Lecturers' Extent of Awareness and Utilization of WhatsApp for Teaching Integrated Science Courses in Tertiary Institutions in Enugu State, Nigeria

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Abstract
The research investigated the extent of awareness and utilization of the WhatsApp platform among lecturers for teaching integrated science courses in tertiary institutions across Enugu State, Nigeria. Employing a descriptive survey design, the study targeted a population of 112 integrated science lecturers within these institutions. A sample of 23 lecturers was selected from two institutions in Enugu State via simple random sampling. Data collection relied on a researcher-structured questionnaire, validated through face validation techniques. The instrument's reliability was established using Cronbach's Alpha technique, yielding a coefficient of 0.77. Data analysis involved computing the mean and standard deviation using mean and standard deviation, with hypotheses tested using a t-test at a significance level of 0.05. The results indicated a high awareness and utilization of WhatsApp among lecturers for teaching integrated science in Enugu State's tertiary institutions. Furthermore, gender was found to have no significant impact on lecturers' awareness and utilization of WhatsApp for teaching integrated science courses in tertiary institutions.

Keywords*: Awareness; Gender; Integrated Science; Tertiary Institutions; WhatsApp Utilization*

Introduction

Ensuring universal access to quality education stands as a cornerstone for fostering global peace and prosperity. Education equips individuals with the requisite knowledge and skills to navigate and contribute to our rapidly evolving society. Education encompasses the accumulation of knowledge and the enlightenment of intellect through various experiences. Within tertiary institutions, education encompasses a broad spectrum of programs designed to facilitate specialization in diverse fields, among which Science education holds significant recognition.

Science education constitutes a distinct domain within the educational landscape, dedicated to the instruction and comprehension of scientific principles across various disciplines. Its focal point lies in fostering scientific literacy among students through experiential learning, involving activities such as planning, observation, analysis, and experimentation. Given its pertinence to everyday life and its role in addressing contemporary societal challenges, science education has prompted the introduction of specialized disciplines aimed at fostering deeper understanding. Integrated Science Education emerges as one such discipline, designed to equip prospective educators with the knowledge and pedagogy necessary for integrating scientific concepts into

primary and junior secondary school curricula, thereby encouraging scientific development.

The integrated science curriculum, as outlined by the Federal Republic of Nigeria (2013), synthesizes diverse scientific domains such as Biology, Chemistry, Physics, Astronomy, Geology, and Environmental sciences, offering a holistic perspective on scientific inquiry. Within universities, integrated science programs play a pivotal role in preparing students for careers in teaching. Notably, the efficacy of teaching methodologies and academic performance is intricately linked to various factors, including the quality of educators, teaching processes and strategies (Mbonu-Adigwe & Ude, 2023), administrative efficacy, and the learning environment (Usman & Madudili, 2019).

Amidst challenges confronting the educational sector, educators have sought alternative means of instruction, transcending traditional classroom settings. In this digital age, social media platforms such as WhatsApp have emerged as valuable tools for facilitating educational endeavors. WhatsApp, distinguished by its versatility and user-friendly interface, offers educators and learners a conducive environment for interaction and knowledge dissemination.

The ubiquity of WhatsApp presents a paradigm shift in educational communication, influencing both learning dynamics and instructional approaches. Studies by Bouhnik and Deshen (2014) and Hamiyet (2016) underscore the platform's efficacy in facilitating collaborative learning and enhancing student engagement. Moreover, WhatsApp's integration into educational settings has been associated with positive outcomes, ranging from increased social interactivity to enhanced learning experiences (Bansal & Joshi, 2014; Mistar & Embi, 2016).

Educators can leverage WhatsApp's features to cater to diverse learning needs, accommodating students with varying learning preferences and abilities. WhatsApp's asynchronous and synchronous communication capabilities, as highlighted by Abaido and El-Messiry (2016), offer a flexible platform for fostering inclusive learning environments. Additionally, WhatsApp's multimedia capabilities facilitate multimodal learning experiences, catering to the needs of visually impaired and attention deficit students (Boyinbode, Agbonifo, & Ogundare, 2017)

Gender dynamics also play a significant role in shaping educators' utilization of WhatsApp for teaching. Research indicates varying patterns of social media usage among male and female instructors, with females exhibiting a greater propensity for employing social media learning tools (Alqarni & Alqarni, 2020; Kasuma, 2017; Mahdi & Al-Dera, 2013). However, both genders demonstrate a positive attitude towards integrating WhatsApp into teaching practices, underscoring its potential as a versatile educational tool.

Against this backdrop, this study aims to assess lecturers' awareness and utilization of WhatsApp for teaching integrated science courses in tertiary institutions in Enugu State, shedding light on the intersection of technology, education, and gender dynamics in contemporary pedagogical practices.

Research questions

The following research questions guided the study.

1. What is the extent to which Lecturers are aware of the use of the WhatsApp platform for teaching

integrated science courses?
2. What is the influence of gender on lecturers' extent of awareness of the WhatsApp platform for teaching integrated science courses?
3. What is the extent to which lecturers utilize WhatsApp for teaching integrated science courses?
4. What is the influence of gender on lecturers' extent of utilization of the WhatsApp platform for teaching integrated science?
5. What are the challenges facing the effective utilization of WhatsApp in teaching integrated science courses?
6. What possible ways can be used to ameliorate the challenges facing the use of the WhatsApp platform for teaching integrated science?

Hypotheses

The following hypotheses guided the study and were tested at 0.05 level of significance.

$H0_1$: There is no significant influence of gender on lecturers' extent of awareness of use of the WhatsApp platform in teaching Integrated Science courses.

$H0_2$: There is no significant influence of gender on lecturers' extent of utilization of the WhatsApp platform for teaching Integrated Science courses**.**

Methods

The study employed a descriptive survey research design to explore lecturers' awareness and utilization of WhatsApp for teaching integrated science courses in tertiary institutions. This design, as outlined by Ezeh (2015) and Nworgu (2018), involves describing and explaining present conditions by gathering data from a representative sample using questionnaires.

Thirteen tertiary institutions in Enugu State were selected for the study, comprising two federal universities, five state-owned institutions, and six private institutions. The population included 112 integrated science lecturers from these institutions. The choice of institutions was strategic, considering their high usage of social media platforms and the challenges posed by large student numbers and inadequate physical classrooms.

Data collection utilized a researcher-structured questionnaire titled "Awareness and Utilization of WhatsApp Platform for Teaching Integrated Science (AUWTIS)." The questionnaire comprised two sections: the first capturing lecturer biodata and the second containing clusters of questions measuring awareness, utilization, challenges, and potential solutions regarding WhatsApp usage. A four-point Likert scale and frequency rating system were employed.

To ensure the questionnaire's validity, three experts from the Department of Science Education at the University of Nigeria, Nsukka, validated the instrument through face validation. Their feedback guided refinements in drafting the final questionnaire. Reliability testing using Cronbach's Alpha yielded a coefficient of 0.77, affirming the instrument's suitability. Both hard and soft copies of the questionnaire were distributed to respondents, allowing flexibility in response submission. Hard copies were collected onsite, while online submissions via Google Forms were channeled to the database for analysis.

Research questions were addressed using mean and standard deviation, while hypotheses were tested using a t-test at a significance level of 0.05. The mean ranges provided a structured

interpretation framework for the responses, facilitating a nuanced understanding of lecturers' perspectives. The mean ranges are as follows
0.0—1.0----not/Never/strongly disagree
1.1—2.0---- slightly/rarely/disagree
2.1—3.0----aware/Often/ agree
3.1—4.0--- extremely/Always/ strongly agree

RESULTS

Research Question One: What is the extent to which Lecturers are aware of the use of the WhatsApp platform for teaching integrated science courses?

Table 1: Mean and Standard Deviation rating of the extent of Lecturers' awareness level of the use of the WhatsApp platform for teaching Integrated Science courses in Enugu state.

Item Statement	Mean	Std. Deviation	Remark
1. WhatsApp can be installed/ used on a mobile phone	3.61	0.84	High extent
2. WhatsApp can be integrated into the teaching of integrated science	3.48	0.59	High extent
3. Lecturers love using WhatsApp to teach integrated science	2.35	1.07	Low extent
4. There are several benefits to using WhatsApp as a teaching tool	3.17	0.72	High extent
5. Lecturers can get information on how to innovatively use WhatsApp in teaching integrated science	3.09	0.79	High extent
6. Colleagues usually discuss the potential use of WhatsApp for the teaching of integrated science	2.83	0.84	High extent
7. There are several privacy/security considerations in using WhatsApp for educational purposes	3.04	0.83	High extent
8. The features of WhatsApp can be useful for educational purposes	2.96	0.77	High extent
9. WhatsApp can enhance students' engagement in the classroom	3.17	0.83	High extent
Grand mean and standard deviation	3.07	0.81	High extent

Table 1 shows lecturers' responses on the extent of awareness of the use of the WhatsApp platform for teaching integrated science courses in tertiary institutions in Enugu state. The lecturers agreed that they are aware that the WhatsApp platform can be integrated into teaching of integrated science as captured in item two (2) with a mean of 3.48 and a standard deviation of 0.59. Since the mean is greater than the cutoff point of 2.5, it is therefore implying that lecturers are aware of the item. It is also seen in item statement three (3) with a mean score of 2.35 and a standard deviation of 1.07 that lecturers don't like using WhatsApp to teach integrated science. Similarly, the remaining 7 items have mean scores ranging from 2.83 to 3.61 and standard deviations ranging from 0.72 to 0.84. Since their mean is greater than 2.5, which is the cutoff point. This implies that lecturers are aware of the WhatsApp platform for teaching.

Research question two: To what extent do lecturers utilize WhatsApp for teaching integrated science courses?

Table 2: Mean and Standard Deviation rating of lecturers' extent of utilization of WhatsApp platforms for teaching integrated science courses

Item Statement	Mean	Std. Deviation	Remark
1. I use WhatsApp to share educational resources such as articles and links with my students	3.61	0.58	High extent
2. I use WhatsApp to provide timely updates and announcements to my students	3.61	0.50	High extent
3. I engage in discussions related to course content through WhatsApp	3.52	0.85	High extent
4. I encourage students to ask questions and seek clarification through WhatsApp	3.61	0.78	High extent
5. I use WhatsApp for conducting virtual office hours and one-on-one student consultations	3.00	0.91	High extent
6. I organize group chats on WhatsApp for collaborative learning among students	3.43	0.79	High extent
7. I use WhatsApp for conducting quizzes	2.48	0 .89	Low extent
8. I integrate WhatsApp as a means of peer-to-peer interactions	2.83	0.83	High extent
9. I create and share educational content, such as worksheets or study guides, via WhatsApp	3.39	0.72	High extent
10. I share multimedia content, such as videos or images, to enhance my teaching through WhatsApp	3.65	0.49	High extent
11. I encourage students to share their educational resources /findings on WhatsApp	3.17	0.65	High extent
12. I use WhatsApp to conduct surveys or gather feedback from my students about the course	2.87	1.01	High extent
13. I use WhatsApp to conduct live virtual lectures	3.30	0.82	High extent
Grand Mean and stand. Dev.	3.27	0.80	High extent

Table 2 above shows the mean and standard deviation responses of both male and female lecturers on the extent of utilization of WhatsApp platforms for teaching integrated science courses in Enugu state. Item statements 1, 2, and 11, with grand mean of 3.61, 3.61, and 3.30, respectively, with standard deviation of 0.58, 0.5, and 0.82 shows that their mean is greater than the cut of point which is 3.0 which implies that the lecturers utilize WhatsApp platforms in teaching integrated science course. Also, item statement 7, with a mean and standard deviation of 2.48 and 0.89, respectively, shows that lecturers do not like using WhatsApp for conducting quizzes. The remaining item statements with mean and standard deviation scores that range from 2.83 to 3.65 and 0.49 to 1.014, respectively, show that lecturers utilize WhatsApp in teaching integrated science because their mean is above the cutoff point in the rating scale.

Research question three: What is the influence of gender on lecturers' extent of awareness of the WhatsApp platform for teaching integrated science courses?

Table 3: Mean and standard deviation of influence of gender on the extent of lecturers' awareness of the use of the WhatsApp platform for teaching integrated science courses in Enugu state

Lecturers	N	Mean	SD	Std. Error mean
Male	9	1.63	0.52	0.78
Female	14	3.09	0.50	0.75

Table 3 shows the mean and standard deviation of male and female lecturers' responses on their extent of awareness of the WhatsApp platform in teaching integrated science in tertiary institutions in Enugu state. The mean and standard deviation of male lecturers are 1.63 and 0.52, with a standard error of 0.78, while the mean and standard deviation of female lecturers are 3.09 and 0.50, with a standard error of 0.75. It means that the female lecturers are more aware of the use of WhatsApp in teaching Integrated science courses in the tertiary institutions.

Research Question 4. What is the influence of gender on lecturers' extent of utilization of the WhatsApp platform for teaching integrated science?

Table 4: Mean and standard deviation of gender on lecturers' extent of utilization of the WhatsApp platform for teaching integrated science courses in Enugu state

Lecturers	N	Mean	Std. Deviation	Std. Error mean
Male	9	1.63	0.53	0.78
Female	14	3.26	0.48	0.70

Table 4 shows the mean and standard deviation of male and female lecturers' responses on their extent of utilization of the WhatsApp platform in teaching integrated science in tertiary institutions in Enugu state. The mean and standard deviation of male lecturers are 1.63 and 0.53, with a standard error of 0.78, while the mean and standard deviation of female lecturers are 3.26 and 0.48, with a standard error of 0.70. This means that the female lecturers utilize WhatsApp more than the male lecturers in teaching integrated science courses in tertiary institutions in Enugu state.

Research question 5: What are the challenges facing the effective utilization of WhatsApp in teaching integrated science courses?

Table 5: Mean and Standard Deviation rating on the possible factors militating against the effective use of WhatsApp in teaching integrated science courses.

Item Statement	Mean	Std. Deviation	Decision
1. Unsteady and limited internet access	3.78	0.42	Agreed
2. Poor and inconsistent power supply	3.78	0.42	Agreed
3. Lack of proper knowledge on how to use WhatsApp for teaching	3.48	0.67	Agreed
4. Students may easily get distracted by unrelated messages and notifications on WhatsApp group discussions	3.57	0.51	Agreed
5. Technical glitches can disrupt the flow of communications and learning activities	3.61	0.50	Agreed
6. WhatsApp may not be accessible to all students, especially those who cannot afford WhatsApp-enabled phones	3.26	0.81	Agreed
7. WhatsApp may not be conducive for senior academic discussions and assessments	3.30	0.88	Agreed
8. WhatsApp groups may be vulnerable to hacking, compromising the confidentiality of course materials and discussions	3.52	0.67	Agreed
9. Using WhatsApp for teaching may blur the boundaries between my personal and professional communications	3.17	0.72	Agreed
10. I find it challenging to manage the volume of messages and notifications on WhatsApp related to my teaching	2.96	0.90	Agreed
Grand mean and stand. Dev	3.12	0.65	Agreed

The results in Table 5 show the mean and standard deviation of male and female lecturers' responses on the possible factors militating against the effective use of WhatsApp in teaching integrated science in tertiary institutions in Enugu state. The item statements from 1 and 2 with the same mean and standard deviation of 3.78 and 0.42 appear to have the highest mean in the table, and this implies that they are the most common issues faced by the lecturers when using WhatsApp to teach integrated science. Their mean is greater than the cut-off point of 2.5. Also, the remaining item statements from items 3 to 10, with mean and standard deviation that ranges from 2.96 to 3.61 and 0.50 to 0.90 has mean greater than the cutoff point, this signifies that lecturers agreed to the above listed statements as the possible problems that can militate while teaching integrated science using WhatsApp platform.

Research question 6: What possible ways can be used to ameliorate the challenges facing the use of the WhatsApp platform for teaching integrated science?

Table 6: Mean and Standard Deviation rating of the ways to ameliorate the challenges facing the use of the WhatsApp platform for teaching integrated science

Item Statement	Mean	Std. Deviation	Decision
1. Provision of steady and unlimited internet access	3.87	0.34	Agreed
2. Provision of good and consistent power	3.83	0.39	Agreed
3. Training should be conducted for teachers on the use on the use of WhatsApp for teaching	3.65	0.49	Agreed
4. Pausing and asking questions intermittently in the middle of the class to make sure students are following	3.78	0.42	Agreed
5. Taking different questions from all the students using a voice note to ensure their active participation	3.78	0.42	Agreed
Grand mean and SD	3.78	0.41	Agreed

The results in Table 6 show the mean and standard deviation of the responses of both male and female lecturers on ways to ameliorate the challenges facing the use of the WhatsApp platform for teaching integrated science courses in tertiary institutions in Enugu state. All the item statements have a mean higher than the cut-off point in the rating scale. This implies that the lecturers agreed on the different ways in which problems facing the use of WhatsApp can be ameliorated.

Testing the Hypotheses

HO_1: There is no significant influence of gender on lecturers' level of awareness of the WhatsApp platform in teaching integrated science courses

Table 7: T-test summary on the influence of gender on lecturers' extent of awareness of the WhatsApp platform in teaching integrated science courses in Enugu state

Variable	N	Mean	Std. Deviation	T	df	sig.(2-tailed)
Male	9	1.63	0.52	13.58	91	.000
Female	14	3.09	0.50	13.59		

The results in Table 7 above show there is no significant influence of gender on lecturers' extent of awareness of WhatsApp platform in teaching integrated science.

HO_2: There is no significant influence of gender on lecturers' extent of utilization of the WhatsApp platform for teaching integrated science courses

Table 8: t-test summary on the influence of gender on lecturers' utilization of the WhatsApp platform in teaching integrated science courses in Enugu state

Variable	N	Mean	Std. Deviation	T	df	sig.(2-tailed)
Male	9	1.63	0.53	15.61	91	.000
Female	14	3.26	0.48	15.63		

The results in Table 8 above show there is no significant influence of gender on lecturers' extent of utilization of the WhatsApp platform in teaching integrated science.

Discussion of findings

The extent to which lecturers are aware of the use of the WhatsApp platform for teaching integrated science courses.

The findings of this study, presented in Table 1 in our chapter four, showed that WhatsApp is one of the common platforms used by lecturers to communicate among themselves. Lecturers are aware of the WhatsApp platform for teaching. It is seen that WhatsApp is a common platform among lecturers. The result also stated that lecturers discuss the potential use of the WhatsApp platform for teaching with their colleagues. Lecturers indicated that there are several benefits attached to the use of the WhatsApp platform for teaching. This finding confirmed those of Bouhnik and Deshen (2014), who agreed that communication remains one of the primary functions of WhatsApp in both teaching and learning.

Lecturers' extent of utilization of WhatsApp for teaching integrated science courses

The result showed that lecturers utilize WhatsApp for teaching. Responses gotten from each structured item statement shows that even in the absence of a structured learning environment, WhatsApp platform is being used to drive home teaching effectively. They indicated that WhatsApp helps them to share educational resources such as articles, links, worksheets and study guides with their students and also used to engage in course related contents.

This finding aligns with that of Nyinondi and Mwakapina (2023), who found that WhatsApp is an effective classroom-learning platform facilitating connectivity among students and their teachers.

Influence of gender on lecturers' extent of awareness of the use of the WhatsApp platform for teaching integrated science courses.

In Table 3 of this study, it is seen that gender is not a significant factor that affect lecturers' level of awareness of the WhatsApp platform for teaching integrated science courses in Enugu state.
The findings of this work contradict that of Alnjadat et al (2019) which opined that males were more aligned to social media then the females with percentage of 49.6% and 32% respectively.

Influence of gender on lecturers' extent of utilization of WhatsApp for teaching integrated science courses.

This study also explored the influence of gender on lecturers' utilization of WhatsApp in teaching integrated science. It revealed that gender is not a significant factor that affects lecturers' utilization of the WhatsApp platform for teaching integrated science courses in Enugu State.
This study is in contrast with Efosa et al (2017) study, which opined that females have a stronger and significant perception of use of social media (WhatsApp) than their male counterparts.

Challenges facing the effective utilization of WhatsApp in teaching integrated science courses

Despite the numerous advantages of using WhatsApp for teaching, respondents identified several challenges that impede its effectiveness. These include unreliable and limited internet access, inconsistent power supply, and technical issues that can disrupt communication during lessons, virtual office hours, or one-on-one consultations. Additionally, students often face distractions from unrelated messages and notifications from personal chats and groups. These distractions can cause students to lose focus during lectures, resulting in minimal retention of the material being taught.

The findings of this study align with Michele and Shonna (2007), who reported that approximately 51% of the 21 million youths and students using social media sites daily experience negative effects. Similarly, Nsabayezu et al (2020) highlighted that while WhatsApp facilitates collaboration between teachers and students, issues related to internet connectivity, including its cost and availability, pose significant barriers to effective interaction for both students and educators.

Possible ways to ameliorate the challenges facing the use of the WhatsApp platform for teaching integrated science.

The respondents emphasized several key strategies outlined in Table 8 to address the challenges associated with using WhatsApp for teaching. These include ensuring consistent and unlimited internet access, providing a reliable power supply, conducting training sessions for lecturers on WhatsApp usage, implementing interactive teaching methods such as pausing for questions, and utilizing voice notes for student inquiries. Notably, among these solutions, the provision of a steady and unlimited power supply received the highest mean score of 3.87, indicating its paramount importance in facilitating effective communication between lecturers and students.

This recent study aligns with the findings of Nsabayezu et al. (2020), who similarly identified the provision of computers, smartphones, and adequate internet connectivity for both students and teachers as potential solutions for integrating WhatsApp into teaching practices. Additionally, they underscored the importance of teacher guidance and follow-up to manage student engagement and minimize distractions during WhatsApp-based learning activities.

Conclusion

In conclusion, this study delved into the awareness and utilization of WhatsApp among lecturers for teaching integrated science courses in tertiary institutions in Enugu State. The findings shed light on the significant role that WhatsApp plays in facilitating communication and instructional delivery in the face of challenges such as large student numbers and inadequate physical classrooms. The research revealed a high level of awareness and utilization of WhatsApp among lecturers, underscoring its value as a supplementary teaching tool in tertiary education. Importantly, solutions proposed by respondents, such as ensuring steady internet access and reliable power supply, highlight the infrastructural needs essential for the effective implementation of WhatsApp-based teaching methods. Moreover, the study's alignment with prior research, particularly regarding the importance of teacher training and guidance, underscores the need for ongoing support mechanisms to optimize WhatsApp's potential as an educational platform.

In essence, the findings underscore the transformative potential of digital technologies like WhatsApp in enhancing teaching and learning experiences. Moving forward, initiatives aimed at addressing infrastructural challenges and providing targeted training programs for educators can further harness the benefits of WhatsApp in tertiary education, ultimately enriching the academic journey for both lecturers and students alike.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are made:

1. **Infrastructure Improvement**: Tertiary institutions should prioritize the provision of steady and

unlimited internet access as well as consistent power supply to support the effective utilization of WhatsApp for teaching. Investment in infrastructure upgrades will enhance the reliability of digital teaching platforms and minimize disruptions to communication and instructional delivery.

2. **Training Programs**: Institutions should organize training sessions and workshops to equip lecturers with the necessary skills and knowledge to effectively integrate WhatsApp into their teaching practices. These training programs should focus on exploring the various features of WhatsApp and providing guidance on best practices for utilizing the platform for educational purposes.

3. **Pedagogical Support**: Alongside technical training, institutions should offer pedagogical support to lecturers, emphasizing interactive teaching methods and strategies for engaging students effectively through WhatsApp. Guidance on designing engaging learning activities and managing student interactions within digital platforms will enhance the quality of teaching and learning experiences.

4. **Continuous Monitoring and Evaluation**: Institutions should establish mechanisms for monitoring and evaluating the implementation of WhatsApp-based teaching methods. Regular feedback loops and assessments can help identify areas for improvement and inform adjustments to teaching strategies, ensuring ongoing optimization of WhatsApp's educational potential.

5. **Collaboration and Knowledge Sharing**: Facilitate collaboration and knowledge sharing among lecturers within and across institutions to exchange best practices, lesson plans, and innovative teaching ideas utilizing WhatsApp. Establishing communities of practice and online forums can foster peer support and facilitate the dissemination of effective teaching strategies.

6. **Research and Development**: Encourage further research into the effectiveness of WhatsApp as a teaching tool across various disciplines and educational contexts. Continued research and development efforts will deepen our understanding of the potential benefits and challenges associated with WhatsApp integration, informing future educational practices and policies.

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