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EXTENT OF UTILIZATION OF WHATSAPP AND GOOGLE CLASSROOM FOR MOBILE-SUPPORTED INSTRUCTIONAL DELIVERY AMONG OPEN AND DISTANCE LEARNING FACILITATORS IN COLLEGES OF EDUCATION IN SOUTHEAST NIGERIA

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Abstract

This study examined the extent of utilization of WhatsApp and Google Classroom for Mobile-supported Instructional delivery, among Open and Distance Learning facilitators in Colleges of ed in Southeast Nigeria. Six research questions and six hypotheses guided the study. The population for the study is 900 facilitators across the different departments of colleges of education in southeast, Nigeria. A sample of 120 facilitators were drawn using Proportionate stratified random sampling technique. Utilization of WhatsApp and google classroom for mobile–supported instructional delivery (UWGMID) Questionnaire was adapted and used to collect data. The instrument was face validated by three experts from University of Nigeria, Nsukka. A reliability coefficient of 0.84 was obtained using SPSS statistical tool. The data collected were analyzed using mean and standard deviation. T-test was used to test the Hypotheses at 0.05 level of significance. The study found that facilitators demonstrated a moderate level of utilization of WhatsApp and Google Classroom for key instructional activities, including content dissemination, assignment distribution, learner engagement, and the provision of feedback. The study further found that facilitators in both Federal and State Colleges of Education share similar perceptions and experiences regarding the use of mobile learning tools for Open and Distance Learning programs. This study recommends that Colleges of Education should organize regular training programs to improve facilitators' digital literacy skills for effective use of mobile learning tools.

Keywords: Mobile-supported learning, WhatsApp, Google Classroom, Open and Distance Learning, Colleges of Education, Nigeria.

Introduction

The integration of mobile technologies into education has transformed instructional delivery by providing flexible, accessible, and learner-centred opportunities for teaching and learning across different educational contexts. The increasing adoption of smartphones and internet-enabled mobile applications has facilitated the emergence of Mobile-supported Open and Distance Learning (ODL), enabling facilitators and learners to interact beyond the traditional classroom irrespective of geographical location and time constraints (Crompton, 2013; Moore & Kearsley, 2018). As educational institutions continue to embrace digital transformation, the effective utilization of mobile learning platforms such as WhatsApp and Google Classroom has become

increasingly important for improving instructional delivery, learner engagement, and academic communication. However, the effectiveness of these platforms depends not only on their availability but also on the extent to which facilitators utilize them, the challenges encountered during their use, the strategies adopted to improve their utilization, and the facilitators' level of digital literacy.

Mobile-supported learning refers to the use of mobile devices such as smartphones, tablets, and other wireless technologies to facilitate teaching and learning regardless of time and place (Crompton, 2013). It allows facilitators and learners to access instructional resources, communicate, collaborate, participate in discussions, complete assignments, and receive feedback through internet-enabled mobile technologies. The flexibility and portability of mobile devices have made mobile-supported learning a significant component of Open and Distance Learning programs, particularly in higher education institutions where flexible access to education is increasingly required.

Open and Distance Learning (ODL) is an educational approach designed to provide learners with flexible access to education through the application of digital technology without requiring continuous physical interaction between facilitators and learners (Moore & Kearsley, 2018). Digital technology according to UNESCO (2023) refers to electronic devices, software applications, and communication networks that generate, process, store, retrieve, and transmit digital information to facilitate communication, learning, collaboration, and knowledge sharing. This encompasses a wide range of technologies, including computers, the internet, cloud computing, artificial intelligence (AI), learning management systems, mobile devices, and digital communication platforms. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2023), the adoption of digital technologies in education systems enhances access, equity, and quality of learning, particularly in resource-constrained environments. The integration of mobile technologies into ODL has enhanced instructional delivery by supporting learner-centred education, collaborative learning, timely communication, and continuous access to educational resources.

WhatsApp has become one of the most widely utilized mobile communication applications in education because of its simplicity, accessibility, affordability, and interactive features. The application enables facilitators to establish virtual learning groups, share lecture notes, distribute multimedia instructional resources, conduct academic discussions, provide immediate feedback, and maintain continuous communication with learners (Bouhnik & Deshen, 2014). The widespread ownership of smartphones and the relatively low cost of using WhatsApp make it particularly suitable for supporting Mobile-supported Open and Distance Learning programmes in developing countries. Furthermore, WhatsApp promotes collaborative learning by encouraging peer interaction, knowledge sharing, and active learner participation in instructional activities (Cetinkaya, 2017).

In contrast, Google Classroom is a cloud-based learning management platform designed specifically to support teaching and learning in digital environments. It enables facilitators to organize virtual classrooms, upload learning materials, administer assignments, conduct assessments, grade students' work, monitor learning progress, and provide timely feedback

(Shaharanee, Jamil, & Rodzi, 2016). Unlike WhatsApp, which primarily supports instant communication and collaboration, Google Classroom provides structured course management and integrates seamlessly with Google Workspace applications such as Google Drive, Google Docs, Google Forms, and Google Meet. These features make Google Classroom particularly suitable for organizing instructional activities and managing Mobile-supported Open and Distance Learning programmes (Al-Maroof & Al-Emran, 2018).

The concept of utilization refers to the extent to which facilitators effectively employ available technological resources to achieve instructional objectives. In this study, utilization refers to the degree to which facilitators use WhatsApp and Google Classroom to communicate with learners, distribute instructional materials, facilitate discussions, administer assignments, conduct assessments, provide feedback, and support collaborative learning within Mobile-supported Open and Distance Learning programs. Effective utilization is reflected in the regular, purposeful, and pedagogically appropriate integration of these digital platforms into instructional delivery. The educational value of WhatsApp and Google Classroom depends not merely on their availability but on how effectively facilitators incorporate them into teaching and learning processes (Moore & Kearsley, 2018).

Despite their numerous educational benefits, the effective utilization of WhatsApp and Google Classroom is constrained by several challenges. These include inadequate internet connectivity, high cost of internet data, erratic electricity supply, inadequate ICT infrastructure, insufficient institutional support, inadequate professional training, technical difficulties, and limited access to digital devices (Mpungose, 2020). These challenges may reduce facilitators' willingness and ability to integrate mobile learning technologies into instructional delivery, thereby limiting the effectiveness of Mobile-supported Open and Distance Learning programs. Addressing these challenges requires deliberate institutional and policy interventions aimed at improving the utilization of mobile learning platforms. Strategies for improving utilization include continuous professional development programs for facilitators, provision of adequate ICT infrastructure, affordable and reliable internet services, institutional technical support, improved electricity supply, effective technology integration policies, and regular monitoring of digital instructional practices (Tondeur, Van Braak, Siddiq, & Scherer, 2017). These strategies are expected to strengthen facilitators' competence and confidence in utilizing WhatsApp and Google Classroom for instructional purposes.

A critical factor that may influence the relationship between the availability of mobile learning platforms and their effective utilization is digital literacy. Digital literacy refers to the knowledge, skills, attitudes, and competencies required to use digital technologies effectively, critically, ethically, and responsibly for communication, information management, collaboration, content creation, and problem-solving (Belshaw, 2014; Falloon, 2020). In the context of this study, digital literacy is conceptualized as a moderating variable because it is expected to influence the extent to which facilitators utilize WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning programs. Facilitators with higher levels of digital literacy are more likely to explore advanced features of these platforms, develop engaging instructional materials, manage virtual classrooms effectively, and resolve technological challenges than facilitators with lower levels of digital competence. Consequently, digital

literacy is expected to strengthen the effective utilization of WhatsApp and Google Classroom irrespective of institutional ownership.

Colleges of Education occupy a strategic position in Nigeria's educational system because they are responsible for preparing qualified teachers for basic education. As teacher education institutions continue to integrate digital technologies into instructional delivery, there is an increasing need to examine the extent to which facilitators utilize WhatsApp and Google Classroom, identify the challenges affecting their utilization, determine strategies for improving their effective use, and investigate the moderating influence of digital literacy on their utilization. Such an investigation is particularly important in Federal and State Colleges of Education in Southeast Nigeria, where differences in institutional ownership may influence the availability of technological resources and support for digital teaching and learning. Although previous studies have examined the educational benefits of WhatsApp, Google Classroom, mobile learning, and open and distance learning, there is limited empirical evidence on the extent of utilization of these platforms. The challenges affecting their utilization, the strategies for improving their effective use, and the moderating influence of digital literacy among facilitators in Federal and State Colleges of Education in Southeast Nigeria. This gap provides the rationale for the present study. This study seeks to investigate the extent of utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning programs, the challenges associated with their utilization, the strategies for improving their effective utilization, and the moderating influence of digital literacy among facilitators in Federal and State Colleges of Education in Southeast Nigeria.

Statement of the Problem

While utilization of WhatsApp and Google Classroom for mobile –supported instructional delivery has been promoted globally and locally as a solution for flexible education, its effectiveness in ODL programmes in Colleges of Education in Southeast Nigeria remains unclear. Existing literature shows that WhatsApp and Google Classroom are widely accessible, but there is limited evidence on how facilitators utilize these tools to deliver structured instruction. The problem is compounded by variations in facilitators' digital literacy skills and possible gender differences, which may influence the extent and quality of utilization. Without understanding these factors, ODL programmes risk underutilizing mobile technologies, limiting the potential benefits of enhanced learner engagement, interaction, and academic performance. Thus, there is a need for empirical research to determine the extent to which WhatsApp and Google Classroom are utilized for mobile-supported instructional delivery and to examine the moderating roles of digital literacy in influencing these practices in Federal and State colleges of Education in Southeast, Nigeria

Research Questions

The following research questions guided the study:

1. What is the extent of utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, among facilitators in Federal and State Colleges of Education in Southeast, Nigeria?
2. What is the extent of utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, among facilitators in Federal and State Colleges of Education in Southeast, Nigeria?
3. What are the challenges associated with the utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, in Federal and State Colleges of Education in Southeast, Nigeria?
4. What are the challenges associated with the utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, in Federal and State Colleges of Education in Southeast, Nigeria?
5. What are the strategies for promoting effective utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, in Federal and State Colleges of Education in Southeast, Nigeria?
6. What are the strategies for promoting effective utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, in Federal and State Colleges of Education in Southeast, Nigeria?
7. What is the moderating influence of digital literacy on the extent of utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning programs among facilitators in Federal and State Colleges of Education in Southeast, Nigeria?

Hypotheses

The following hypotheses guided the study at 0.05 level of significance:

HO_1. There is no significant difference in the mean ratings of federal and state facilitators on the extent of utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, among facilitators in Federal and State Colleges of Education in Southeast, Nigeria.

HO_2. There is no significant difference in the mean ratings of federal and state facilitators on the extent of utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, in Federal and State Colleges of Education in Southeast, Nigeria.

HO_3. There is no significant difference in the mean ratings of federal and state facilitators on the challenges associated with the utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, in Federal and State Colleges of Education in Southeast, Nigeria.

HO_4. There is no significant difference in the mean ratings of federal and state facilitators on the challenges associated with the utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, in Federal and State Colleges of Education in Southeast, Nigeria.

HO_5. There is no significant difference in the mean ratings of federal and state facilitators on the strategies for promoting effective utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, in Federal and State Colleges of Education in Southeast, Nigeria.

HO_6. There is no significant difference in the mean ratings of federal and state facilitators on the strategies for promoting effective utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, in Federal and State Colleges of Education in Southeast, Nigeria.

HO_7**:** There is no significant moderating influence of digital literacy on the extent of utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning programs among facilitators in Federal and State Colleges of Education in Southeast, Nigeria.

Methodology

This study adopted a descriptive survey research design. The area of the study was Southeast, Nigeria. The population of the study is all the 900 facilitators of colleges of education in southeast, Nigeria. The study adopted multi-stage sampling technique. Simple random sampling technique was used to select four colleges of education: Federal College of Education of Imo and Enugu state: Eha- Amufu, Alvan Ikoku Federal College of Education, Owerri, Enugu State College of Education (Technical), Enugu and Imo State College of Education, Ihitte Uboma. While Simple proportionate random sampling was used to select 120 facilitators (30 facilitators) from each of the selected colleges of education in southeast, Nigeria. A self-structured instrument titled Extent of Utilization of WhatsApp and google classroom for mobile supported instructional delivery (EUWGMID) was used for data collection. Three experts expert from Educational Technology, Measurement and Evaluation and Open and Distance Learning, University of Nigeria, Nsukka validated the instrument after which it was used to establish the reliability using Cronbach Alpha which yielded 0.84. Mean and standard deviation were used to answer the research questions while T- test was used to test the hypotheses at 0.05 level of significance. Any item mean score above 2.5 was regarded as accepted and mean scores below 2.50 was regarded as rejected. Real limits of numbers of: Strongly Agree / Very high extent =3.50 - 4.0, Agree / high extent = 2.50 - 3.49, Disagree / low extent = 1.50 - 2.49 and Strongly Disagree / very low extent = 0.50 - 1.49 were used to interpret the research questions. The null hypotheses were tested using the independent samples *t*-test at the 0.05 level of significance. The decision was based on the probability (*p*) value. Where the calculated p-value was less than or equal to 0.05 ($p \leq 0.05$), the null hypothesis was rejected, indicating a statistically significant difference between the mean ratings of facilitators in Federal and State Colleges of Education. However, where the p-value was greater than 0.05 ($p > 0.05$), the null hypothesis was not

rejected, indicating that there was no statistically significant difference between the mean ratings of the two groups.

Result

Research Question 1: What is the extent of utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, among facilitators in Federal and State Colleges of Education in Southeast, Nigeria?

Table 1: Mean Ratings and Standard Deviations of Federal, and State College Facilitators on the Extent of Utilization of WhatsApp for Mobile-supported Open and Distant Learning programs.

S/N	Questionnaire Items	Federal			State		
		$\bar{X}$	SD	Decision	$\bar{X}$	SD	Decision
1	Use WhatsApp to communicate academic information	3.56	0.61	VHE	3.48	0.66	HE
2	Share lecture notes through WhatsApp	3.44	0.70	HE	3.38	0.74	HE
3	Facilitate online discussions.	3.41	0.73	HE	3.34	0.76	HE
4	Provide assignment feedback	3.27	0.81	HE	3.19	0.84	HE
5	Monitor students' learning	3.35	0.75	HE	3.28	0.77	HE
	Grand Mean	**3.41**	**0.72**	**HE**	**3.33**	**0.75**	**HE**

Key: *VHE = Very High Extent, HE = High Extent*

Table 1; indicates that facilitators in Federal Colleges of Education recorded a grand mean of 3.41 (SD = 0.72), which falls within the real limit of 2.50–3.49, indicating a High Extent of utilization of WhatsApp. Although one item (Item 1, Mean = 3.56) falls within the Very High Extent category, the overall grand mean shows that facilitators generally utilized WhatsApp to a High Extent. Similarly, facilitators in State Colleges of Education obtained a grand mean of 3.33 (SD = 0.75), which also falls within the real limit of 2.50–3.49, indicating a High Extent of utilization. Overall, facilitators in both Federal and State Colleges utilized WhatsApp to a High Extent, with Federal College facilitators recording slightly higher mean ratings.

Research Question 2: What is the extent of utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, among facilitators in Colleges of Education in Southeast, Nigeria?

Table 2: Extent of utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, among facilitators in Federal and State Colleges of Education in Southeast, Nigeria.

S/N	Questionnaire Items	Federal			State		
		$\bar{X}$	SD	Decision	$\bar{X}$	SD	Decision
6	Upload lecture materials through Google Classroom.	3.34	0.75	HE	3.25	0.81	HE
7	Administer assignments using Google Classroom.	3.38	0.73	HE	3.29	0.79	HE
8	Grade students' assignments through Google Classroom.	3.19	0.80	HE	3.12	0.86	HE
9	Provide learning resources through Google Classroom.	3.32	0.76	HE	3.24	0.81	HE
10	Monitor students' learning progress using Google Classroom.	3.24	0.80	HE	3.16	0.84	HE
	Grand Mean	**3.29**	**0.77**	**HE**	**3.21**	**0.82**	**HE**

Key: *VHE = Very High Extent, HE = High Extent*

Table 2 shows that facilitators in Federal Colleges of Education recorded a grand mean of 3.29 with a grand standard deviation of 0.77, which falls within the real limit of 2.50–3.49, indicating a High Extent of utilization of Google Classroom. Similarly, facilitators in State Colleges of Education obtained a grand mean of 3.21 and a grand standard deviation of 0.82, which also falls within the same real limit, indicating a High Extent of utilization. This implies that facilitators in both Federal and State Colleges utilized Google Classroom to a high extent, although Federal College facilitators reported a slightly higher level of utilization.

Research Question 3: What are the challenges associated with the utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, in Colleges of Education in Southeast, Nigeria?

Table 3: Mean Ratings and Standard Deviations of Federal and State College Facilitators on the Challenges Associated with the Utilization of WhatsApp for Mobile-Supported Open and Distance Learning Programs

S/N	Questionnaire Items	Federal			State		
		$\bar{X}$	SD	Decision	$\bar{X}$	SD	Decision
11	Poor internet connectivity limits the use of WhatsApp.	3.60	0.60	SA	3.54	0.66	SA
12	High cost of internet data affects utilization.	3.71	0.55	SA	3.65	0.59	SA
13	Frequent distractions from non-academic messages reduce effectiveness.	3.35	0.76	A	3.29	0.79	A
14	Difficulty managing large class groups affects utilization.	3.24	0.81	A	3.18	0.84	A
15	Limited ICT skills hinder effective utilization.	3.20	0.82	A	3.14	0.86	A
	Grand Mean	**3.42**	**0.71**	**A**	**3.36**	**0.75**	**A**

Key: *SA = Strongly Agree, A = Agree*

Table 3 reveals that facilitators in Federal Colleges of Education obtained a grand mean of 3.42 and a grand standard deviation of 0.71, which fall within the real limit of 2.50–3.49, indicating that they Agreed that the identified factors constitute challenges to the utilization of WhatsApp. Although Items 11 and 12 fall within the Strongly Agreed category, the overall grand mean indicates Agreement. Likewise, facilitators in State Colleges of Education recorded a grand mean of 3.36 and a grand standard deviation of 0.75, also indicating Agreement. This implies that respondents in both Federal and State Colleges agreed that the listed factors constitute challenges associated with the utilization of WhatsApp.

Research Question 4: What are the challenges associated with the utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, in Colleges of Education in Southeast, Nigeria?

Table 4: Mean Ratings and Standard Deviations of Federal and State College Facilitators on the Challenges Associated with the Utilization of Google Classroom

S/N	Questionnaire Items	Federal			State		
		$\bar{X}$	SD	Decision	$\bar{X}$	SD	Decision
16	Poor internet connectivity affects utilization.	3.62	0.58	SA	3.56	0.63	SA
17	Insufficient training limits effective utilization.	3.46	0.70	A	3.39	0.74	A
18	Students lack adequate digital devices.	3.50	0.67	SA	3.44	0.71	A
19	Technical difficulties reduce utilization.	3.39	0.73	A	3.32	0.76	A
20	Limited institutional ICT support affects utilization.	3.54	0.65	SA	3.47	0.69	A
	Grand Mean	**3.50**	**0.67**	**SA**	**3.44**	**0.71**	**A**

Key: *SA = Strongly Agree, A = Agree*

Table 5 shows that facilitators in Federal Colleges of Education obtained a grand mean of 3.80 and a grand standard deviation of 0.44, indicating that they Strongly Agreed with the proposed strategies for promoting the effective utilization of WhatsApp. Similarly, facilitators in State Colleges of Education recorded a grand mean of 3.73 and a grand standard deviation of 0.50, which also indicate Strong Agreement. Therefore, respondents from both categories of Colleges strongly supported the identified strategies.

Research Question 6: What are the strategies for promoting effective utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, in Colleges of Education in Southeast, Nigeria?

Table 6: Mean Ratings and Standard Deviations of Federal and State College Facilitators on the Strategies for Promoting Effective Utilization of Google Classroom

S/N	Questionnaire Items	Federal			State		
		$\bar{X}$	SD	Decision	$\bar{X}$	SD	Decision
21	Regular ICT training should be organized.	3.76	0.47	SA	3.69	0.52	SA
22	Affordable internet services should be provided.	3.84	0.41	SA	3.77	0.47	SA
23	Institutions should provide adequate ICT facilities.	3.81	0.43	SA	3.74	0.49	SA
24	Technical support services should be available.	3.70	0.53	SA	3.63	0.58	SA
25	Stable electricity supply should be ensured.	3.87	0.36	SA	3.80	0.42	SA
	Grand Mean	**3.80**	**0.44**	**SA**	**3.73**	**0.50**	**SA**

Key: *SA = Strongly Agree, A = Agree*

Table 6 reveals that facilitators in Federal Colleges of Education obtained a grand mean of 3.80 and a grand standard deviation of 0.43, which fall within the real limit of 3.50–4.00, indicating Strong Agreement with the proposed strategies for promoting the effective utilization of Google Classroom. Likewise, facilitators in State Colleges of Education recorded a grand mean of 3.74 and a grand standard deviation of 0.48, which also indicate Strong Agreement. The results therefore suggest that respondents in both Federal and State Colleges strongly endorsed the identified strategies for enhancing the effective utilization of Google Classroom for Mobile-supported Open and Distance Learning program.

Research Question 7: What is the moderating influence of digital literacy on the extent of utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning programs among facilitators in Federal and State Colleges of Education in Southeast Nigeria**?**

Table 7: Mean Ratings and Standard Deviations of Federal and State College Facilitators on the Moderating Influence of Digital Literacy on the Extent of Utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning Programmes

S/N	Questionnaire Items	Federal			State		
		$\bar{X}$	SD	Decision	$\bar{X}$	SD	Decision
31	My level of digital literacy enhances my effective use of WhatsApp for instructional delivery.	3.68	0.51	VHE	3.59	0.57	VHE
32	Digital literacy enables me to use Google Classroom more effectively for teaching and learning.	3.72	0.48	VHE	3.61	0.55	VHE
33	My digital skills improve my ability to manage online learning activities through mobile technologies.	3.55	0.60	VHE	3.47	0.65	HE
34	Digital literacy enables me to integrate multimedia instructional resources into WhatsApp and Google Classroom.	3.49	0.67	HE	3.38	0.72	HE
35	My level of digital literacy increases my confidence in facilitating Mobile-supported ODL programs.	3.63	0.56	VHE	3.54	0.60	VHE
	Grand Mean	**3.61**	**0.56**	**VHE**	**3.52**	**0.62**	**VHE**

Key: *VHE = Very High Extent, HE = High Extent*

Table 7 reveals that facilitators in Federal Colleges of Education obtained a grand mean of 3.61 and a grand standard deviation of 0.56, which fall within the real limit of 3.50–4.00, indicating Very High Extent of agreement with the statements on the role of digital literacy in enhancing the effective utilization of mobile technologies for instructional delivery. Likewise, facilitators in State Colleges of Education recorded a grand mean of 3.52 and a grand standard deviation of 0.62, which also fall within the real limit of 3.50–4.00, indicating Very High Extent. The results therefore suggest that respondents in both Federal and State Colleges reported a very high extent to which digital literacy enhances the effective utilization of WhatsApp, Google Classroom, and other mobile technologies for Mobile-supported Open and Distance Learning programs.

Hypotheses

The following hypotheses were tested at 0.05 level of significance.

HO_1. There is no significant difference in the mean ratings of federal and state facilitators on the extent of utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, among facilitators in Colleges of Education in Southeast, Nigeria.

Table 8: Independent Samples t-test Analysis of the Mean Ratings of Federal and State College Facilitators on the Extent of Utilization of WhatsApp for Mobile-supported Open and Distance Learning Programs

S/N	Institution	N	$\bar{X}$	SD	t-value	df	p-value	Dec
1	Federal Colleges of Education	60	3.41	0.72				
					0.61	118	0.543	NR
2	State Colleges of Education	60	3.33	0.75				

Result of the study in table 8 shows that, facilitators in Federal Colleges of Education obtained a mean rating of 3.41 with a standard deviation of 0.72, whereas facilitators in State Colleges of Education obtained a mean rating of 3.33 with a standard deviation of 0.75 on the extent of utilization of WhatsApp for Mobile-supported Open and Distance Learning programs. Although facilitators in Federal Colleges recorded a slightly higher mean rating than those in State Colleges, the difference was not statistically significant ($t = 0.61$, $df = 118$, $p = 0.543 > 0.05$). Therefore, the null hypothesis was not rejected, indicating that there was no significant difference in the mean ratings of facilitators in Federal and State Colleges of Education on the extent of utilization of WhatsApp.

.HO_2. There is no significant difference in the mean ratings of federal and state facilitators on the extent of utilization of Google Classroom for Mobile-supported Open and Distant Learning programs.

Table 9: Independent Samples t-test Analysis of the Mean Ratings of Federal and State College Facilitators on the Extent of Utilization of Google Classroom

S/N	Institution	N	$\bar{X}$	SD	t-value	df	p-value	Dec
1	Federal Colleges of Education	60	3.29	0.77				
					0.56	118	0.578	NR
2	State Colleges of Education	60	3.21	0.82				

Table 9 reveals that facilitators in Federal Colleges of Education recorded a mean rating of 3.29 (SD = 0.77), while facilitators in State Colleges of Education recorded a mean rating of 3.21 (SD = 0.82). The independent samples t-test showed that the observed difference was not statistically significant ($t = 0.56$, $df = 118$, $p = 0.578 > 0.05$). Hence, the null hypothesis was not rejected. This implies that facilitators in Federal and State Colleges of Education did not differ significantly in their ratings on the extent of utilization of Google Classroom**.**

HO_3. There is no significant difference in the mean ratings of federal and state facilitators on the challenges associated with the utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, in Colleges of Education in Southeast, Nigeria.

Table 10: Independent Samples t-test Analysis of the Mean Ratings of Federal and State College Facilitators on the Challenges Associated with the Utilization of WhatsApp

S/N	Institution	N	$\bar{X}$	SD	t-value	df	p-value	Dec
1	Federal Colleges of Education	60	3.42	0.71	0.47	118	0.641	NR
2	State Colleges of Education	60	3.36	0.75				

Table 10 indicates that facilitators in Federal Colleges of Education obtained a mean rating of 3.42 (SD = 0.71), whereas facilitators in State Colleges of Education obtained a mean rating of 3.36 (SD = 0.75) regarding the challenges associated with the utilization of WhatsApp. The t-test result ($t = 0.47$, $df = 118$, $p = 0.641 > 0.05$) revealed that the difference in the mean ratings was not statistically significant. Therefore, the null hypothesis was not rejected**.**

HO_4. There is no significant difference in the mean ratings of federal and state facilitators on the challenges associated with the utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, in Colleges of Education in Southeast, Nigeria.

Table 11: Independent Samples t-test Analysis of the Mean Ratings of Federal and State College Facilitators on the Challenges Associated with the Utilization of Google Classroom

S/N	Institution	N	$\bar{X}$	SD	t-value	df	p-value	Dec
1	Federal Colleges of Education	60	3.50	0.67	0.49	118	0.625	NR
2	State Colleges of Education	60	3.44	0.71				

Table 11 shows that facilitators in Federal Colleges of Education recorded a mean rating of 3.50 (SD = 0.67), while facilitators in State Colleges of Education recorded a mean rating of 3.44 (SD = 0.71). The difference between the two groups was not statistically significant ($t = 0.49$, $df = 118$, $p = 0.625 > 0.05$). Therefore, the null hypothesis was not rejected, indicating that facilitators in both categories of Colleges did not differ significantly in their perceptions of the challenges associated with the utilization of Google Classroom.

HO_5. There is no significant difference in the mean ratings of federal and state facilitators on the strategies for promoting effective utilization of WhatsApp for Mobile-supported Open and Distant Learning programs, in Colleges of Education in Southeast, Nigeria.

Table 12: Independent Samples t-test Analysis of the Mean Ratings of Federal and State College Facilitators on the Strategies for Promoting Effective Utilization of WhatsApp for Mobile-supported Open and Distant Learning programs.

S/N	Institution	N	$\bar{X}$	SD	t-value	df	p-value	Dec
1	Federal Colleges of Education	60	3.80	0.44	0.82	118	0.414	NR
2	State Colleges of Education	60	3.73	0.50				

Table 12 reveals that facilitators in Federal Colleges of Education obtained a mean rating of 3.80 (SD = 0.44), whereas facilitators in State Colleges of Education obtained a mean rating of 3.73 (SD = 0.50). Although the Federal Colleges recorded a slightly higher mean rating, the difference was not statistically significant (t = 0.82, df = 118, p = 0.414 > 0.05). Consequently, the null hypothesis was not rejected.

HO_6. There is no significant difference in the mean ratings of federal and state facilitators on the strategies for promoting effective utilization of Google Classroom for Mobile-supported Open and Distant Learning programs, in Colleges of Education in Southeast, Nigeria

Table 13: Independent Samples t-test Analysis of the Mean Ratings of Federal and State College Facilitators on the Strategies for Promoting Effective Utilization of Google Classroom for Mobile-supported Open and Distant Learning programs

S/N	Institution	N	$\bar{X}$	SD	t-value	df	p-value	Dec
1	Federal Colleges of Education	60	3.80	0.43	0.74	118	0.461	NR
2	State Colleges of Education	60	3.74	0.48				

Table 13 indicates that facilitators in Federal Colleges of Education recorded a mean rating of 3.80 (SD = 0.43), while facilitators in State Colleges of Education recorded a mean rating of 3.74 (SD = 0.48). The independent samples t-test showed that the observed difference was not statistically significant (t = 0.74, df = 118, p = 0.461 > 0.05). Therefore, the null hypothesis was not rejected.

HO_7: There is no significant moderating influence of digital literacy on the extent of utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning programs among facilitators in Federal and State Colleges of Education in Southeast, Nigeria.

Table 14 Independent Samples t-test Analysis of the Mean Ratings of Federal and State College Facilitators on the Moderating Influence of Digital Literacy on the Extent of Utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning Programs

S/N	Institution	N	$\bar{X}$	SD	t-value	df	p-value	Dec
1	Federal Colleges of Education	60	3.61	0.56				
					0.83	118	0.408	NR
2	State Colleges of Education	60	3.52	0.62				

Table 14 shows that facilitators in Federal Colleges of Education obtained a mean rating of 3.61 with a standard deviation of 0.56. Whereas facilitators in State Colleges of Education obtained a mean rating of 3.52 with a standard deviation of 0.62 on the moderating influence of digital literacy on the extent of utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning programs. Although facilitators in Federal Colleges reported a slightly higher mean rating, the difference was not statistically significant ($t = 0.83$, $df = 118$, $p = 0.408 > 0.05$). Therefore, the null hypothesis was not rejected, indicating that facilitators in Federal and State Colleges of Education did not differ significantly in their perceptions of the moderating influence of digital literacy on the utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning programms.

Discussion of Findings

Extent of Utilization of WhatsApp for Mobile-Supported Open and Distance Learning Programs

The findings of the study revealed that facilitators in both Federal and State Colleges of Education in Southeast Nigeria utilized WhatsApp to a high extent for Mobile-supported Open and Distance Learning (ODL) programs. The respondents indicated that WhatsApp was widely used for communicating with students, sharing lecture notes, facilitating discussions, disseminating learning resources, providing feedback, and monitoring learning activities. Although facilitators in Federal Colleges recorded slightly higher mean ratings than their counterparts in State Colleges, the difference was not statistically significant. This finding agrees with the study of Bouhnik and Deshen (2014), who reported that WhatsApp promotes collaborative learning, enhances communication between instructors and students, and supports continuous academic interaction beyond the traditional classroom. The finding is also consistent with the work of Cetinkaya (2017), who concluded that WhatsApp is an effective instructional tool for improving communication, collaborative learning, and student participation. The finding further supports the assertion of UNESCO (2023) that mobile technologies have become indispensable tools for ensuring continuity of teaching and learning in flexible and distance education environments.

Extent of Utilization of Google Classroom for Mobile-Supported Open and Distance Learning Programs

The study found that facilitators utilized Google Classroom to a high extent in delivering Mobile-supported ODL programs. Google Classroom was commonly used for uploading lecture

materials, administering assignments, grading students' work, monitoring learners' progress, and organizing virtual classroom activities. Although Federal College facilitators reported slightly higher utilization than State College facilitators did, the difference was not statistically significant. This finding is in agreement with Al-Maroof and Al-Emran (2018), who found that Google Classroom enhances instructional delivery, improves communication, and increases students' participation in online learning environments. Likewise, Shaharanee, Jamil and Rodzi (2016) reported that Google Classroom significantly improves classroom management, assignment submission, and learning interactions between instructors and students.

Challenges Associated with the Utilization of WhatsApp

The findings revealed that facilitators agreed that poor internet connectivity, high cost of internet data, distractions from non-academic messages, inadequate ICT skills, and difficulties in managing large learning groups constitute major challenges affecting the utilization of WhatsApp for Mobile-supported ODL programs. This finding agrees with the study by Mpungose (2020), who observed that unstable internet services and limited digital competencies hinder the effective use of mobile learning technologies in higher education. However, UNESCO (2023), observed that improvements in mobile technologies and increased smartphone ownership have significantly reduced some of the barriers to mobile learning in many educational settings. The disparity may be attributed to differences in technological infrastructure and internet accessibility between developed and developing countries.

Challenges Associated with the Utilization of Google Classroom

This study found that facilitators agreed that inadequate training, poor internet access, insufficient ICT infrastructure, lack of institutional support, and limited access to digital devices were major challenges affecting the utilization of Google Classroom. This finding corroborates the work of Azhar and Iqbal (2018), who found that limited technological infrastructure and inadequate training significantly reduce the effective utilization of Google Classroom. Similarly, Basilaia and Kvavadze (2020) reported that internet connectivity and digital competence remain critical challenges in online teaching and learning.

Strategies for Promoting the Effective Utilization of WhatsApp

The findings indicated that facilitators strongly agreed that regular ICT training, provision of affordable internet services, improved ICT infrastructure, stable electricity supply, and institutional technical support are effective strategies for promoting the utilization of WhatsApp. This finding agrees with OECD (2021), which reported that institutional investment in digital infrastructure and teacher capacity building improves digital teaching practices.

Strategies for Promoting the Effective Utilization of Google Classroom

The study revealed that facilitators strongly agreed that continuous professional training, improved ICT facilities, reliable internet connectivity, institutional support, and regular monitoring are necessary strategies for enhancing the utilization of Google Classroom. This finding agrees with Trust and Whalen (2020), who reported that continuous training and institutional support significantly improve teachers' adoption and effective use of digital learning platforms. Likewise, König, Jäger-Biela and Glutsch (2020) concluded that professional digital competence training enhances teachers' readiness to implement online learning technologies

Moderating Influence of Digital Literacy

The study further found that digital literacy had a very high moderating influence on the utilization of WhatsApp and Google Classroom for Mobile-supported ODL programs. Facilitators in both Federal and State Colleges agreed that digital literacy enhances their ability to communicate effectively, create digital instructional resources, manage online learning environments, and utilize mobile technologies for instructional delivery. Although facilitators in Federal Colleges recorded a slightly higher mean rating than those in State Colleges, the difference was not statistically significant. This finding is also consistent with the UNESCO (2018) Global Framework of Reference on Digital Literacy Skills, which identifies digital literacy as a key determinant of educators' ability to effectively utilize digital technologies.

The absence of a significant difference between Federal and State Colleges suggests that facilitators across both institutional categories recognize the importance of digital literacy in supporting the effective utilization of mobile learning technologies for Open and Distance Learning programs.

Conclusion

Based on the findings of this study, it was concluded that facilitators in Federal and State Colleges of Education in Southeast Nigeria utilize WhatsApp and Google Classroom to a high extent for Mobile-supported Open and Distance Learning programs. These platforms have become valuable instructional technologies for facilitating communication, distributing learning materials, administering assignments, monitoring students' learning progress, and promoting interaction between facilitators and learners. The study also established that inadequate internet connectivity, high cost of internet data, insufficient ICT infrastructure, inadequate institutional support, and limited digital competencies constitute major challenges affecting the effective utilization of these platforms. To address these challenges, facilitators strongly supported strategies such as continuous ICT training, improved digital infrastructure, reliable internet services, stable electricity supply, and sustained institutional support.

Furthermore, the study concluded that digital literacy plays a critical moderating role in the utilization of WhatsApp and Google Classroom. Facilitators with stronger digital literacy competencies are better positioned to integrate these technologies into instructional delivery and to maximize their educational benefits in Mobile-supported Open and Distance Learning environments. Finally, the study found no statistically significant differences between facilitators in Federal and State Colleges of Education regarding the extent of utilization of WhatsApp and Google Classroom, the challenges associated with their utilization, the strategies for promoting their effective utilization, and the moderating influence of digital literacy. This suggests that facilitators across both institutional types share similar perceptions and experiences regarding the integration of these mobile learning platforms into Open and Distance Learning programs.

Recommendations

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

1. College Managements should encourage facilitators to sustain and expand the utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning (ODL) programs by integrating these platforms into regular instructional delivery, learner support, and academic communication.

2. Federal and State Governments should provide adequate funding for Colleges of Education to improve Information and Communication Technology (ICT) infrastructure, including reliable internet connectivity, functional computer laboratories, digital learning devices, and uninterrupted electricity supply, to facilitate the effective utilization of mobile learning platforms.
3. The National Commission for Colleges of Education (NCCE) should develop and implement policies that promote the integration of WhatsApp, Google Classroom, and other mobile learning technologies into teacher education programs and institutional instructional practices.
4. College Administrators should organize regular workshops, seminars, and professional development programs to enhance facilitators' competencies in the pedagogical use of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning.
5. Curriculum Planners and Teacher Education Program Developers should incorporate digital literacy, mobile learning technologies, and online instructional strategies into teacher education curricula to prepare facilitators with the competencies required for effective technology-supported instructional delivery.
6. Government and Educational Stakeholders should prioritize the development of facilitators' digital literacy competencies through sustained investment in digital skills training, certification programs, and technology integration initiatives, given the study's finding that digital literacy plays a significant moderating role in the effective utilization of WhatsApp and Google Classroom for Mobile-supported Open and Distance Learning programs.

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