



Students' Readiness and Performance in Computer Concepts Using Zoom Videoconferencing Platforms in Port Harcourt Metropolis, Rivers State

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ABSTRACT

Physical interaction between humans has steadily decreased over the past few years as a result of the COVID-19 pandemic which has prompted a significant rise in the adoption of videoconferencing for conducting educational activities through technologically mediated platforms. This study, however, investigated the effect of Zoom and Google Meet videoconferencing platforms on students' readiness and academic performance in Computer Studies in Private Senior Secondary Schools in Port Harcourt Metropolis. This study adopted a quasi-experimental nonequivalent pretest-posttest control group design with a population of 12,266 Senior Secondary II students (SS2) in 349 fully accredited private senior secondary schools in Port Harcourt Metropolis. The sample for this study comprised 210 Senior Secondary II students (SS2) drawn from intact classes in six selected private senior secondary schools in the study area. The instruments for data collection were a researcher-made Computer Studies Readiness Assessment Checklist (CSRAC) and a Performance Test on Computer Studies titled; Computer Studies Performance Test (CSPT). The test-retest method was used to generate two sets of scores from students outside the sample of this study and the scores were correlated using the PPMC to determine the internal consistency of the instruments. The reliability coefficients of the instruments were 0.76 and 0.84 for the Readiness Assessment Checklist (CSRAC) and Computer Studies Performance Test (CSPT) respectively. Quantitative data were analyzed using mean and standard and Analysis of Covariance. The significance level of 0.05 was used to test the null hypotheses. Findings suggest that GMVP had a greater effect on mean readiness rating of students in computer studies compared to ZVP. Again, GMVP had a better effect than ZVP on students' performance in Computer Studies. Based on the results obtained in this study, it was concluded that Zoom and Google Meet Videoconferencing Platforms enhanced students' digital readiness and academic performance in Computer Studies in the study area. The study recommended amongst others that teachers should adopt the use of videoconferencing e-learning platforms in the teaching of Computer Studies and other ICT-related subjects as it has a higher effect on students' digital readiness and academic performance.

Keywords: E-learning, videoconferencing, Zoom, Google Meet, digital readiness, performance, COVID-19

INTRODUCTION

Technology has made access to learning materials in text, graphics, audio, video and animation through the internet become so flexible even in the comfort of the user's home any day, anytime and anywhere with the availability of educational opportunities. Because of the flexibility attached to it, the use of ICT in education has become increasingly trendy globally through electronic learning. E-learning is basically

the use of computers and networks to enable the transfer of skills and knowledge for the diffusion of innovative teaching has become as important as education itself in the delivery of learning content.

While e-learning and the educational sector generally were yet undergoing innovation in Nigeria, the outbreak of Coronavirus (COVID-19) struck and disrupted the physical system of schooling within the country and all over the world. The novel Coronavirus disease (COVID-19), first identified in Wuhan China in December 2019 within a very short period of time, rapidly spread to almost every region of the world causing the death of many people. To reduce transmission of the Coronavirus, several countries including Nigeria established measures for infection prevention and control by limiting physical and social contact between people. The COVID-19 control measures adopted resulted in school closure, which prompted concerned stakeholders and the government to give more attention to the alternative to physical teaching and learning process hence; e-learning in form of audio, audio-visual, virtual and other forms of nonphysical contact teaching and learning processes were utilized. These alternatives to physical contact teaching and learning were laudable but it exposed the major strength and huge weaknesses of the Nigerian educational system owing to the fact that very many things still need to be put in place for the effective and efficient transition to e-learning.

The unplanned interruption and quick transition to e-learning produced tremendous distress and instability for both teachers and students. Teachers struggled with how to best to teach students through a variety of digital instructional tools, such as Learning Management Systems (LMSs), electronic mail (Email), and videoconferencing (VC) platforms, which had unexpectedly overtaken their previous in-person lectures, discussions, laboratories, and office hours. Videoconferencing tools, such as Zoom, Google Meet, Microsoft Teams, etc. were heavily utilized and became important components of many staff and students' daily activities.

Zoom and Google Meet were ranked among the most popular applications utilized for online learning and provided excellent video communication services. Zoom is an application that can be downloaded into a personal computer or a mobile device. It offers robust collaboration and engagement tools as part of its standard free license, including the ability to connect using voice-over-internet protocol (VoIP) or via traditional phones. Zoom.us is a leader in corporate video communication with a cloud platform that is secure and reliable for video and audio conferencing, chat, and webinars. Zoom is a video and web conferencing platform while Zoom webinars are a unique feature that allows presenters to broadcast to up to 500 participants, available to premium members only. This application is used for video conferences instead of direct meetings in the classroom. It can be installed on devices such as computers, laptops, android and smartphones. The innovation of zoom increases better learning outcomes for different groups of students.

Similar to Zoom, another video conferencing platform that saw an upsurge in popularity and utilization was Google Meet. This application is very helpful, especially in these conditions where we are required to keep our distance to avoid the COVID-19 virus. For students and educators, this application is very helpful because they can easily join via live video or video conferences from the comfort of their respective homes. Furthermore, Google Meet is a safe application because Google has stated that they have made and operated all of their products on a safe foundation. So, they believe the data of their product users will exist and remain private. In their Google Meet product, Google also provides built-in protection by default that will keep users' meetings safe. Because of the various advantages of Google Meet as a video conferencing application, many people in business and education like to use this application.

Based on scholars' views, the adoption of video conferencing platforms for educational purposes to a large extent depends on learners' digital readiness. Digital readiness in the context of e-learning revolves around the mental or physical preparedness of an individual or group to embrace an e-learning experience or action (Coopasami, Knight, & Pete, 2017). These views specify that an individual's or group's mental and physical readiness, experiences, or activities in this situation is learning online. Students' readiness is a strong element in the effective implementation of e-learning. Readiness may also be examined by evaluating students' knowledge, technology skills, technology availability, self-directed learning, computer and internet efficacy as well as an attitude toward e-learning. Technology aids visualization of

concepts helping better comprehension of the subject as well as providing ubiquitous access to knowledge and helping a wider coverage of knowledge on the subject suiting learners' appetite and interest which provides for enhanced academic performance.

As opined by Amo (2015), academic performance is described as a successful accomplishment or achievement in a particular subject area. It is indicated by grades, marks and scores of descriptive commentaries. It is, therefore, not out of place to describe the performance as the gain in knowledge of students as a result of taking part in a learning activity or programme. Several factors have been advanced as affecting students' academic performance. These include student factors, teachers' factors, societal factors, governmental infrastructural problems, language problems, and instructional strategies employed by the teacher, technology incorporated into the learning process and gender. Gender is often seen to have considerable effects on students' academic performances, especially in science subjects such as computer science. Computer Science (often referred to as Computer Studies at the Secondary School level) is the study of the theory, design, use and analysis of computer devices. This entails knowing the computer itself, its operation, what it can do, how it can do it and why it is doing it, these form the basis of Computer science in higher institutions. Therefore, computer studies was introduced into the secondary school curriculum in Nigeria to expose students to ICT needs. This is given due recognition because of its unquantifiable significance in introducing students to ICT on a wider scope.

Statement of the Problem

Physical interaction between humans has steadily decreased over the past few years as a result of the COVID-19 pandemic which has prompted a significant rise in the adoption of e-conferencing for conducting educational activities through technologically mediated platforms. The use of these technologically mediated platforms such as videoconferencing applications is perceived to facilitate the creation of the best learning environment for students and aids the realization of a balance between life and teaching duties for teachers. Through videoconferencing technologies, educational institutions are able to expand access to instructions while also creating new experiences in the teaching and learning environment. Videoconferencing allows learners in different locations to collaborate without having to move or meet at the same location and oftentimes provides learners the opportunity to access previously learned content. Despite these wide arrays of benefits accruable to the adoption of the videoconferencing format of e-learning in education not many students and teachers in secondary school are conversant with the use of videoconferencing platforms for learning as such implementation of e-learning may be difficult. It is against this backdrop therefore that this study strived to investigate the effect of Zoom and Google Meet Videoconferencing platforms on secondary school students' readiness and academic performance in Computer Studies in private Senior Secondary Schools in Port Harcourt Metropolis.

Objectives of the Study

This study investigated the effect of Zoom and Google Meet Videoconferencing platforms on students' readiness and academic performance in Computer Studies in Private Senior Secondary Schools in Port Harcourt Metropolis. Specifically, the study sought to;

1. determine students' readiness to use Zoom Videoconferencing Platform (ZVP) and Google Meet Videoconferencing Platform (GMVP) to learn Computer Studies in Private Senior Secondary Schools in Port Harcourt Metropolis.
2. ascertain the effect of Zoom Videoconferencing Platform (ZVP) on students' pretest and posttest performance mean scores in Computer Studies in Private Senior Secondary Schools in Port Harcourt Metropolis
3. determine the effect of Google Meet Videoconferencing Platform (GMVP) on students' pretest and posttest performance mean scores in Computer Studies in Private Senior Secondary Schools in Port Harcourt Metropolis.

Research Questions

The following two research questions guided this study.

1. What difference exists between the mean readiness ratings of students who learned Computer Studies using Zoom Videoconferencing Platform (ZVP) and those who learned using Google Meet Videoconferencing Platform (GMVP)?

2. What difference exists between the pretest and posttest mean performance scores of students taught Computer Studies using Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP)?

Research Hypotheses

For this study to establish and determine the stated objectives, research hypotheses that are testable and analyzable based on data collected therefore need to be formulated. The following research hypotheses were formulated to guide the study.

1. Significant difference does not exist between the mean readiness ratings of students who learned Computer Studies using Zoom Videoconferencing Platform (ZVP) and those who learned using Google Meet Videoconferencing Platform (GMVP).
2. Significant difference does not exist between the pretest and posttest mean performance scores of students taught Computer Studies using Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP).

RESEARCH METHODS

Research Design

This study adopted a quasi-experimental nonequivalent pretest-posttest control group design to identify the effectiveness of Zoom Videoconferencing Platform and Google Meet Videoconferencing Platform on students’ digital readiness and learning performance in Computer Studies. This research design is used because secondary schools exist in intact classes and the randomization of students into groups for the purpose of the experiment will not simply be allowed to avoid class disintegration and the introduction of bias. The design is schematically represented as follows;

s/n	Groups	Pre-test	Treatment	Post-test
1	Experimental 1(ZVCS)	O ₁	X ₁	O ₂
2	Experimental 2 (GMVCS)	O ₃	X ₂	O ₅
3	Control (F2F)	O ₄	—	O ₆

Where,

- O₁ = Pre-test for Experimental group 1 (ZVCS)
- O₂ = Post-test for Experimental group 1 (ZVCS)
- O₃ = Pre-test for Experimental group 2 (GMVCS)
- O₅ = Post-test for Experimental group 2 (GMVCS)
- O₄ = Pre-test for Control group (F2F)
- O₆ = Post-test for Control group (F2F)
- X₁= Instruction with Zoom Video Conferencing Strategy
- X₂ = Instruction with Google Meet Video Conferencing Strategy
- = No Treatment

Population, Sample and Sampling Techniques

The population for this study comprised 12,266 Senior Secondary II students (SS2) in 349 fully accredited private senior secondary schools in Port Harcourt metropolis. The sample for this study comprised 210 Senior Secondary II students (SS2) drawn from intact classes in six selected private senior secondary schools in Port Harcourt Metropolis. This was made up of 73 students (33 males and 40 females) for experimental group I, 75 students (44 males and 31 females) for experimental group II and 62 students (35 males and 27 females) for the control group. The multi-stage sampling procedure was used to obtain the sample for this study as more than one sampling technique were adopted at various stages of selection.

Research Instrument

The instruments used for data collection were a researcher-made Computer Studies Readiness Assessment Checklist (CSRAC) and a Performance Test on Computer Studies titled; Computer Studies Performance Test (CSPT). The instruments were used as pretest to be sure of the equivalent ability of the students and it was as well used as a posttest after the treatment has been administered to determine the effect of the treatment on the student’s digital readiness and academic performances. The instruments were given to two secondary school computer studies teachers and an expert in measurement and evaluation for validation. The test-retest method was used to generate two sets of scores from students outside the sample of this study and the scores were correlated using the PPMC to determine their internal consistency. The reliability coefficient of the instruments were 0.76 and 0.84 for the Readiness Assessment Checklist (CSRAC) and Computer Studies Performance Test (CSPT) respectively.

Procedure for Data Collection

The researcher carried out the data collection procedure in stages for three weeks. The researcher visited the selected school for permission to use the students and some of the school facilities. Afterward, the Readiness Assessment Checklist (CSRAC) and Computer Studies Performance Test (CSPT) were administered as a pretest to both the experiment and control groups to ascertain their equivalence in ability. In the second stage, the two experimental groups were subjected to a readiness assurance procedure on the use and functionalities of Zoom and Google Meet Platforms. Thereafter students were taught using Zoom and Google Meet Platforms while taking cognizance of the students’ previous knowledge of the concepts of Output devices and Computer System software. The students were actively engaged and encouraged to interact in breakout groups, while the control groups were also taught the same concept using the conventional face-to-face teaching method where there was no proper teaching model and no interaction among students. One period of 45 minutes was allocated for each group three times a week. In the final stage, the Readiness Assessment Checklist (CSRAC) and Computer Studies Performance Test (CSPT) were rearranged and administered to the groups as a post-test. The post-test was scored and used to generate quantitative data which was analyzed using mean and standard and Analysis of Covariance. The significance level of 0.05 was used to test the null hypotheses.

RESULTS

The results of the analysis of the post-test scores in CSRAC and CSPT for the two experimental groups were analyzed and the results are presented below.

Research Question 1: *What difference exists between the mean readiness ratings of students who learned Computer Studies using Zoom Videoconferencing Platform (ZVP) and those who learned using Google Meet Videoconferencing Platform (GMVP)?*

Table 1: Comparison of mean readiness rating of students in the ZVP and GMVP

Group	Treatment	n	Pre-test \bar{x} (SD)	Post-test \bar{x} (SD)	Mean Gain
Experimental I	ZVP	73	29.28 (4.44)	44.98 (4.24)	15.70
Experimental II	GMVP	75	30.34 (3.21)	48.13 (3.27)	17.79

From the results shown in Table 1 on the mean comparison of students’ readiness who learned computer studies using Zoom Videoconferencing Platform (ZVP) and those who learned using Google Meet Videoconferencing Platform (GMVP), it was shown that those who were taught using ZVP had a pretest mean rating of 29.28 (SD = 4.44), and a posttest mean rating of 44.98 (SD = 4.24) which resulted in a mean difference of 15.70, while those taught using GMVP had a pretest mean of 30.34 (SD = 3.21) and a post-test mean of 48.13 (SD = 3.27) with a resultant mean difference 17.79. This result suggests that GMVP had a greater effect on mean readiness rating of students in computer studies compared to ZVP.

Research Question Two: *What difference exists between the pretest and posttest mean performance scores of students taught Computer Studies using Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP)?*

Table 2: Comparison of mean performance scores of students taught Computer Studies using the Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP).

Group	Treatment	n	Pre-test \bar{x} (SD)	Post-test \bar{x} (SD)	Mean Gain
Experimental I	ZVP	73	15.78 (3.89)	21.73 (4.21)	5.95
Experimental II	GMVP	75	14.31 (2.75)	22.61 (4.20)	8.30

From the results shown in Table 2 on the mean comparison of students' performance taught Computer Studies using Zoom Videoconferencing Platform (ZVP) and Google Meet Videoconferencing Platform (GMVP), it was shown that students in ZVP had a mean performance score of 15.78 (SD = 3.89), and a posttest mean rating of 21.73 (SD = 4.21) which resulted in a mean difference of 5.95. While for those taught Computer Studies using Google Meet Videoconferencing Platform (GMVP), it was shown that they had a mean performance score of 14.31 (SD = 2.75), and a posttest mean rating of 22.61 (SD = 4.20) which resulted in a mean difference of 8.30. This result suggests that using GMVP had a better effect than using ZVP on students' performance in Computer Studies.

Hypothesis One: Significant difference does not exist between the mean readiness ratings of students who learned Computer Studies using Zoom Videoconferencing Platform (ZVP) and those who learned using Google Meet Videoconferencing Platform (GMVP).

Table 3: Summary of Analysis of Covariance (ANCOVA) on mean ratings of students taught Computer Studies using the Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP).

Tests of Between-Subjects Effects

Dependent Variable: Post_Test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	545.231 ^a	2	272.615	21.206	.000
Intercept	1244.303	1	1244.303	96.792	.000
Pretest	180.076	1	180.076	14.008	.000
Group	430.641	1	430.641	33.499	.000
Error	1234.123	146	12.855		
Total	19008.000	147			
Corrected Total	1779.354	146			

a. R Squared = .306 (Adjusted R Squared = .292)

From the result displayed in Table 3, it can be observed that when the pretest of students' mean ratings on readiness was used as a covariate for the ANCOVA analysis, an F-value of 33.499 was obtained with a corresponding p-value of 0.000 at 1 and 146 degrees of freedom. Since the p-value obtained, 0.000 was lesser than the chosen alpha guiding the study (0.05), it, therefore, implies that students taught Computer Studies using the GMVP had significantly better readiness mean ratings than those taught using the ZVP. The null hypothesis is therefore rejected.

Hypothesis Two: Significant difference does not exist between the pretest and posttest mean performance scores of students taught Computer Studies using Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP).

Table 4: Summary of ANCOVA on mean performance scores of students taught Computer Studies using Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP).**Tests of Between-Subjects Effects**

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	97.807 ^a	2	48.904	3.732	.031
Intercept	468.437	1	468.437	35.751	.000
Pre_test	34.396	1	34.396	2.625	.112
Genders	69.755	1	69.755	5.324	.025
Error	628.938	146	13.103		
Total	10035.000	147			
Corrected Total	726.745	146			

a. R Squared = .135 (Adjusted R Squared = .099)

According to the result shown in Table 4, the differences in students' performance taught Computer Studies using Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP) was investigated, an F-value of 5.32 was obtained with a corresponding p-value of 0.025 at 1 and 146 degrees of freedom. Therefore, since the p-value of 0.025 was lesser than 0.05, it, therefore, implies that there is a significant difference in the performance of students taught Computer Studies using Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP). The null hypothesis was therefore rejected.

DISCUSSION OF FINDING

The data gathered under research question one and presented in Table 1, showed that students who were taught using Zoom Videoconferencing Platform (ZVP) had a mean gain of 15.70, while those taught using Google Meet Videoconferencing Platform (GMVP) had a mean gain of 17.79. This result suggests that GMVP had a greater effect on the mean readiness rating of students in computer studies compared to ZVP. This indicates that although the two approaches had positive effects, Google Meet Videoconferencing Platform had a higher positive effect on the students' digital readiness rating than the Zoom Videoconferencing Platform. This result corroborates the finding of Olayemi, Adamu and Olayemi, (2021) who investigated the perception and readiness of students toward online learning in Nigeria during the COVID-19 pandemic. Their finding showed that the majority of the respondents claimed to be conversant with online learning with a high level of readiness. Furthermore, the findings revealed that the majority of the respondents indicated a high level of ICTs skills and competencies needed for online learning. On the negative side, fear of the high cost of data, poor internet services, erratic power supply, and inaccessibility to online library resources and limited access to computers was the major perceived challenges to effective online learning. The result of the test of hypothesis one, which was presented in Table 3, showed that the p-value obtained, (0.000) was lesser than the chosen alpha level guiding the study (0.05), it, therefore, implies that students taught Computer Studies using the GMVP had a significantly better readiness mean ratings than those taught using the ZVP. The null hypothesis is therefore rejected. This result supports the study of Abu Shadat, Benjamin and Umme, (2017) whose study on the effective use of videoconferencing technology and instructional videos to improve the engagement and success of distance students in engineering showed improved engagement. As Engin (2017) aptly opined, students need to have online readiness to benefit from online learning settings. The result obtained showed a better readiness rating with the use of Google Classroom platforms, this is also in line with the findings of Pedroso, Tubola, Mamon and Sencida (2021) who discovered that Google Meet is an ideal application for learning and facilitates learning enrichment.

Also, the results of research question two, which was presented in Table 2, revealed that the mean gain between the pretest and posttest performance scores of students taught Computer Studies using Zoom Videoconferencing Platform was 5.95 and that of those taught using Google Meet Videoconferencing Platform (GMVP) was 8.30. This result suggests that using GMVP had a positive effect on students' performance in Computer Studies. The result of the test of hypothesis two which was presented in Table 4, showed that the p-value of 0.025 was lesser than 0.05, it, therefore, implies that there is a significant difference in the performance of students taught Computer Studies using Zoom Videoconferencing Platform (ZVP) and those taught using Google Meet Videoconferencing Platform (GMVP). The null hypothesis was therefore rejected. This finding supports the assertion of AlMahdawi, Senghore, Ambrin and Belbase (2021) which indicated that students' performance in online chemistry classes during the COVID-19 pandemic provided opportunities to develop creativity and collaborative skills, together with better learning achievement as perceived by the students.

CONCLUSION

Based on the results obtained in this study, it was concluded that Zoom and Google Meet Videoconferencing Platforms enhanced students' digital readiness and academic performance in Computer Studies in the study area.

RECOMMENDATIONS

Considering the findings and discussion of this study, the following recommendations are made:

1. Teachers should adopt the use of videoconferencing e-learning platforms in the teaching of Computer Studies and other ICT-related subjects as it has a higher effect on students' digital readiness and academic performance.
2. Teachers should pursue training in the use of videoconferencing platforms and learning management systems, like Google Meet, Zoom, Google Classroom, and Moodle, for teaching students because these e-learning platforms can be used to facilitate virtual and blended learning.

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