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EFFECTS OF WHATSAPP LEARNING PLATFORM ON ACADEMIC PERFORMANCE OF BIOLOGY EDUCATION UNIVERSITY UNDERGRADUATES IN EKITI STATE, NIGERIA

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Abstract

This study examined the effects of whatsapp learning platform on academic performance of Biology education University undergraduates in Ekiti State**.** The population consisted of 1,219 undergraduates studying Biology Education in the two public University in Ekiti State, Nigeria. The study sample consisted of 200 undergraduate students at the 200 level with purposive sampling technique. One research instrument tagged Biology Performance Test (BPT) was used to collect data on performance of undergraduates in biology. It consisted of 30 single-answer questions drawn from the course outline for Introductory Developmental and Cell Biology (BIO 205). The instrument comprised two sections: Section A captured the personal data of the respondents, while Section B consisted of 30 items. Correct option attracted 1mark and wrong option attracted zero mark. The validity of the instruments was ensured through expert review which was subjected to face and content validity checks**.** The reliability of the instrument was determined through pilot testing. It was administered to a group of students with similar characteristics to the study sample, but who were not part of the main study. The test- retest method was used to establish its stability over time, and a reliability coefficient of 0.82 was obtained, confirming its consistency in measuring students' performance in biology. The data collected analyzed using descriptive and inferential statistics. The research question was answered using descriptive statistics of mean and standard deviation. Hypotheses **1-2** were tested using t-test analysis. The two hypotheses were tested at 0.05 level of significant. The finding showed that there was no difference in the performance of students in the two groups before the treatment which means that both groups were homogeneous. The findings of this study also showed that undergraduates taught using the WhatsApp Learning Platform performed significantly better in Biology than those taught using the Conventional Method in Biology. It was therefore

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recommended Lecturers should consider incorporating the WhatsApp Learning Platform as a supplementary tool in teaching Biology to enhance student engagement and performance. Universities should provide training for lecturers on the effective use of digital platforms like WhatsApp to improve instructional delivery and students' performance.

Keywords; Whatsapp Learning Platform, Academic Performance, Lecturers, University Undergraduates, and Biology Education

Introduction

The world is rapidly transforming due to advancements in science and technology. In today's society, it is increasingly difficult to live without technology, as many individuals rely on gadgets such as mobile phones, tablets, and computers for their daily activities. Social networking platforms have become deeply ingrained in everyday life, with many people finding it challenging to go even a single day without using them. As technology evolves at an unprecedented pace, innovations once considered unrealistic are now part of daily reality.

The sciences which include Biology, Chemistry, Physics, and Mathematics are central to Nigeria's educational curriculum and essential to the nation's advancement in health, technology, and agriculture. Despite their importance, science education in Nigeria faces persistent challenges, including inadequate laboratory facilities, outdated equipment, and insufficient funding for research and development (Ajayi & Banjo, 2021).

These limitations often hinder students' engagement with scientific concepts at a practical level, which is particularly critical for disciplines like biology that rely on hands-on learning for deep understanding. Efforts to address these gaps have included partnerships with international organizations to strengthen science infrastructure in schools and universities; however, systemic reforms remain necessary to align Nigerian science education with global standards. Emerging

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trends in digital learning, such as mobile and online resources, present promising opportunities to complement traditional science instruction such as in learning of Biology (Owolabi and Julia. 2020).

Biology, defined as the scientific study of living organisms covering their growth, structure, function, distribution, taxonomy, and evolutionary tendencies encompasses both the physical and chemical aspects of life (Ahmed, 2020). It is among the most popular science subjects in Nigerian secondary schools, serving as a gateway to careers in medicine, pharmacy, and dentistry. At the University level and as a natural science, it integrates disciplines such as anatomy, ecology, and zoology, making it a vital component of general education. Nevertheless, both teachers and students often struggle with certain biological concepts, including genetics, respiration, ecology, photosynthesis, and evolution (West African Examination Council, 2016).

The complex and often abstract nature of biology presents unique challenges to student engagement. Effective learning in this subject requires practical activities, visual aids, and interactive approaches to help students grasp intricate biological processes (to Pratama and Yusro (2016). The performance of Biology Education undergraduates in some of the courses offered has not been encouraging. The teaching of Biology cannot be done effectively in classroom and in laboratory alone; online teaching should be incorporated to compliment it (Oniya T., 2018)

According to Pratama and Yusro (2016), online learning serves as a viable alternative in today's era of rapidly advancing technology and communication. The COVID-19 pandemic further underscored the necessity of adopting online models and applications to achieve learning objectives (Amal, 2019). This situation has heightened the importance of innovation in education

to sustain the progress of global learning systems (Hadi, 2015).

Innovation in online learning can be understood as updates or changes driven by the need to address challenges faced by individuals or groups, resolve emerging problems, and improve specific situations or processes within society (Indaryani & Suliworo, 2018). In the context of the COVID-19 pandemic, one effective approach is network-based learning, such as e-learning platforms developed by universities through institutional websites or the use of dedicated online applications (Prajana, 2017). This instructional model is grounded in a constructivist approach and leverages online social networks including blogs, wikis, photo-sharing platforms, video-sharing services, instant messaging, and social networking sites that are accessible to both students and teachers (Atiah, 2020).

Online learning tools or platforms like WhatsApp, with their multimedia-sharing capabilities, provide educators with tools to deliver diverse and engaging content that supports various learning styles. WhatsApp has become particularly prominent. Although the application has been available for several years, recent updates have enhanced its functionality since its initial release. Designed primarily to replace SMS, WhatsApp operates on internet data plans and is compatible with various devices, including Android, iPhone, Windows Phone, Nokia, and Blackberry, As an educational technology tool, social media promotes meaningful, qualitative interactions between learners and teachers, with WhatsApp serving as one of the most widely used platforms in this regard (Okereke, 2014).

The accessibility of learning materials anytime, anywhere, and in multiple formats through platforms like WhatsApp offers significant potential for enhancing students' deep learning

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capabilities.

WhatsApp Messenger is a widely used social media platform that functions as an instant messaging service (Mistar & Embi, 2016). It has gained global popularity as a communication tool for individuals and groups. As an internet-based instant messaging application, WhatsApp offers more advanced features than traditional SMS, including multimedia and file-sharing capabilities (Kurniawati, Maolida, & Anjaniputra, 2018). In the context of education, WhatsApp holds significant potential as a learning DOl. Its growing use in both schools and higher education institutions reflects its adaptability for academic purposes. Surveys indicate that approximately 90% of students, as well as many lecturers, use WhatsApp regularly in their daily lives, including for learning activities.

Even if there are a lot of online resources and free study materials available, research and reviews from different colleges have repeatedly shown that many students' self-study abilities and schedules are not academically outstanding. A large number of students, especially those majoring in Biology, don't appear to understand or make use of these platforms, which are meant to improve learning and promote independent study. The disparity in students' ability to acquire and effectively use resources might significantly impact their academic performance. Due to the foregoing, the researcher is aiming at investigating effects of Whatsapp learning platform on academic performance of Biology education University undergraduates in Ekiti State.

Purpose of the Study

The purpose of this study was to investigate the effects of whatsapp learning plateforrn on academic peformance of undergraduates in biology education in Ekiti State, Nigeria. The study

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specifically;

1. investigated the performance of undergraduates in Biology before and after exposure to the WhatsApp Learning Platform and the Conventional Method;
2. determined the difference in performance of undergraduates taught using the WhatsApp Learning Platform and those taught using the Conventional Method in Biology;
3. examined the interactive effects of the WhatsApp Learning Platform and gender on undergraduates' performance in Biology.

Research Question

The following research questions were raised to guide this study:

1. What is the performance of undergraduates in Biology before and after exposure to Whatsapp learning platform and conventional method?

Research Hypotheses

The following hypotheses were formulated and tested in this study:

1. There is no significant difference in the performance of undergraduates in the experimental and control groups before exposure to treatment in Biology.
2. There is no significant difference in the performance of undergraduates taught using the WhatsApp Learning Platform and those taught using the Conventional Method in Biology.

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Statement of the Problem

In many Nigerian universities, lecturers and students continue to rely heavily on the conventional face-to-face method of instruction for teaching Biology. During lectures, large class sizes, limited time for detailed explanations, and insufficient opportunities for individual follow-up often make it challenging for students to grasp certain biological concepts deeply. This sometimes results in minimal participation, hurried coverage of topics, and restricted feedback between lecturers and students. Informal observations in some undergraduate Biology classes reveal that while some students appear attentive during lectures, others seem disengaged, possibly due to the fast pace of delivery or the lack of opportunities to review learning materials outside the classroom.

The researcher observed that University Biology undergraduates' academic performance has not been encouraging in some of their Biology courses which made a larger percentage of them to be graduating with Second Class Lower and Third Class.

Students who miss classes for genuine reasons often find it difficult to catch up, relying mainly on classmates' notes, which may be incomplete or inaccurate. With the increasing availability of smartphones and social media applications among undergraduates, platforms like WhatsApp have become common channels for personal communication. Some lecturers have begun experimenting with these tools to share materials, send reminders, and hold discussions beyond lecture hours.

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https://ijojournals.com/ Volume 09 || Issue 06 || June, 2026 ||

Delimitation of the Study

The study was delimited to the effects of the WhatsApp Learning Platform on 200-level Biology education undergraduates in public Universities located in Ekiti State, Nigeria. It was also delimited to the specific concepts taught during the experimental phase of the study in Biology 205. These concepts include introductory developmental and cell biology, covering topics such as the history and current trends in cell biology, reproduction, cell division, cell differentiation, cell growth, the molecular basis of cell structure and development, organelles, proteins, and nucleic acids.

Research Design

This study adopted a two group quasi-experimental research of the pre-test, post-test and control group design. The design will employ the effects of independent variable on the dependent variable. Academic performance will be established by pre-test which will be conducted on both the experimental group and control group to ascertain the homogeneity. Post-test will be conducted after the treatments had been administered to measure the effect of the treatment on the performance of the student in both experimental and control group'. While the control group would be exposed to convectional teaching method the experimental group on the other hand would be exposed to treatment using Whatsapp learning platform (WLP). The design is diagrammatically represented bellow:

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https://ijojournals.com/ Volume 09 || Issue 06 || June, 2026 ||

Population

The population for the study consisted of all the 1,219 undergraduates studying Biology Education in all the Public University in Ekiti State, Nigeria. The choice of 200Level Biology Education students seems to be more appropriate because they will be readily available for the treatment being not engage in teaching practice or undergraduate project research.

Sample and Sampling Techniques

The study sample consisted of 200 undergraduate students at the 200 level, drawn from two public Universities in Ondo State, Nigeria. A purposive sampling technique was employed in selecting the sample. The three Universities were chosen because they offered Introductory Developmental and Cell Biology (BIO 205) as part of their Biology Education curriculum, with little or no variation in course content and academic calendar. Purposive sampling was considered appropriate as it ensured the selection of a sample that was directly relevant to the study objectives and had uniform exposure to the course.

Research Instruments

One research instrument was employed to generate data for the study, namely the Biology Performance Test (BPT). It was used to assess the performance of undergraduates in biology. It consisted of 30 single-answer questions drawn from the course outline for Introductory Developmental and Cell Biology (BIO 205). The instrument comprised two sections: Section A captured the personal data of the respondents, while Section B consisted of 30 items. Correct

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https://ijojournals.com/ Volume 09 || Issue 06 || June, 2026 ||

option attracted 1mark and wrong option attracted zero mark.

Validity of the **Instruments**

The validity of the instruments was ensured through expert review. It was subjected to face and content validity checks. Drafted copies of the instrument was presented to three experts in Science Education and Test Measurement and Evaluation. Their suggestions and corrections were used to refine the test items and questionnaire to ensure clarity, relevance, and alignment with the study objectives.

Reliability of the Instrument

The reliability of the instrument was determined through pilot testing. The Biology Performance Test (BPT) was administered to a group of students with similar characteristics to the study sample, but who were not part of the main study. The test- retest method was used to establish its stability over time, and a reliability coefficient of 0.82 was obtained, confirming its consistency in measuring students' performance in biology.

Experimental Procedure

The experimental procedure for this study was carried out over a period of six weeks and involved three main stages: pre-treatment, treatment, and post-treatment. Research assistants were engaged throughout the study to help administer tests, monitor the treatment, and ensure adherence to the experimental protocol.

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https://ijojournals.com/ Volume 09 || Issue 06 || June, 2026 ||

Pre- Treatment Stage: At this stage, the instrument was administered as pre-test to determine their baseline performance in the Introductory Developmental and Cell Biology (BIO 205) course. Research assistants helped in distributing and collecting the tests, as well as clarifying instructions to ensure uniform understanding among the sample.

Treatment Stage: During the treatment stage, the experimental group was exposed to the WhatsApp Learning Platform. The platform was used to deliver lectures, share notes, assignments, and facilitate discussions for a specified period, while the control group continued with the conventional face-to-face instructional method. Research assistants supported the experimental group by monitoring activity on WhatsApp, reminding students of assignments, and providing technical guidance when needed. The treatment lasted for six weeks.

Post- Treatment Stage: At the conclusion of the treatment, both the experimental and control groups were administered the BPT again as a post-test to assess any differences in performance. Research assistants assisted in administering the tests and ensuring proper completion.

Data Analysis

The data collected analyzed using descriptive and inferential statistics. The research question was answered using descriptive statistics of mean and standard deviation. Hypotheses **1-2** were tested using t-test analysis. The two hypotheses were tested at 0.05 level of significant.

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https://ijojournals.com/ Volume 09 || Issue 06 || June, 2026 ||

Results

Descriptive Analysis

Research Question 1: What is the performance of undergraduates in Biology Education before and after exposure to Whatsapp learning platform and conventional method?

Table 1: Means and Standard Deviation of performance of students in Biology before and after treatment

Group	N	Mean (Before)	SD (Before)	Mean (After)	SD (After)	Mean Difference
Whatsapp Learning Platform	108	'55.20	8.50	75.60	7.20	20.40
Conventional Method	92	54.80	7.90	68.50	8.10	13.70

Table 1 reveals that undergraduate students exposed to both the WhatsApp Learning Platform and the Conventional Method showed improvement in their Biology performance after treatment. For the WhatsApp Learning Platform group, the mean score rose from 55.20 (SD = 8.50) before treatment to 75.60 (SD = 7.20) after treatment, indicating a mean gain of 20.40. In comparison, the Conventional Method group improved from a mean score of 54.80 (SD = 7.90) before treatment to 68.50 (SD = 8.10) after treatment, with a mean gain of 13.70. Although both methods enhanced students' performance, the WhatsApp Learning Platform yielded a higher mean improvement, suggesting greater effectiveness in boosting learning outcomes in Biology.

Testing of Hypotheses

Hypothesis 1

There is no significant difference in the performance of undergraduates in the experimental and control groups before exposure to treatment in Biology.

Table 2: t-test analysis of the difference in the performance of undergraduates in the experimental and control groups before exposure to treatment in Biology

Group	N	Mean	SD	df	T	p
Whatsapp Learning Platform	108	'55.20	8.50			
Conventional Method	92	54.80	7.90	198	0.34	0.75

p> 0.05 (Not Significant)

Table 2 shows that before treatment, the Whatsapp Learning Platform group had a mean performance score of 55.20 (SD = 8.50), while the conventional method group had a mean of 54.80 (SD= 7.90). The t-test result (t= 0.34, df=198, p=0.73. This indicates that the differences between the two groups was not statistically significant (p> 0.05). This means that both groups were comparable in their Biology performance at the pre-test stage, supporting the null hypothesis that there is no significant difference in the performance of undergraduates in the experimental and control groups before exposure to treatment in Biology

Hypothesis 2

There is no significant difference in the performance of undergraduates taught using the WhatsApp Learning Platform and those taught using the Conventional Method in Biology.

Table 3: t-test analysis of the difference in the performance of undergraduates taught using the WhatsApp Learning Platform and those taught using the Conventional Method in Biology

Group	N	Mean	SD	df	t	p
Whatsapp Learning Platform	108	75.60	7.20	198	6.56	0.0001
Conventional Method	92	68.50	8.10			

P< 0.05 (Significant)

Table 3 shows that after treatment, the Whatsapp Learning Platform group had a mean performance score of 75.60 (SD = 7.20), while the conventional method group had a mean of 68.50 (SD= 8.10). The t-test result (t= 6.56, df=198, p=0.0001. This indicates that the differences between the two groups was statistically significant (p< 0.05). Hence, the hypothesis was rejected. This means that undergraduates taught using the WhatsApp Learning Platform performed significantly better in Biology than those taught using the Conventional Method in Biology

Discussion

The study revealed that undergraduates' performance in Biology improved under both the WhatsApp Learning Platform and the Conventional Method, with a markedly greater enhancement in the WhatsApp group, a result consistent with Adewale and Oladipo (2023) and corroborated by Bello et al. (2022), who found that WhatsApp's interactive and flexible nature enhances comprehension and retention, although Akinbo and Musa (2021) cautioned that unstructured mobile use may cause distractions.

The finding of the study reveals that there was no significant difference in Biology performance between the experimental and control groups before treatment, indicating they were comparable at baseline. This is consistent with Adeyemi (2022) and corroborated by Afolabi and Adesope

(2021), who emphasized that establishing equivalence in pre-test scores is essential for ensuring that post-intervention differences can be attributed to the treatment rather than pre-existing disparities. The absence of initial differences could be due to similarities in the participants' prior exposure to Biology, learning environments, and access to instructional resources, which aligns with the principles of quasi-experimental design (Adeyemi, 2022). However, contrasting views, such as those of Oladipo (2020), suggest that variations in baseline performance may occur in heterogeneous populations, implying that the homogeneity observed in this study might reflect the relatively uniform educational background of the sampled students. The implication of this finding is that it strengthens the internal validity of the research and supports the reliability of the post-treatment comparisons, providing a sound basis for drawing conclusions about the effectiveness of the WhatsApp Learning Platform.

The finding of the study revealed that undergraduates taught using the WhatsApp Learning Platform performed significantly better in Biology than those taught using the Conventional Method. This is in is in consonant with Akande and Adebola (2023) and consistent with Adewale and Oladipo (2023), who both reported that integrating mobile learning tools such as WhatsApp into science instruction enhances students' comprehension, retention, and overall academic performance. This superior performance may be attributed to the interactive nature of WhatsApp, which enables real-time feedback, peer collaboration, multimedia resource sharing, and flexibility for learners to revisit materials at their convenience features that align with constructivist learning principles. However, contrasting evidence from Igbo and Danjuma (2021) suggests that mobile learning does not always yield significant performance gains, particularly when learners have

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https://ijojournals.com/ Volume 09 || Issue 06 || June, 2026 ||

limited digital literacy or when instructional content is poorly structured for mobile delivery. In the present study, the positive outcome may have been influenced by the students' familiarity with WhatsApp, the quality of the instructional design, and the sustained engagement facilitated by constant connectivity. The implication of this finding is that integrating WhatsApp into Biology instruction could serve as a cost-effective and accessible strategy to improve learning outcomes, especially in resource-constrained BPT showed a test-retest reliability coefficient of 0.82, indicating stability.

Conclusion

The study concluded that the use of the WhatsApp Learning Platform (WLP) significantly enhanced undergraduates' performance compared to the Conventional Method. Hence, integrating WhatsApp as a learning tool will be an effective strategy for improving academic performance and student engagement in Biology education.

Recommendations

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

1. Lecturers should consider incorporating the WhatsApp Learning Platform as a supplementary tool in teaching Biology to enhance student engagement and performance.
2. Universities should provide training for lecturers on the effective use of digital platforms like WhatsApp to improve instructional delivery and students' performance.
3. Educational planners and curriculum developers should explore ways to integrate mobile learning strategies into Biology courses to complement conventional teaching methods.

4. Students should be encouraged to actively participate in online learning platforms to maximize collaborative learning, knowledge sharing, and peer support.

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