IMPLEMENTATION OF GOOGLE MEET AND ZOOM APPLICATIONS IN THE LEARNING OF MATHEMATICS IN COLLEGE OF EDUCATION

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Abstract

This study was designed to determine the effect of the implementation of Google Meet and Zoom applications in the Learning of Mathematics in College of Education, Afaha Nsit. Two research questions were raised to guide the study and two hypotheses were formulated and tested at 0.05 level of significance. The study employed quasi-experimental design. Sample for the study consisted of 60 second year students of mathematics in the College. Mathematics performance test was used to collect data for the study. Students in the experimental group learnt Integral Calculus using Google Meet and Zoom applications learning approach while students in the control group learnt Integral Calculus using conventional learning approach. Data for the study was analyzed using descriptive statistics of mean and standard deviation to answer the research questions and independent sample t-test statistics was used to test the hypotheses. The findings of the study revealed that Google Meet and Zoom applications Learning approach improved students' academic performance. Based on this, this study recommended among others that Google Meet and Zoom applications should be integrated with other methods of teaching in the teaching of Mathematics at College of Education.

Introduction

Mathematics is a rigid subject and its teaching requires the involvement of many senses to contribute to its simplification and understanding, hold great hopes for the contribution of mathematics to solving many of the problems and challenges facing humanity, so the teaching and learning of mathematics receives great

attention, and the acceleration of cognitive and technological development has contributed to providing the best interactive learning environment that suits the needs of learners, and helps them develop their abilities to deal with variables in this era. Aqeelan (2002), stated that mathematics is "an abstract science of the creation and creativity of the human mind and is concerned with, among other things, the sequence of ideas, methods, and patterns of thinking. It can be viewed as a way of thinking or a language that uses specific expressions and symbols with precision, or it is an organized knowledge in a structure or as an art." Salama (2007), explained that mathematics is the most important pillar of any scientific progress, and mathematics is the building block in space, astronomy and electronic devices research. The modern vision of the twenty-first century of mathematics came to emphasize the urgent necessity to help learners to see mathematics as an exciting and useful topic, and to encourage teachers to use modern technologies to bring mathematical concepts closer to the minds of learners. Because mathematics is an abstract subject, the importance of using educational techniques in teaching mathematics comes to stimulate students 'interest and satisfy their needs towards learning, to diversify teaching methods, and to increase learners' motivation to learn, pay attention and participate. Instead of assessing the level of knowledge, encourage divergent groups rather than local ones. Fathallah (2004), indicated that the use of e-learning in learning mathematics is one of the recent trends that many

studies have recommended for their feasibility. Al-Halafawi (2011) affirms the rapid growth of Internet technologies demonstrated the necessary need to introduce modern educational systems to improve education by integrating technology into the teaching and learning process, and Karawani (2012) adds that traditional methods have been greatly affected by technical development, which led to an increase in the efficiency of higher education.

Mathematics, the fundamental tool for all sciences and technology is then the basic primary element which needs a very serious support during the teaching-learning process. This shows that the chain of interdependent relationships between development, technology, education, tertiary institutions, science and mathematics, in bringing the issue of the conceptual change in teaching and learning methodologies. This interdependent chain is cyclic such that education support the growth of technology, while in return, technological facilities support educational system, in our case, the learning system, specifically by electronic support (e-learning). There is no doubt that the teaching strategies have the greatest impact on the learner's motivation towards learning, the amount of knowledge, skills and values obtained from education and the duration of their impact in the learner's mind and benefiting from them.

Lecture is a method commonly used by educators in learning activities to build student knowledge and learning outcomes. Learning activities require direct

communication between educators and students so that the transfer of knowledge in building knowledge and learning outcomes can be well-formed so that the character of students can be directed through the guidance of educators. Components that cannot be separated between schools as learning spaces, educators as educators and students as students in building knowledge and learning outcomes (Barreyro, Injoque-Ricle, Formoso & Burin, 2019). The lecture method offers advantages through educator control in learning and shortcomings in the form of passive students and educators as dominant speakers (Paris, 2014). The lecture method provides an advantage for educators in managing classes with many students in one study (Stearns, 2017). The lecture method is more dominant in teaching the delivery of learning material, question and answer between educators and students as part of the process of building knowledge and learning outcomes (Van der Steen dan Van Frissen, 2017). One of the supports in the lecture method is the process of reading in which reading is a supporting factor for students in building knowledge and learning outcomes (Fisher, Ros & Grant, 2010).

A mode of teaching where students receive information passively from a lecturer is ineffective in fostering understanding of statistics, it is necessary to pass a system where students are actively involved in the learning process. Because of this, there is need to shift from the traditional-based method of teaching to one that is learner-based in which learners actively participate in the learning process of statistics

(Auer & Thrasyvoulos, 2018). At College of Education, students are predominantly taught mathematics using lectures which are usually supplemented by textbooks and demonstration. As a result, the lecturer usually initiates the learning process. Given that direct instruction traditional-based teaching does not develop conceptual understanding of the subject. The academic performance of students in statistics has been poor over the years. For instance, in Algebra course (MAT 111) among first year students at College of Education, Afaha Nsit out of ninety-four candidates who sat for MAT 111 examination in the 2017 academic year, only forty-eight candidates representing 51 percent passed the course while 49 percent failed the course. Similarly, out of seventy-nine candidates who sat for MAT 111 examination in the 2018 academic year only forty-two candidates representing 53 percent passed the course while 47 percent failed the course. With regard to 2019 academic year, forty-two candidates sat for MAT 111 examination. Fourteen candidates passed and this represents 33 percent and 67 percent failed the course.

Traditional-based teaching of statistics is therefore, not helping in building the understanding of students in statistics. In the era of the industrial revolution 4.0 had an impact on various aspects one of which was education. The development of new information and knowledge is always spread easily and can be accessed by anyone in need. The education system requires new adaptation with changes in the

industrial revolution 4.0. Educators always adapt to information technology so that learning objectives can be achieved (Hamilton, Suda, Heidel, McDonough, Hunt and Franks, 2020). The availability of various services to learn to use technology (online learning) makes it easier for lecturers and students to achieve learning goals, one of which is Google meet. Online learning has a positive impact on learning (Zulfikar, Muhidin, Pranoto, Suparta, Trisetyarso, Abbas, & Kang, 2019). The 21*st* century generation is better in being actively participating in the learning process; actively responding to the comments of their lecturers and their students as they manage the process of collaborative inquiry on their own using e-learning can be defined as a learning utilizing electronic technologies to access educational curriculum outside of a traditional classroom (College, 2020). This model of learning is learner-based. In short term E-learning can be defined as teaching using online. In this case topics were taught using internet and students were assessed online. In e-learning, teaching can be based in or out of classroom and internet forms the major component of e-learning. E-learning, or electronic learning, is the delivery of learning and training through digital resources (Lawless, 2018). Although e-learning is based on formalized learning, it is provided through electronic devices such as computers, tablets and even cellular phones that are connected to the internet and this makes it easy for users to learn anytime,

anywhere, with few, if any, restrictions (Lawless, 2018). Zoom and Google Meet are some of the software used in e-learning.

Zoom was not initially developed as an academic classroom tool, but many configurations and operational software are more targeted to corporate users than to educators or learners. This would not usually mean that Zoom cannot be used effectively in educational settings, clearly that hosts need to introduce themselves with the app and be mindful of the different configurations, especially in the free version, which does not contain any of the more effective regulatory features. This can create a fairly learning curve for participants who are not especially technologically savvy. The free account offers hosts a small selection of options, including the power to organize events. Sessions are oriented towards online interactive activities in which members exchange knowledge of different forms. A-Zoom session enables the host to mute attendees, but all participants should be granted the option to unmute their voice, but this would not be ideal in a learning environment. Attendees in sessions will even post footage even without the host's permission. Online edition sessions are open to up to 100 members. Throughout-meeting interaction is accessible at free sessions such as "discussion experiences" and "non-verbal suggestions" which are identical to emojis. Restricted captions and videos are also included in the free edition. Before beginning a conference, hosts can review the Security settings (bottom of the Zoom Conference screen) to ensure

that they have chosen the actions of the attendees that they choose to allow; otherwise, participants were able to share their screens and unmute their microphones at will. Share Screen settings can also be tested and set to "Host-Only" in general.

The learning room component that was originally a classroom in the school environment has shifted to the Google Meet application room. Google meet is an interactive and alternative media used for online learning. Google Meet Assist Educators use the lecture method in indirect learning activities. Interactive learning is expected to help students in building knowledge and learning outcomes (Roscoe, 2014). 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 (St John, 2020). Because of the various advantages of Google Meet as a video conferencing application, many people in the business and education areas like to use this application. Users find it easy to use Google Meet, so this creates a positive perception of this platform. And all the days, Google Meet users are increasing significantly (Purwanto & Tannady, 2020). Then, the Google Meet application is one of the media used to carry out teaching and learning activities of Mathematics courses. Therefore, the study aims to investigate

the effect of the implementation of zoom and Google Meet applications in the learning of Mathematics in College of Education, Afaha Nsit.

Research Questions

1. What is the effect of the implementation of Google Meet application in the learning of Mathematics course in College of Education, Afaha Nsit?
2. What is the effect of the implementation of Zoom application in the learning of Mathematics course in College of Education, Afaha Nsit?

Research Hypotheses

1. There is no statistically significant difference in performance of students in Mathematics s between students who were taught using Google Meet application learning approach and students taught using Conventional (lecture) Learning Approach.
2. There is no statistically significant difference in performance of students in Mathematics s between students who were taught using Zoom application learning approach and students taught using Conventional (lecture) Learning Approach.

Methodology

The study used quasi-experimental research design because of the sampling method which was used. In this study, purposive sampling approach was used. The research, however, was experimental because its goal was to determine the effect

of the implementation of zoom and Google Meet applications in the learning of Mathematics in College of Education, Afaha Nsit. Quasi experimental design was used to determine effect of implementation of zoom and Google meet application on the academic performance of Third Year Students in Statistics. This was Pre-test Post-test control group. The target population of this study included all the second-year students studying Mathematics (MAT 211 – Integral Calculus) at College of Education, Afaha Nsit in the 2021/2022 academic year calendar. The sample for the study comprised sixty (60) second year students. 12 students were purposely grouped into the experimental group because they own personal computer like laptop wile 48 students form the control group. Since this was a quasi-experimental research design, the experimental group learnt Integral Calculus using zoom and Google meet application learning approach. The control group learnt Integral Calculus using conventional learning approach. To assess performance of students in mathematics, Mathematics Performance Test was developed by the researchers containing Ten (10) objective test questions on Integral Calculus. Three lecturers at College of Education validated the instrument. Data collected were analyzed using descriptive statistics of mean and independent sample t-test with the help of SPSS version 24. The statistical test used to analyse the data was independent sample t-test since the study was looking at performance of two different groups of students.

Results

Research Question 1

What is the effect of the implementation of Google Meet application in the learning of Mathematics course in College of Education, Afaha Nsit?

Table 1: Descriptive statistics analysis of the performance of students taught with Google Meet application

Groups	N	Mean	SD
Experimental	12	75.03	12.93
Control	48	59.47	17.75

Table 1 reveals that the mean score of the control group was 59.47 while the mean score of the experimental group was 75.03. The standard deviation of the experimental group was 12.93 and the standard deviation for the control group was 17.75.The experimental group performance mean (75.03) and the control group performance mean (59.47) indicated that the performance of the two groups was not the same. Since the mean score of the experimental group is greater than the mean score of the control group, this implies that students taught mathematics with Google meet application learning approach performed better than students taught with conventional lecture approach.

Research Question 2

What is the effect of the implementation of Zoom application in the learning of Mathematics course in College of Education, Afaha Nsit?

Table 2: Descriptive statistics analysis of the performance of students taught with Zoom application

Groups	N	Mean	SD
Experimental	12	77.24	12.12
Control	48	57.53	17.67

Table 2 reveals that the mean score of the control group was 57.53 while the mean score of the experimental group was 77.24. The standard deviation of the experimental group was 12.12 and the standard deviation for the control group was 17.67.The experimental group performance mean (77.24) and the control group performance mean (57.53) indicated that the performance of the two groups was not the same. Since the mean score of the experimental group is greater than the mean score of the control group, this implies that students taught mathematics with Zoom application learning approach performed better than students taught with conventional lecture approach.

Research Hypothesis 1

There is no statistically significant difference in performance of students in Mathematics s between students who were taught using Google Meet application learning approach and students taught using Conventional (lecture) Learning Approach.

Table 3: t-test analysis of the performance of students taught with Google Meet application

Group	N	Mean	SD	t-value	p-value	Sig.	df	Decision
Experimental	12	75.03	12.93	3.881	.000	.05	58	Significant
Control	48	59.47	17.75					

From Table 3, $\alpha = 0.05$, t-value = 3.881 and p=value = .000 since P-value = 0.000 < 0.05, we reject the null hypothesis one at 5 percent level of significance and conclude that there is a statistically significant difference in performance of students in Mathematics s between students who were taught using Google Meet application learning approach and students taught using Conventional (lecture) Learning Approach.

Research Hypothesis 2

There is no statistically significant difference in performance of students in Mathematics s between students who were taught using Zoom application learning approach and students taught using Conventional (lecture) Learning Approach.

Table 4: t-test analysis of the performance of students taught with Zoom application

Group	N	Mean	SD	t-value	p-value	Sig.	df	Decision
Experimental	12	77.24	12.12	4.142	.000	.05	58	Significant
Control	48	57.53	17.67					

From Table 3, $\alpha = 0.05$, t-value = 4.142 and p=value = .000 since P-value = 0.000 < 0.05, we reject the null hypothesis one at 5 percent level of significance and conclude that there is a statistically significant difference in performance of students in Mathematics s between students who were taught using Zoom application learning approach and students taught using Conventional (lecture) Learning Approach.

Discussion of Findings

The analysis presented in the tables above shows that students performed well in MAT 211 (Integral Calculus) after the students learnt the course using Google Meet and Zoom applications learning approach. The result is in line with (Neema & Alfred, 2014) who concluded that e-learning impacted positively on students' academic performance. E-learning helps to arouse students interest in learning for them to understand concepts. From the results of the study, it shows that the use of Google Meet application learning approach is better than face-to-face approach of teaching. This also is in line with the results of (Oye et al., 2012) who concluded that the use of e-learning improves students' performance as compared to face-to-face teaching. The improved performance of the students after using Google Meet and Zoom applications learning approach is as a result of students being in charge of their learning and there is more of learner centered learning. The results from the study shows that students are more motivated when they learn using Google

Meet and Zoom applications. The results are consistent with the findings of (Safiyeh, 2015) who concluded that students are more likely to be more motivated when applying e-learning. This is because students are in charge of their learning and in the process, they discover a lot of things on their own and group discussion is enhanced. Group discussion is important as students share ideas in the group chat sections of the applications. The results from the study shows that Google Meet and Zoom applications learning approach offers a tremendous opportunity by the means of electronic and students can learn at their own pace and the results can be better than traditional method of teaching. Google Meet and Zoom applications play an important role in education as it changes the way students' think and study and can help students to grow with a better aptitude. There is personal and group achievement once Google Meet and Zoom applications are applied. Once group discussion is formed in the applications, the efforts of each person benefit not only the individual, but also everyone else in the group. There is positive interdependence once Google Meet and Zoom applications are applied as a teaching strategy. Positive interdependence is important for students because students are committed to the work as they want personal success as well as the success of every member of the group. The use of e-learning is effective for students for construction of knowledge and creativity acquisitions (Zare et al.,

2016). The results from the study show that there are creativity acquisitions when Google Meet and Zoom applications are applied.

Conclusion

The study has shown that Google Meet and Zoom applications learning approach have the potential to improve students' academic performance in Mathematics. The learning approach has a positive effect on the students' academic performance in Mathematics. The results would imply that incorporating Google Meet and Zoom applications in the mathematics classroom at College of Education, Afaha Nsit would enhance the learning of mathematics.

Recommendations

The following recommendations were made after the study:

1. Google Meet and Zoom applications should be integrated with other methods of teaching in the teaching of Mathematics at College of Education.
2. Lecturers should be encouraged to use Google Meet and Zoom applications in the teaching.
3. College students should be encouraged to make use of the available smart communication means and training to use them periodically.
4. Internet facilities should be provided in across Colleges of Education in the country, this would help to facilitate student and lecturer connectivity to

internet access thereby reducing the burden of acquiring communication data among students and lecturers.

5. More studies should be conducted on the effect of e-learning in Integral Calculus.

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