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Effects of Whatsapp group learning platform on senior secondary schools students' learning outcomes in Science, Technology, and Mathematics (stm) in Ekiti State, Nigeria

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The study investigated the effects of the WhatsApp Group Learning Platform (WGLP) on Senior Secondary School (SSS) Students' Learning Outcomes in Science, Technology, and Mathematics (STM) in Ekiti State, Nigeria. The sample comprised 100 SS II students from two public secondary schools in Ekiti State who were randomly selected from their classrooms. A multistage sampling technique was used to pick the sample. Data were collected using a self-created questionnaire called Science, Technology, and Mathematics Performance Tests (STMPT). The instrument's reliability was determined using the test-retest approach, which provided reliability co-efficient of 0.86. Descriptive and inferential statistics were used to analyze the data. The study question was answered using mean and standard deviation, while all the hypotheses were tested using a t-test statistical analysis tool at 0.05 level of significance. The results revealed that before the treatment, there was no significant difference between the mean scores of students in Science, Technology, and Mathematics in the experimental and control groups. The results also demonstrated that the pre-test and post-test mean scores of students exposed to STM using the WhatsApp Group Learning Platform and those exposed to traditional methods differed significantly. Based on the findings, it was recommended that the WhatsApp Group Learning Platform should be used to improve students' performance in STM.

Key words: Science, technology, mathematics, WhatsApp, learning platform, students.

INTRODUCTION

Education is a tool for societal moral, intellectual, cultural, and social development. The importance of education to both individuals and society cannot be overstated.

Individuals and governments have been putting money into education because of its importance in promoting societal technological re-awakening (Ekundayo, 2020). In

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a developing country like Nigeria, education is a top priority for the federal, state, and local governments, as well as citizens. Education is seen as an instrument for change and a path to social, political, scientific, technological, and economic excellence.

STM is essential for the growth of science and technology in any civilization; as a result, no society can hope to survive without embracing Science and Technology. STM is a combination of disciplines that form the basis of human and environmental development. In Nigeria, Computer Studies also referred to as Basic Technology is a subject that is taught at all levels of education. The subject overlaps with Science and Mathematics. Though Basic Technology is often referred to as the application of science and mathematics yet many problems in the sciences, engineering, health care, business, and other professions are tackled effectively through the use of technology. The teaching of these three subjects in Nigerian schools is not always being handled properly. Most often, the teachers are so theoretical in their presentations with little or no practical manipulations; yet, these subjects are practical oriented (Federal Government of Nigeria, 2014). As a result of poor classroom interaction, students' performances have been consistently not encouraging (Ajayi et al., 2017). Hence, the need for innovations in the teaching of the subjects. Basic Technology is made compulsory for all students at the elementary school levels while it is optional at the higher levels. In high school, Computer Studies (Basic Technology alongside Science and Mathematics are frequently seen as career options (Frank and Quaxil, 2018). The three subjects are preferred in this study because they are subjects of emphasis in Nigeria for students at the middle schools called Senior Secondary Schools in the country. These three subjects are made compulsory in the curriculum of secondary education (Federal Government of Nigeria, 2014).

The teaching of Science, Technology, and Mathematics are unique in process and practice. They require a manipulative and constructive approach that makes the concepts concrete and practical. On this premise, the use of innovative strategies like the electronic classroom, virtual laboratory, and Social Media handles are gaining upper hands in Nigerian classrooms.

Virtually all homes and youths in Nigeria are now glued to the use of social handles, especially WhatsApp and this is taking a better part of their time daily. It is therefore of opinion that such handles which the students are much familiar with and most addicted to could be transformed into learning devices and environments to properly engage them in academic activities rather than social use only. The use of social handles especially and most common, WhatsApp is so rampant among the age bracket of youths in Senior Secondary Schools. For this purpose, the research focused on Senior Secondary School Students where the highest populations of social handle users are found.

Social media/networking, particularly one of its handles referred to as WhatsApp has been warmly received by all since its introduction, especially youths. Different institutions in Nigeria today, as well as others across the world, can speak to the fact that the majority of students and lecturers using mobile phones are engaged in online communication and social interactions. Social Media has become an important part of modern life. It provides a vastly expanded route for information delivery, exchange, and collaborative engagement between people and technology that is not limited by geography (Agui and Ogwueleka, 2018; Asur annd Huberman, 2010). People especially youths now spend more time online than in the "real world" for most of their day-to-day engagements. In most cases, individuals do use such strong and multifunctional platforms for mere audio and video communications only possible to reconnect with their old high schoolmates (Nikos, 2016).

There are numerous social media networking platforms to choose from. These include Beboin in the United Kingdom and Cyworld in Korea. The most popular and extensively used social networking sites in Nigeria are Facebook, Google+, Linkedin, WhatsApp, Instagram, Reddit, Telegram, Messenger, Twitter, YouTube, Google+, Zoom, and Skype (Ajayi, 2020a). All of these platforms might be turned into productive learning environments to improve student engagement in academic activities to bring about enhanced performance.

Social media network sites are online-based sites that allow video and audio conferencing, screen sharing, two-way communication, and manipulation. Common social media sites in Nigeria include WhatsApp, Zoom, Google Classroom, Google Docs, Google Forms, AZ Recorder, Cisco Web-Ex, Team Viewer, and Join Me, Messenger, Apache, OpenMeeting, Google Hangouts, GoToMeeting, Skype, Mikogo, WeChat, Screenleap, AnyMeeting, Discord, JitsiMeeting, Proficonf, UberConference, Other social media network applications are just a few examples of (Ajayi, 2020b).

Due to the popularity and general use of the WhatsApp platform among Nigerian youths the platform could be turned into a mobile classroom in which all students are registered to participate in the learning activities. WhatsApp has several tools like Live videos, Photos, Events, Files, Albums, Announcements, and Watch parties among other features which are suitable for classroom activities (Ajayi, 2020a).

WhatsApp handle in recent years has transformed communication and this could make teaching and learning activities easier. The WhatsApp platform is one of the most significant communication tools among teenagers. It is a term that is frequently used to describe an approach that combines online and in-person learning experiences. WhatsApp is a mobile application that allows users to communicate with one another using a smartphone or a computer (Edglossary, 2016). Educators

are in recent years advocating the importance of WhatsApp handle in the classroom. The use of WhatsApp facilitates communication, and education is nothing more than communication in its most basic form.

Teachers can use WhatsApp to communicate with their students more swiftly and effectively. It can also help students to communicate better in any given environment (Muhammed and Umar, 2021). The group chat features can be used to coordinate learning and studies within and outside the school premises to produce lessons that could be listened to at students' leisure, and maintain constant contact with students outside of the classroom.

When students are encouraged to participate in learning and research through social networks, it might provide possibilities for them to develop teamwork and communication skills as well as create a learning environment in which they can be self-directed learners (Oriji and Anikpo, 2019). WhatsApp is a free, limitless messaging tool that may be used in and out of the classroom. WhatsApp Web is a web-based version of WhatsApp that allows you to utilize it directly over the internet. WhatsApp can be used to communicate with kids and parents who do not have access to traditional communication methods like landlines or email. With the use of WhatsApp groups, teachers can effortlessly and effectively manage large class sizes. It can help students acquire self-assurance.

A social networking site, sometimes known as a social website, is a website that allows users to engage, communicate, socialize, entertain themselves, and exchange information with others (Ajayi, 2020a). According to Mehjabin and Banu (2015), Mageto (2017), and Ngonso (2019), social networking activities are time-demanding and useless if they are not translated into meaningful academic pursuits. The fulfillment of a country's educational goals could be jeopardized by such social networking. Social networking refers to a confined setting in which people connect. At any time, this setting can be transformed into an academic learning environment suitable for remote learning, e-learning, virtual classrooms, and mobile classrooms.

Purpose of the study

The purpose of this study was to investigate the effects of the WhatsApp Group Learning Platform on Senior Secondary Schools Students' Learning Outcomes in Computer Studies in Ekiti State, Nigeria. The process of teaching-learning in Nigeria is more of rote learning and this is limiting the application skills among the 'product' of such 'process'. Most youths in Nigeria are not entrepreneurial-oriented; they are not problem solvers as a result of the kind of exposure given to them while in school. Most teachers are not innovative in their teaching Concepts are most often taught theoretically with little or no moment of manipulations throughout teaching.

This study thought that the use of the WhatsApp Group Learning Platform could tackle most of the challenges faced by teaching the concepts in STM properly and appropriately. The study would possibly enhance the students' performance in the subjects.

Research Question

This research question was raised and answered to guide the study:

1. What is the performance of students in STM before and after the treatment?

Research Hypotheses

The following null hypotheses were generated for the study:

1. There is no significant difference in the pretest performance mean score of students in STM in experimental and control groups.
2. There is no significant difference between the performances mean scores of students exposed to STM through the WhatsApp Group Learning Platform and those exposed to the conventional method.
3. There is no significant difference between the retention of students exposed to STM through the WhatsApp Group Learning Platform and those exposed to the conventional method.

RESEARCH METHOD

A two-group pre-test, post-test, control quasi-experimental research design was used in this study. The quasi-experimental approach allows for the employment of experimental and control groups, with the experimental group being exposed to the use of the WhatsApp Group Learning Platform while the control group is taught by their normal teacher using traditional methods. To ensure homogeneity, the experimental and control groups were given a pre-test.

After the treatment had been carried out on the experimental group, a post-test was conducted on the two groups to determine the performance across the two groups.

The population for this study included all 53,562 students in Senior Secondary School two (SSS II) in all Secondary Schools across the Ekiti State's sixteen Local Government Areas (Ekiti State Ministry of Education, 2021). Because of S.S.S. II students not preparing for any external examinations at the time of this research, they are anticipated to be more prepared and available for study.

The sample consisted of 100 S.S.S. II students from two public secondary schools in Ekiti State who were offering core Science subjects, Computer Studies, and Mathematics. Multistage sampling techniques were used in selecting the sample. In stage one; a simple random sampling technique was used to determine two Local Government Areas in the state. Stage two involved the selection of a secondary school each from the two Local Government Areas through a simple random sampling technique. In stage three, the purposive sampling technique was adopted in the selection of students who were offering the three subjects in the two

Table 1. Mean and standard deviation of pre-test and post-test scores of students exposed to WhatsApp Group Learning Platform and conventional method.

Strategies	Test	N	Mean	S.D	Mean Diff.
Social Media	Pre-Test	52	12.40	1.35	9.47
	Post Test		21.87	3.51	
Conventional	Pre-Test	48	12.29	1.50	1.11
	Post Test		13.40	1.55	
Total		100			

Source: SPSS analysis of data collected through STMPT

Table 2. t-test analysis of the difference in the pre-test performance mean scores of students in experimental and control groups before the treatment.

Variation	N	Mean	SD	df	t_{cal}	P
Experimental	52	12.40	1.35	98	0.394	0.695
Control	48	12.29	1.50			

*$p>0.05$
Source: SPSS analysis of data collected through STMPT

schools previously selected for the study. 50 students were selected from each school totaling 100 students used in the study. In stage four, a simple random sampling technique was used to select the school that served as the experimental group while the second school automatically became the control group.

The instrument used in this study was a Science, Technology, and Mathematics Performance Test (STMPT). It was self-designed by the researchers using the curricula contents of the three subjects. The current contents of the curriculum at the time of carrying out the research were adopted. The instrument comprised ten items each from the STM subjects amounting to 30 multiple-choice items extracted from the past questions of the West Africa Examinations Council (WAEC) which is the body responsible for the conduct of the final year examinations in Nigeria. The researchers ensured that the items extracted were those covered by the contents used in this study. Each of the items with the correct choice was allotted one mark while any item with the wrong choice was scored zero. The test-re-test approach was used to determine the instrument's reliability. The instrument was given out twice over two weeks on 40 students who were not included in the study's sample. Pearson's Product Moment Correlation method was used to analyze the data collected with the STMPT. The analysis of the data yielded a reliability coefficient of 0.86 which was high enough to adjudge the instrument as trustworthy and appropriate for the study.

RESULTS

Before the treatment, the instrument (STMPT) was administered to the two groups to elicit the pretest scores. After the treatment, the instrument was re-administered to elicit the posttest scores. After a space of two weeks, the instrument was again administered to the groups to obtain the retention scores. The pretest, posttest, and retention scores served as the data analyzed to answer the question and test the research hypotheses.

Descriptive and inferential statistics were used to analyze the data acquired. Means and Standard Deviation were used to answer the study questions. The t-test was used to test all of the hypotheses at 0.05 level of significance.

Research Question 1: What is the performance of students in STM before and after the treatment?

Table 1 shows that the difference in the pretest and post-test performance mean scores of students in the experimental group is 9.47 while the difference in the pretest and post-test performance mean scores of the control group is 1.11. This outcome indicates that the usage of a WhatsApp Group Learning Platform employed in the teaching of Science, Computer Studies, and Mathematics has an impact on students' performance. The use of the WhatsApp Group Learning Platform has the potential to enhance students' performance in STM.

Test of Hypotheses

Hypothesis 1: There is no significant difference in the pretest performance mean score of students in STM in experimental and control groups.

The P-value = (0.695) is greater than the value (0.05) > 0.05, as shown in Table 2. This implies that both experimental and control groups performed equally before the treatment. Therefore, the hypothesis was not rejected. There was no significant difference in the performance mean score of students in STM in the experimental and control groups. Both groups of pupils

Table 3. t-test analysis of the difference in the post-test performance mean scores of students in experimental and control groups after the treatment.

Variation	N	Mean	SD	Df	t_{cal}	P
Experimental	52	21.87	2.51	98	20.07*	0.000
Control	48	13.40	1.55			

*p<0.05
Source: SPSS analysis of data collected through STMPT

Table 4. t-test analysis of the difference in the retention mean scores of students in experimental and control groups after the treatment.

Variations	N	Mean	SD	Df	t_{cal}	P
Experimental	52	20.83	3.41	98	14.37*	0.000
Control	48	12.83	1.65			

*p<0.05.
Source: SPSS analysis of data collected through STMPT

did equally well. This shows that the two groups are homogeneous.

Hypothesis 2: There is no significant difference between the performances mean scores of students exposed to STM through the WhatsApp Group Learning Platform and those exposed to the conventional method.

Table 3 reveals that the P-value (0.000) is less than 0.05. As a result, the null hypothesis was rejected. The performance mean scores of students exposed to STM using WhatsApp Group Learning Platform and those exposed to traditional methods differ significantly. Students who were exposed to the WhatsApp Group Learning Platform performed better in STM than students who were exposed to the traditional technique.

Hypothesis 3: There is no significant difference between the retention of students exposed to STM through the WhatsApp Group Learning Platform and those exposed to the conventional method.

Table 4 reveals that the P-value (0.000) is less than 0.05. Therefore, the null hypothesis was rejected. There was a significant difference in the retention mean scores of students exposed to STM using the WhatsApp Group Learning Platform and those exposed to traditional methods. Students who were exposed to the WhatsApp Group Learning Platform were able to retain what they have learned in STM better than students who were exposed to the traditional technique.

DISCUSSION

Based on the findings of this study, there was no significant difference in the pre-test mean scores of students in STM when exposed to the WhatsApp Group Learning Platform and the group not so exposed. This finding proved the homogeneity of the two research groups before the treatment.

The findings of the study also revealed a significant difference in performance mean scores between students who were taught STM using the WhatsApp Group Learning Platform and those who were taught with the conventional method. Students who were exposed to the WhatsApp Group Learning Platform performed well than students who were exposed to STM through the traditional methods. This might be because the students were already used to the consistent interactions among their peers through WhatsApp social handles. It was possible and easy for them to collaborate, share ideas, and source more information on the concepts through the internet. They build better confidence working through the medium they are already familiar with. The opportunity of working alone or with a peer of their own choice was also an added advantage. There are earlier studies of similar findings by Ajayi (2020b) who in his study found out that students develop a better attitude towards the learning of science using WhatsApp Group Class and this enhances their performance. Tulika and Dhananjay (2014) and Khurana (2015) found that a Social Media handle can help students and enhance their academic performance in Biology and other science courses.

The findings also showed that students exposed to STM using the WhatsApp Group Learning Platform had significantly higher retention mean scores than students exposed to traditional techniques. According to the findings of this study, students that were exposed to the WhatsApp Group Learning Platform retained what was learned for a more extended period than their counterparts in the control group. This indicates that using the WhatsApp Group Learning Platform to teach STM is more effective for classroom interaction and has a

significant effect on students' retention abilities. Students were able to retain what they learned for some time. This finding is in support of Ajayi (2020b) who further opined that this could be because a simple and familiar platform was used in disseminating the contents to the students. Also, the teaching was direct and concrete. There was no need for rote learning. The finding also supported by Smit (2012) had earlier discovered that the application of social media in classroom activities has the potential to improve learning and academic performance, also, Abdulla (2017) discovered that social media has a positive impact on academic performance, with 57% of the students sampled preferring the WhatsApp mobile applications as a Learning Platform for academic purposes.

Conclusion

From the findings of the study, it was deduced that the use of the WhatsApp Group Learning Platform has effects on the students' performance and retention. Most students were conversant and comfortable with the use of the WhatsApp handle and this made it easy for them to concentrate with a positive attitude towards learning with full participation. This resulted in better performance in the subjects. The fact that the students were good in the manipulation and applications of the functions in the WhatsApp handle was an advantage that resulted in their good performance and retention.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

1. Secondary school students should be encouraged to apply the WhatsApp Group Learning Platform in their academic activities.
2. Teachers of STM should always incorporate the use of the WhatsApp Group Learning Platform in the delivery of classroom instruction to improve students' academic performance and retention in STM.
3. Teachers of Science, Technology, and Mathematics should be equipped with the knowledge of Social Media facilities and use of WhatsApp Group Learning Platform and encourage them to apply the same in all their classroom teachings and students' homework.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Abdulla JMD (2017). The impact of using social media and internet on academic performance: A case study of Bahrain Universities. EAI Endorsed Transactions on Scalable Information Systems 4:(13).

Agui UO, Ogwueleka FN (2018). Impact of social media on Students' Academic Performance. International Journal of Scientific and Engineering Research 9(3):1-10.

Ajayi PO, Ajayi LF, Oniya T (2017). Classroom dialogue as a panacea for improving students' learning outcomes and economic revitalization. EKSU Journal of Education 7(3):138-142.

Ajayi PO (2020a). Influence of WhatsApp Group Learning Platform on undergraduates' study habit in Basic Science Education in Nigerian Universities. EKSU Journal of Education 9(2):70-75.

Ajayi PO (2020b). Use of Facebook Group Class in enhancing postgraduates learning outcomes in Science Education. The International Journal of Humanities and Social Studies 8(5):260-264.

Asur S, Huberman BA (2010). Predicting the Future with Social Media. Social Computing Lab: HP Labs.

Edglossary R (2016). WhatsApp is a social media tool for teaching and learning in tertiary institutions in Nigeria. (Unpublished M.Ed dissertation). The University of Port Harcourt.

Ekundayo SK (2020). Application of Information and Communication Technology in the Teaching and Learning of Science in Secondary School in Ondo State. Unpublished Ph.D. Thesis), Ekiti State University, Ekiti State.

Frank R, Quaxil L (2018). Information technology and student academic performance in China. Advance Journal of Technological Management 4(8):67-79.

Federal Government of Nigeria (2014) National Curriculum for Senior Secondary School Science. Vol. 3. NERDC press, Lagos

Khurana N (2015). The impact of social networking sites on the youth. Mass Communicate Journalism 5:285.

Mageto J (2017). Impact of social media on the youths. Available online at https://www.grin.com/documents/358350

Mehjabin K, Banu WA (2015). An efficient method to detect communities in social networks using DBSCAN algorithm. Social Network Analysis and Mining 9(1):1-12.

Muhammed W, Umar F (2021). Use of WhatsApp for educational purposes. Online.

Ngonso BF (2019). Effect of social media on teenagers and youths: A study of rural Nigerian teenagers and youths in secondary schools. Global Media Journal 17(32):1-6.

Nikos P (2016). Innovation and technology business and economics approaches. Routledge.

Oriji A, Anikpo F (2019). Social media in teaching-learning process: Investigation of the use of Whatsapp in teaching and learning in University of Port Harcourt. European Scientific Journal 15(4):15-39.

Smit I (2012). WhatsApp with blackberry; Can messengers (BBM) be MXit? In Proceedings of the 14th annual conference on World Wide Web applications. Cape Town, South Africa.

Tulika B, Dhananjay J (2014). A study of students' experiences of mobile learning. Global Journal of Human-Social Science 4(14).