of E-Learning on Higher Education. Int. J. Emerg. Technol. Learn. 2014;9:689–695

19. Dhawan S. Online Learning: A Panacea in the Time of COVID-19 Crisis. J. Educ. Technol. Syst. 2020;49:5–22.

20. Fischer H, Heise L, Heinz M, Moebius K, Koehler T. E-learning trends and hypes in academic teaching. Methodology and findings of a trend study. In Proceedings of the International Association for Development of the Information Society (IADIS) International Conference on Cognition and Exploratory Learning in the Digital Age (CELDA), Porto, Portugal. 2014;25–27 :63–69.

21. Marinoni G, Van't Land H, Jensen T. The Impact of COVID-19 on Higher Education around theWorld. International Association of Universities; 2020. Available:https://www.iauaiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf (accessed on 14 August 2020).

22. Popovici A, Mironov C. Students' Perception on Using eLearning Technologies. Procedia Soc. Behav. Sci. 2015;180:1514–1519.

23. Shahzad A, Hassan, R., Abdullah, N.I., Hussain, A., Fareed, M. COVID-19 impact on e-commerce usage:An empirical evidence from Malaysian healthcare industry. Humanities & Social Sciences Reviews. 2020b;8(3):599–609 Available:https://doi.org/10.18510/hssr.2020.8364.

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