Influence of social media applications on pre-service biology teachers' learning outcomes in Kwara State college of education, Oro, Nigeria

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ABSTRACT

This study examined the influence of social media applications on pre-service Biology teachers' learning outcomes in Kwara State College of Education, Oro, Nigeria. The sample comprised sixty pre-service teachers who were drawn using purposive sampling technique from NCE 3 of the 2021/2022 set. Questionnaire was used for data collection while the data gathered were analyzed using mean, standard deviation and t-test statistical tool at a mean benchmark of 2.50. Findings from the study revealed that WhatsApp, Facebook, Instagram and YouTube are the commonly used social media applications by pre-service Biology teachers which are usually accessed through mobile phones and tablets. Further findings indicate that pre-service biology teachers use social media applications daily but more at night. There was also a significant difference between social media application usage and pre-service Biology teachers study habits in Kwara State College of Education, Oro, Nigeria t(118) = 2.39, p = .02. The study concluded that pre-service Biology teachers use social media and it is affecting their study habits, and in turn their learning outcomes. It is therefore, recommended that the college should provide adequate training to equip pre-service teachers with necessary skills to maximize the utilization of social media applications to boost their learning outcomes.

INTRODUCTION

Social media has no doubt shrunk the world into a micro-village where diverse contents can be prepared, transmitted, received and stored within a split second, thus, helping to breach the gap that existed in communication. Social media is a collective term for websites and applications that focuses on communication, community-based input, interaction, content-sharing and collaboration (Irawadi & Marini, 2024). According to Irawadi & Marini (2024) social media is a technology that facilitates the sharing of ideas, thoughts, and information through virtual networks and communities. Bhandarkar et al. (2021) observed that social media consists of network of websites and applications which enables communication between or among individuals to generate, use, exchange and discuss content over the worldwide web.

The reliance on traditional methods of communication, storage and retrieval of information became less populous due to the advent of social media networking and short messaging sites which as undoubtedly facilitated contents sharing regardless of distance over the internet. Evolution of the internet dates back to 1969 when Advanced Research Project Agency Network (ARPANET) was developed to enable universities and research organizations exchange information freely while in the 1980s the Transmission Control Protocol (TCP) was birth which afford different machines and networks across the world to assemble data packets. Advances in technology caused ARPANET to be replaced by the National Science Foundation Network (NSFNET) in 1990 and this also coincides with the advent of World Wide Web which enabled exchange of information over the Internet through Hyper Text Transfer Protocols (Nuriadin & Harumike, 2021).

Historically, the first social media network Six Degrees was launched in 1997 purposely for profile uploading services. Table 1 shows the timeline when some other social networking sites where launched. It is important to point out that some of the social media sites such as Six Degrees, Friendster and Google+ have suspended their activities.

Table 1. Launched timeline of social media networking sites

Year launched	Social media network
1997	Six Degrees
2002	Friendster, Linkedln, myspace
2004	Facebook, Flickr
2005	Reddit, YouTube, Qzone
2006	Twitter (now X)
2007	Tumblr
2008	Hootsuite
2009	WhatsApp, Sina Weibo, Quora
2010	Instagram, Pinterest
2011	Snapchat, Zoom, Facebook Messenger, WeChat, Twitch
2012	Google+
2013	Telegram
2016	Douyin
2017	TikTok, Microsoft Teams, Google Meet
2020	Clubhouse

Source: Adapted from "*History of social media (it's younger than you think)*," by Lyndon (2023), Retrieved from https://www.broadbandsearch.net/blog/complete-history-social-media

All around the world, the use of social media sites has gained momentum among people of different ages and available statistics obtained online in Figure 1 indicates a progressive increase in the number of social media users from 2012 to 2023.
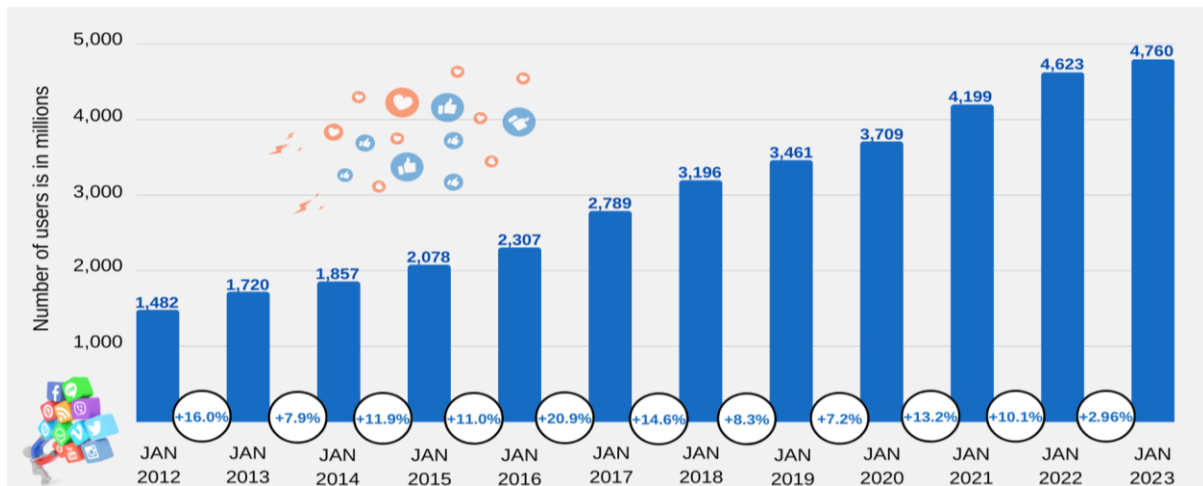
Source: Adopted from "*History of social media (it's younger than you think)*," by Lyndon (2023), Retrieved from https://www.broadbandsearch.net/blog/complete-history-social-media

Figure 1. Bar chart showing social media users around the world between 2012 and 2023

Some of the crucial factors that necessitated the usage of social media by individuals of different ages include its ubiquitous access, conveniences, functionality and flexibility (Schroeder et al., 2010). Other attendant benefits that has made social media an indispensable part of our lives is evident in the area of communication, information sharing, business activities, provision of online health care services, and importantly virtual education strategy (Komolafe, 2021; Musa & Agboola, 2020; Ratnapuri et al., 2023).

The field of education has greatly been impacted by the incorporation, development and deployment of social media applications for different education related activities ranging from teaching and learning, researches, assessment and evaluation, sharing and marketing of educational materials and books, connection with experts all around the world and promoting independent learning by students (Adeoye et al., 2024). Purwanto et al. (2023) affirmed that social media applications foster collaboration between teachers and learners; hence, it is a valuable educational tool capable of enriching learning experience. Güney (2023) identified specific social media platforms commonly used in K-12 Education to include Edmodo, Facebook, YouTube, and Twitter because it enables individuals to connect and communicate with each other, connects learners with experts, and foster collaborative learning experiences.

Many researchers have probed and identified the significance of social media to educational activities in different tertiary institutions in Nigeria which made Nannim et al. (2023) raise the need for social media regulatory policies in Nigerian universities to safe guard undergraduates against social media addition. For instance, Okereke & Oghenetega (2014) conducted a study in four Nigerian tertiary institutions on the impact of social media on academic performance of university students and discovered that Facebook, WhatsApp, and 2go/Skype are often used by students while Myspace, Twitter, badoo, Blogs/web scholars, Google+/Social bookmarking are not often used by undergraduates for academic purposes. Sari et al. (2022) analyzed junior high school students' perceptions of using TikTok as a learning medium. Data collected via Google Forms, showed that TikTok increased students' motivation and makes learning more enjoyable.

Mkpa (2020) also investigated the use of social media as perceived by 240 junior secondary school teachers in Abia State and found out that the teachers had positive perception about social media impact in education. The study however, showed that oftentimes most teachers uses social media platforms for charting with friends or sending private messages rather than for educational purposes. In another related study, Anyira (2023) researched the influence of social media on reading culture among Nigerian polytechnic students and discovered that the average usage of social media by many students peaked at 7 hours daily as they prefer using social media to read despite identifying it as a major hindrance to reading. Ademiluyi & Ademiluyi (2020) conducted a

study on the utilization of social media for academic purposes by business education students in Nigerian colleges of education using descriptive survey design and researcher designed questionnaire for data collection. Findings revealed that social media platforms such as Blackberry, Messenger, YouTube, WhatsApp and Twitter were utilized by business education students for studying and doing assignment. The study further revealed that considerable number of business education students exhibited signs of addiction to social media as some were involved in posting and commenting on social media even during class sessions.

Maulana et al. (2022) investigated the use of learning media through technology for biology education students and discovered that learning media that incorporate the use of technology is very supportive in the process of implementing learning for students. Nurhazirah & Zaidatul (2017) examined the impact of Edmodo as an Educational Social Network Site (ESNS), on active engagement and integrated subject matter learning in Biology at a public university in Perak, Malaysia. Seventy-four Diploma students participated, experiencing both traditional classes and Edmodo over thirteen weeks. Results indicated that Edmodo shows significant potential for enhancing Biology learning. Susanto et al. (2022) used an Android-based mobile learning app for teaching nervous system assessing its effectiveness in enhancing students' conceptual understanding. The results of the study showed that Android-based mobile learning app was highly feasible and significantly improved Student understanding.

The effect of social media use on learning, social interactions, and sleep duration among university students was investigated by Manjur et al. (2021) and the results indicated that excessive use of social media for non-academic purpose distracted students from learning and delayed their bed time, which in turn reduced their sleep duration and decreased face to face interaction among undergraduates. Loto & Ayelaagbe (2023) identified social media as an alternative learning tool for pre-service teachers learning especially during insecurity or lockdown based on the findings of a study on social media learning platforms and insecurity among pre-service teachers in Ondo State, Nigeria. A study by Ogbuso (2022) also revealed that Pinterest, Twitter, Instagram, Zoom, WhatsApp, Facebook, YouTube, and Email are often utilised by lecturers for pre-service teachers in colleges of education in Nigeria.

Pre-service teachers' or teachers in-training styles of education has also been revolutionized by the adoption and integration of social media platforms for teaching, learning and assessment despite the fact that many research findings have revealed that social media is not mainly used for academic purposes by undergraduates. Alabi et al. (2016) found out that though pre-service teachers have positive attitude towards the use of social media they do not use the platforms majorly for academic activities. Onwuagboke et al. (2014) noted that mobile phones remain the most widely used mode of internet access among undergraduates with social networking, searching for information on school assignments, chatting forming the major reasons why they surf the net. This finding is rightly affirmed by the study of Adewumi et al. (2023) which revealed that preservice and in-service teachers are willing to adopt mobile learning pedagogical approach in Nigeria tertiary institutions.

A similar study by Adebayo et al. (2023) on the perceived usefulness and ease-of-use of pre-service teachers towards the integration of social media for education in universities in Niger State indicated that pre-service teachers had a positive disposition and perception towards the usefulness and ease-of-use of social media for education purposes. Apuke (2016) conducted a study on the influence of social media on academic performance of undergraduate students of Taraba state university, Jalingo, Nigeria and found out that students of the university access the internet using smart phones, tablets and computers. In addition, Facebook and WhatsApp are the most used social media platforms by students of the university who spend up to 4-5 hours daily surfing the internet and this may negatively impact their learning outcomes.

Learning outcomes have remained a vital indicator for determining the effectiveness of education and student achievement. Prøitz (2010) defined learning outcomes as a written statement of intended and/or desired knowledge, skills, and abilities that students are expected

to manifested after a programme of study. The learning outcomes of students are determined by contents of the curriculum, learning environment, teachers and students related factors among others (Fraser, 2012; Irdawati et al., 2023; Pangsuma et al., 2024). One student-related factor that remains contentious among researchers is the considerable variability of students' study habits within and outside of the learning environment, such as reading, note-taking, engagement in study groups, and regularly meeting learning objectives (Fakunle et al., 2023; Kaur & Singh, 2020).

Study habit is the process of allocating time and resources to plan and manage tasks (Dungon et al., 2024). According to Walck-Shannon (2021), study habits include behaviors that encompass the time students allocate to studying, the strategies they utilize, and the environments in which they engage in their studies. The nexus between study habits and students learning outcomes have been documented in literature. Sadang (2022) analyzed the responses of 40 Biology students at Isabela State University-Jones Campus using normative-descriptive methods and statistical models. Factorial MANCOVA and discriminant function analysis (DFA) revealed no significant effect of profile variables on study habits and academic achievement. Navarro (2024) investigated the relationship between study habits and academic performance among College of Health Biology students and the results showed that students generally have average study habits, as there was no significant correlation between study habits and academic performance.

Onwukeme (2023) explored the relationship between study habits and academic achievement among 1,006 biology students in Owerri, Imo State, Nigeria. The analysis of the results with Pearson's Product Moment Correlation revealed a positive but low correlation between study habits and students' academic achievement. Anyanwu (2022) investigated the relationship between study habits and academic performance among pre-service biology students at the Federal College of Education, Zaria. Quasi-experimental design was adopted for the study while 590 students were selected via stratified random sampling and assessed with the Study Skills Inventory and Biology Performance Test. Data analysis with t-tests and Pearson correlation revealed a significant correlation between study habits and students' performance. Leyrer-Jackson & Wilson (2017) investigated the impact of social media on undergraduate students' academic performance by surveying 234 participants. Results showed that female students use social media more frequently and higher social media use correlated with increased daily usage time. It was therefore suggested that incorporating social media into classrooms could negatively affect students study habits and learning outcomes, especially in biological sciences.

The present study which focuses on the influence of social media applications on pre-service Biology teachers' learning outcomes in Kwara State college of education, Oro, Nigeria is motivated out of the dearth of researches on social media which specifically target pre-service Biology teachers learning outcomes in Kwara State College of education Oro, Nigeria. Hence the need for the present study.

Purpose of the study

The main purpose of the study is to determine the impact of social media on pre-service Biology teachers learning outcome in Kwara State College of Education, Oro, Nigeria. Specifically, the study sought to:

1. Identify social media applications that are commonly used by pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria.
2. Determine the channels through which social media applications are accessed by pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria.
3. Investigate the frequency of use of social media applications by pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria.
4. Examine the influence of social media on pre-service Biology teachers study habits in Kwara State College of Education, Oro, Nigeria.

Research questions

The following research questions guided the study:

1. What are the social media applications commonly used by pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria?
2. What are the channels through which social media applications are accessed by pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria?
3. What is the frequency of use of social media applications by pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria?
4. What is the influence of social media on pre-service Biology teachers study habits in Kwara State College of Education, Oro, Nigeria?

Research hypothesis

The only hypothesis raised in this study was tested at 0.05 level of significance. H_0: there is no significant difference between social media application usage and pre-service Biology teachers study habits in Kwara State College of Education, Oro, Nigeria.

METHODS

This research is descriptive research with survey type. The target population of the study comprised all pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria. The sample size of the study was sixty (60) pre-service Biology teachers drawn using purposive sampling from NCE three of the 2021/2022 set. A researchers designed questionnaire entitled "influence of social media on pre-service Biology teachers learning outcome" was used for data collection. The questionnaire is composed of two sections A and B; section A was on the demographic data of respondents which include gender, age, and academic level while section B gather data based on the research questions raised using a four Likert scale approach of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Quantitatively, SA = 4 points, A = 3 points, D = 2 points and SD = 1 point respectively.

The questionnaire developed by the researchers was subjected to face and content validity through science education experts. The reliability index was 0.87 using the test-re-test procedure and Pearson product-moment correlation statistics for analysis of resultant data. The questionnaires were administered after it has been validated and the respondents were guided as they responded to the questions. Respondents were assured of confidentiality and other ethical considerations guiding the conduct of researches so has to eliminate any form of bias when attending to the questionnaire. The questionnaire was administered personally by one of the researchers to the pre-service teachers and collected on the spot after their responses. All the responses obtained from the respondents were coded and analyzed using the Statistical Package for Social Science (SPSS). Descriptive statistics of mean and standard deviation was used to provide answers to the research questions using a mean benchmark of 2.50 which was obtained by calculating the average mark of the Likert scale points. As such calculated mean greater than the benchmark was accepted and rejected if less than the mean benchmark. t-test statistical tool was used to test the hypothesis formulated at 0.05 level of significance.

RESULTS AND DISCUSSION

Research Question 1: What are the social media applications commonly used by pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria?

Table 2 show the social media platform commonly used by pre-service Biology teachers in Kwara State College of Education, Oro. The most commonly used social media by pre-service teachers is WhatsApp with the highest mean (M = 3.53). This is closely followed by Facebook with mean of (M

= 3.32). In addition, pre-service Biology teachers were favorably disposed to the use of Instagram and YouTube ranked 3rd and 4th with mean scores of 3.05 and 2.88 respectively which was above the mean benchmark score of 2.50. Table 2 further revealed that google meet, zoom, blogs/web scholars, twitter and webchat are not commonly used by pre-service Biology teachers in Kwara State College of Education Oro this is because the mean score is less than the benchmark mean of 2.50.

Results from this study indicated that WhatsApp, Facebook, Instagram, and YouTube are the most commonly used social media platforms by pre-service biology teachers and when effectively managed, these platforms can enhance learning activities through both visual and non-visual communication, offering spaces for educational discussions that improve learning outcomes. Therefore, pre-service biology teachers are encouraged to consistently explore these digital platforms and engage in online learning activities because integrating social media insights into classroom practices can significantly enhance pre-service teachers' learning outcomes in biology.

Table 2. Social media platforms commonly used by pre-service biology teachers

Social media apps	SA 4	A 3	D 2	SD 1	SUM	*M*	Std. Dev	Mean Rank
Facebook	33	15	10	2	60	3.32	1.190	2nd
Google meet and Zoom	13	17	10	23	60	2.38	1.162	Rejected
WhatsApp	37	20	1	2	60	3.53	1.245	1st
YouTube	18	23	13	6	60	2.88	1.025	4th
Blogs/web scholars	6	23	13	18	60	2.28	1.025	Rejected
Twitter	9	22	17	12	60	2.47	0.975	Rejected
Instagram	30	11	11	8	60	3.05	1.232	3rd
Webchat	7	11	20	22	60	2.05	1.103	Rejected

Research Question 2: What are the channels through which social media applications are accessed by pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria?
Table 3 revealed that the most common channel through which pre-service Biology teachers in Kwara State College of Education, Oro, access social media applications is through mobile phones which had a mean score of 3.70. This was followed by Tablets with mean of 2.80 while other channels such as Laptops and cyber cafes are rarely used. Mobile phones and tablets as the main channels through which pre-service biology teachers access social media enable students to engage in both individual and cooperative learning by connecting with peers through social media platforms, thereby improving their learning outcomes. Since most pre-service teachers have their own mobile phone or tablets, incorporating social media into classroom practices is essential to ensure that pre-service teachers leverage the benefits of these applications for enhanced learning outcomes.

Table 3. Channels used by pre-service biology teachers to access social media

Social Medias	SA 4	A 3	D 2	SD 1	SUM	*M*	Std. Dev	Mean Rank
Laptops	10	1	23	26	60	1.92	1.025	Rejected
Tablets	24	13	10	13	60	2.80	0.885	2nd
Mobile phones	47	10	1	2	60	3.70	1.372	1st
Cyber cafes	5	12	13	30	60	1.87	0.904	Rejected

Research Question 3: What is the frequency of use of social media applications by pre-service Biology teachers in Kwara State College of Education, Oro, Nigeria?

Table 4 indicates that pre-service Biology teachers in the college mostly visits their social media platforms between one to two hours during the day time since this duration gave the highest mean value of 2.90.

Table 4. Frequency of use of social media applications by pre-service biology teachers during the day

Social Media usage during day	SA 4	A 3	D 2	SD 1	SUM	*M*	Std. Dev	Mean Rank
0 - 59 min	14	23	15	8	60	2.72	0.992	3rd
1 – 2 hours	11	36	9	4	60	2.90	0.866	1st
3 – 5 hours	13	28	13	6	60	2.80	0.940	2nd
5 hours and above	19	16	10	5	60	2.48	1.004	Reject

Table 5 revealed that most pre-service Biology teachers used social media application during the night but the duration varies with one to two hours being the highest having obtained a mean score of 3.22. The scope of the present study did not cover the specific activities pre-service biology teachers engage in on social media platforms during the day and night but considered the frequency of use of social media applications. The main recommendation from the study is that pre-service biology teachers should make personal and deliberate efforts such as setting clear boundaries and creating distraction-free hours. Thus, pre-service biology teachers can benefit from the educational opportunities these platforms offer while minimizing potential distractions.

Table 5. Frequency of use of Social Media Applications by Pre-service Biology Teachers during the Night Time

Social Media usage in the Night	SA 4	A 3	D 2	SD 1	SUM	*M*	Std. Dev	Mean Rank
0 - 59 min	21	20	10	9	60	2.88	1.118	3rd
1 – 2 hours	22	31	5	2	60	3.22	1.025	1st
3 – 5 hours	18	26	12	4	60	2.97	0.992	2nd
5 hours and above	23	14	15	8	60	2.87	1.133	4th

Research Question 4: What is the influence of social media on pre-service Biology teachers study habits in Kwara State College of Education, Oro, Nigeria?

Study habits are the regular practices and routines that pre-service teachers develop to improve their learning and achieve academic success during their training. Table 6 showed that social media usage affects pre-service Biology teachers study habits as all the items had mean score that was above the benchmark mean score of 2.50. The negative influences are ranked 1st, 2nd, 7th, 8th, 9th, and 10th which include the fact that social media applications make students to be lazy and limit the rate at which they visit library. It also wastes, consume, and reduce students' study hours because students become addicted to its usage than being committed to their studies. Table 6 further reveals that users of social media are prone to cyber bullying leading to psychological trauma and subsequently poor study habits. In addition, social media can encourage examination malpractices and may ultimately divert the attention of pre-service Biology teachers from their studies. A cursory look at Table 6 indicates that despite the positive influences of social media applications on pre-service Biology teachers study habits, the negative influences outweigh the positive influences. The positive effects of social media applications are ranked 3rd, 4th and 6th which include making information for research studies readily available, ease communications

during virtual lectures, makes pre-service teachers to be technological inclined and assist pre-service Biology teachers in solving assignments and other class works.

Biology, as a subject, thrives on visual and interactive content, making social media an excellent medium for enhancing students learning outcomes. Platforms such as WhatsApp, Facebook, Instagram, and YouTube can be used to create short, engaging videos that explain complex biological concepts, demonstrate experiments, or showcase fascinating phenomena in the natural world. However, uncontrolled use of social media can be detrimental to the study habits of pre-service biology teachers. However, since mobile phones and tablets are the primary channels for accessing social media as established in this study, it is recommended that pre-service biology teachers intentionally set time limits for these applications to prevent overuse and its adverse effects on their study habits, which could negatively impact their learning outcomes.

Table 6. Influence of social media on pre-service biology teachers' study habits in Kwara State College of Education, Oro, Nigeria

No	Influence of Social Medias	SA	A	D	SD	SUM	*M*	Std. Dev.	Mean Rank
1	Social media usage waste, consume and reduce students' study hours	33	20	5	2	60	3.40	1.190	2nd
2	Social media application makes students addicted to the usage than being committed to studies	21	29	6	4	60	3.12	1.041	7th
3	The use of social media by pre-service Biology teachers' ease communications during virtual lectures	26	26	5	3	60	3.25	1.103	4th
4	Social media usage among pre-service Biology teachers for provide information for research studies readily available	27	26	5	2	60	3.30	1.103	3rd
5	Usage of social media applications among pre-service Biology teachers helps them in solving assignments and other class works	25	26	6	3	60	3.22	1.088	6th
6	Frequent usage of social media by pre-service Biology teachers makes them to be technological incline thereby improving their study habits	29	22	4	5	60	3.25	1.176	4th
7	The usage of social media by pre-service Biology teachers easily diverts their attention from study	15	25	11	9	60	2.77	1.025	10th
8	The usage of social media makes students to be lazy and limit the rate at which they visit library to study	32	24	1	3	60	3.42	1.190	1st
9	Social media usage among pre-service Biology teachers encourages examination malpractices	24	21	6	9	60	3.00	1.162	9th
10	Some pre-service Biology teachers experience cyber bullying through social media usage resulting to psychological trauma and subsequently exhibiting poor study habits	19	28	11	2	60	3.07	0.975	8th

Test of Hypotheses (H$_0$): there is no significant difference between social media application usage and pre-service Biology teachers study habits in Kwara State College of Education, Oro, Nigeria.

In other to test the null hypothesis, the pre-service teachers' responses were converted into quantitative data and subjected to t-test statistical analysis after normality and homogeneity of variance were determined. Hence, an independent sample t-test was conducted to compared social media application usage and pre-service Biology teachers study habits. Table 7 revealed that there was a significant difference in the scores for study habits (M=17.48, SD=6.34) and social media application usage (M=20.65, SD=8.07); t (118) = 2.39, p = .02. Hence, the hypothesis was rejected since p < .05. These results suggest that social media application usage influences pre-service Biology teachers study habits in Kwara State College of Education, Oro, Nigeria.

Table 7. t-test result of the difference between social media application usage and pre-service Biology teachers study habits.

Independent variables	M	SD	t	df	Sig	Remark
Study habits	17.48	6.34	*2.39*	118	.02	Rejected
Usage of social media	20.65	8.07				

Note. M = mean; *t* = value of *t*-test statistic.

The finding of this study indicated that the most commonly used social media platform by pre-service Biology teachers in Kwara State College of Education, Oro is WhatsApp which is closely followed by Facebook, Instagram and YouTube respectively. This is because the mean of these platforms is above the benchmark mean score of 2.50. In addition, it was discovered that google meet, zoom, blogs/web scholars, twitter and webchat are not commonly used by pre-service Biology teachers in Kwara State College of Education, Oro because their mean score is less than the benchmark mean of 2.50. The four identified social media platforms with the highest usage that is WhatsApp, Facebook, Instagram and YouTube are commonly used by pre-service Biology teachers for instant messaging, business publicities, watching movies and status updates. The pedagogical implication of this finding is that pre-service Biology teachers have not been fully immersed into the use of social media platforms for academic work. This finding is in line with that of Okereke & Oghenetega (2014) who identified Facebook, WhatsApp, and 2go/Skype as often used by undergraduates while Myspace, Twitter, badoo, Blogs/web scholars, Google+/Social bookmarking are not often used by undergraduates for academic purposes. The first finding of this study also corroborates the finding of Apuke (2016) which revealed that Facebook and WhatsApp are the most used social media platforms by tertiary institution students. It tallied with Ogbuso (2022) that Pinterest, Twitter, Instagram, Zoom, WhatsApp, Facebook, YouTube, and Email are often utilised by lecturers for pre-service teachers in colleges of education in Nigeria.

Findings also showed that the most common channel through which pre-service Biology teachers in Kwara State College of Education, Oro, access social media applications is through mobile phones and Tablets while Laptops and cyber cafes are rarely used. The possible justification for this finding may be due to economy, ease of accessibility and portability of mobile phones, and the recent deployment of virtual/online classroom by the college which might have caused many students to see the need for possessing smart phones. The implication of this finding is that most pre-service teachers have a means of accessing social media platforms and are prepared for its deployment for teaching and learning activities. This finding tallies with the finding of Adewumi et al. (2023) who discovered that pre-service and in-service teachers displayed high level of preparedness for the use of smart phones as a means of mobile learning pedagogical approach in Nigeria tertiary institutions. The finding also corroborates the discovery of Onwuagboke et al. (2014) who noted that mobile phones remain the most widely used means by

which undergraduates access the internet. This finding is further confirmed by the result of the study by Apuke (2016) on the influence of social media on academic performance of undergraduate students of Taraba State University which revealed that students usually access the internet using smart phones, tablets and computers.

The result of this study also revealed that most pre-service Biology teachers in the college uses their social media applications daily with an average of 1-2 hours usage during the day and night hours. A comparative review of Table 3 and 4 also indicated that social media applications is used mostly during the night hours by pre-service teachers because all the mean scores for the night hours was greater than the mean benchmark score of 2.50. This finding could be ascribed to lecture attendance routine and other related activities which keeps the students busy during the day time in the college than at night when they retire to their respective places of abode and are not bound to any routine. The pedagogical implication of this finding is that pre-service teachers use most of their free time to access their social media applications and this may negatively impact their sleep duration during the night which tends to affect their alertness during the day time when rigorous academic work take place. This agrees with the findings of Anyira (2023) who discovered that the average usage of social media by many students peaked at 7 hours daily as they prefer using social media to read despite identifying it as a major hindrance to reading. It also tallies with the finding of Manjur et al. (2021) that excessive use of social media for non-academic purpose distracted students from learning and delayed their bed time, which in turn reduced their sleep duration and decreased face to face interaction among undergraduates.

In addition, finding indicated that social media usage affects pre-service Biology teachers study habits. This was further confirmed by the hypothesis tested which indicated a significant difference between social media application usage and pre-service Biology teachers study habits. This finding affirmed the positive impact of social media applications on academic work of pre-service teachers. However, it wastes, consume and reduce students' study hours because students may become addicted to its usage than being committed to their studies. This finding tallies with that of Anyanwu (2022) that a significant correlation exists between study habits and students' performance. The finding also corroborates the findings of Mkpa (2020) that oftentimes most teachers use social media platforms for charting with friends or sending private messages rather than for educational purposes. It also agrees with the finding of Ademiluyi and Ademiluyi (2020) that considerable number of business education students exhibited signs of addiction to social media as some were involved in posting and commenting on social media even during class sessions. The finding is further confirmed by the conclusion of the study of Alabi et al. (2016) that though pre-service teachers have positive attitude towards the use of social media they do not use the platforms majorly for academic activities.

CONCLUSION

The study concluded that pre-service Biology teachers use social media and it is affecting their study habits and learning outcomes that is the acquisition of specific knowledge, skills, attitudes, and competencies that are expected to be acquired by pre-service teachers. These outcomes are critical as they prepare pre-service teachers for effective teaching and professional development. It was also concluded that the most used social media platforms are WhatsApp, Facebook, Instagram, and YouTube which are mostly used for socialization than for academic purposes. Based on the findings, the following recommendations are advanced: (1) Pre-service Biology teachers should set their priority right by taking advantage of social media for learning, online discussion, seeking academic help from academic faculty, downloading materials for reading and research purpose, and for solving academic related problems. (2) Lecturers should restrict students from using their phones when lectures are on-going. This will help to curb the extent to which students are distracted during lecture periods. (3) Pre-service teachers should be given take home assignments that gets them engage during the night hours so has to cut down on the time

they spent surfing the internet. (4) Students should invest their time wisely and concentrate more on their studies rather than spend their time on social media platforms for non-beneficial engagement. (5) School management should organize workshops for pre-service teachers on the dangers of getting addicted to social media usage as it may have negative impact on their learning outcomes.

REFERENCES

Adebayo, O. R., Ibrahim, N. S., Adamolekun, I. D., & Adeleke, A. A. (2023). Perceived usefulness and ease-of-use of pre-service teachers towards the integration of social media for education in universities in Niger State. *African Scholars Journal of Education Research and Library Practice, 29*(8), 1-16.

Ademiluyi, L. F., & Ademiluyi, A. (2020). Utilization of social media for academic purposes by business education students in Nigerian colleges of education. *International Journal of Education, Learning and Development, 8*(3), 83-93.

Adeoye, G. A., Adewumi, G. S., & Ayanda, M. O. (2024). Availability and utilization of information and communication technologies facilities for teaching biology in Irepodun Local Government Area, Kwara State, Nigeria. *International Journal of Vocational Studies and Library Science, 4*(1), 10-21.

Adewumi, O. E., Asino, T. I., & Jha, K. (2023). Preparedness of preservice and in-service teachers' towards the use of mobile devices in Nigeria. *International Journal of Education and Development using Information and Communication Technology, 19*(1), 102-114.

Alabi, T. O., Falode, M. E., Nsofor, C. C., & Tukura, C. S. (2016). Pre-service teachers' attitude & extent of social media utilization for educational purposes in tertiary institutions in Minna metropolis, Niger state, Nigeria. *Journal of Science, Technology, Mathematics and Education, 12*(2), 160-166.

Anyanwu, R. I. (2022). Study habit as a predictor of academic performance among biology students in College of Education Zaria. *Journal of Science Technology and Education, 10*(1), 381-386.

Anyira, I. E. (2023). Influence of social media on reading culture among Nigerian polytechnic students. *Asian Journal of Advanced Research and Reports, 17*(10), 224–235.

Apuke, D. O. (2016). The influence of social media on academic performance of undergraduate students of Taraba State University, Jalingo, Nigeria. *Research on Humanities and Social Sciences, 6*(19), 63-72.

Bhandarkar, A. M., Pandey, A. K., Nayak, R., Pujary, K., & Kumar, A. (2021). Impact of social media on the academic performance of undergraduate medical students. *Medical Journal Armed Forces India, 77*(1), 37-41.

Dungon, M., Jainar, M. G., Labrador, G., Lazaga, J., Suello, M. A., & Cabanilla, A. (2024). Study habits and sacrifices of working students in a State University. *International Journal of Multidisciplinary Research and Growth Evaluation, 5*(1), 750-755.

Fakunle, S. M., Bakare, O. D., & Jatto, V. O. (2023). Reading habit as determinant of library usage among undergraduates of private universities in Oyo State. *International Journal of Education, Library and Information Communication Technology, 2*(1), 28-37.

Fraser, B. J. (2012). Classroom learning environments: Retrospect, context and prospect. *Second international handbook of science education*, 1191-1239.

Güney, K. (2023). Considering the advantages and disadvantages of utilizing social media to enhance learning and engagement in K-12 education. *Research in Social Sciences and Technology, 8*(2), 83-100.

Irawadi, S., & Marini, M. (2024). Sosialisasi Pengetahuan Media Sosial dan Modus Kejahatan Teknologi Informasi. *Jompa Abdi: Jurnal Pengabdian Masyarakat*, *3*(1), 1-5.

Irdawati, I., Chatri, M., Wulansari, K., Razak, A., & Fajrina, S. (2023). Development of STEM-based biology e-module to improve student learning outcomes. *Jurnal Penelitian Pendidikan IPA, 9*(8), 6694-6700.

Kaur, J., & Singh, P. (2020). Study habits and academic performance: A comparative analysis. *European Journal of Molecular & Clinical Medicine, 7*(7), 6161-6166.

Komolafe, T. (2021). The impact of social media on education and society. *New Trends in Science, Technology, Management and Social Sciences in Africa; 3rd International Conference of Villanova Polytechnic*, 79-85.

Leyrer-Jackson, J. M., & Wilson, A. K. (2018). The associations between social-media use and academic performance among undergraduate students in biology. *Journal of biological education, 52*(2), 221-230.

Loto, A. B., & Ayelaagbe, S. O. (2023). Social media learning platform as correlate of insecurity among pre-service teachers in Ondo state, Nigeria. *Journal of Contemporary Issues in Education, 7*(1), 88-102.

Manjur, K., Raisa, N. A. K., & Abdalla, A. (2022). Effect of social media use on learning, social interactions, and sleep duration among university students. *Saudi Journal of Biological Sciences, 28*(4), 2216-2222.

Maulana, I., Harahap, R. D., & Safitri, I. (2022). Use of learning media through technology for biology education students. *Jurnal Biologi-Inovasi Pendidikan, 4*(3), 282-290.

Mkpa, A. M. (2020). Perception and the use of social media by junior secondary school teachers in Abia state. *International Journal of Multidisciplinary and Current Educational Research, 2*(5), 427-433.

Musa, E. H., & Agboola, A. K. (2020). Perception of social media use in disseminating health-related academic information in public health schools in Minna, Nigeria. *International Journal of Electronic Healthcare, 11*(2), 170-186.

Nannim, F. A., Njoku, Z. C., Onuoha, J. C., Orji, E. I., & Njoku, O. C. (2023). Undergraduate students' use of social media in school: A need for regulatory policies in Nigerian universities. *Pedagogical Research, 8*(1), 1-11.

Navarro, J. M. F. (2024). Exploring the impact of study habits on the academic performance of college of Health students in biology at the University of Cagayan Valley Tuguegarao. *Psychology and Education: A Multidisciplinary Journal, 16*(6), 628-638.

Nurhazirah, A., & Zaidatul, S. M. A. (2017). Potential of Edmodo – an Educational Social Network Sites (ESNS) in biology classroom. *International Journal of Academic Research in Business and Social Sciences, 7*(11), 1473-1488.

Nuriadin, A., & Harumike, Y. D. N. (2021). Sejarah Perkembangan Dan Implikasi Internet Pada Media Massa Dan Kehidupan Masyarakat. *SELASAR KPI: Referensi Media Komunikasi Dan Dakwah, 1*(1), 1-25.

Ogbuso, G. N. (2022). Colleges of education lecturers use of social media for teaching of office technology and management education (OTME). *Nigerian Online Journal of Educational Sciences and Technology, 4*(1), 100-107.

Okereke, C. E., & Oghenetega, L. U. (2014). The impact of social media on the academic performance of university students in Nigeria. *Journal of Education and Practice, 5*(33), 21-24.

Onwuagboke, B. B. C., Singh, T. K. R., & Fook, S. F. (2014). Pre-Service teachers' internet usage a function of demographic factors: The case of a Nigerian college of education. *Journal of Education and Learning, 4*, 299-308.

Onwukeme, I. A. (2023). The relationship between study habits and academic achievement of biology students in Owerri education zone of Imo State. *ISSRA Journal of Education, Linguistics and Literature, 3*(6), 1-5.

Pangsuma, N. S., Surakusumah, W., & Sanjaya, Y. (2024). Comparative study of learning models and teaching materials on student cognitive learning outcomes. *Quagga: Journal of Education and Biology, 16*(2), 108-117.

Prøitz, T. S. (2010). Learning outcomes: What are they? Who defines them? When and where are they defined?. *Educational Assessment, Evaluation and Accountability, 22*, 119–137.

Purwanto, A., Fahmi, K., & Cahyono, Y. (2023). The benefits of using social media in the learning process of students in the digital literacy era and the education 4.0 era. *Journal of Information Systems and Management, 2*(2), 1-7.

Ratnapuri, C. I., Karmagatri, M., Kurnianingrum, D., Utama, I. D., & Darisman, A. (2023). Users opinion mining of TikTok shop social media commerce to find business opportunities for small businesses. *Journal of Theoretical and Applied Information Technology, 101*(1), 214-222.

Sadang, K. M. C. (2022). Factors affecting the students' academic achievement and study habits of Isabela State University-Jones campus in the history of biological theories. *IOER International Multidisciplinary Research Journal, 4*(3), 32-39.

Sari, A., Manurung, B., & Harsono, T. (2022). Student response to TikTok application as a science biology learning media for middle school students. *Proceedings of the 7th Annual International Seminar on Transformative Education and Educational Leadership, AISTEEL 2022,* 1-5.

Schroeder, A., Minocha, S., & Schneider, C. (2010). Social software in higher education: the diversity of applications and their contributions to students' learning experiences. *Communications of the Association for Information Systems, 26*(25), 547-564.

Susanto, L. H., Rostikawati, R. T., Novira, R., Sa'diyah, R., Istikomah, I., & Ichsan, I. Z. (2022). Development of biology learning media based on android to improve students understanding. *Jurnal Penelitian Pendidikan IPA, 8*(2), 541–547.

Walck-Shannon, E. M., Rowell, S. F., & Frey, R. F. (2021). To what extent do study habits relate to performance? *CBE—Life Sciences Education, 20*(6), 1–15.