Influence of Social Media Usage on Science Students' Academic Achievement and Behaviour in Two School-Types in Nigeria

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Abstract

Students' achievements and behavior have continued to dwindle over the years and are getting worse in Nigeria with advancements in technology. Both Public and Private school students who have access to Android phones for social networking are spending less time studying after school. This paper was carried out to find out how the time spent on social media can influence the basic science achievement and behavior of secondary school students from two school types. The study sample consisted of 180 junior secondary schools three students of Delta State public and private schools who had access to an Android phone for social media activities after school. Four research hypotheses guided this study. The research instruments used were the social media time questionnaire (SMTQ) with a reliability coefficient of 0.66 and the 2020/2021 academic session results of the students. Access to their results made it possible to compare their basic science and behavioral achievements. The data contained no significant outliers (p=0.054 Kolmogorov-Smirnov- normality test). Data analysis was done using descriptive, t-test, and 2-way ANOVA statistics. Results showed differences in Basic science achievement in favor of private schools and differences in behavior assessment in favor of public schools but the differences were not significant (p= 0.242; p= 0.656). No significant interactions were found between social media usage time and school type on students' behavior [p=0.470] and basic science achievement [p= 0.549]. Major recommendations are the emphasis on a reduction in social media usage times irrespective of the school type and an increase in study times.

Keywords: social media times, public schools, private schools, science achievement, behaviour

1. Introduction

The quality of education is measured by outputs such as achievements but is currently threatened by various challenges (Sullivan, 2017; Yuzkiv et al., 2020; Slipchuk et al., 2021), which vary in intensity based on several factors, such as the type of school attended and the amount of time students spend on social media. Social media is an aspect of Information Communication Technology (ICT) that has rapidly proliferated and penetrated almost every sector of human life. Social media is defined as an application that allows users to converse and interact with each other, to create, edit, and share new forms of textual, visual, and audio content, and to categorize, label, and recommend existing forms of content (Olowo et al., 2020). It is fast changing the public discourse in our societies and setting inclinations and agendas in various topics on the environment, politics, education, technology as well as the entertainment industries (Oguoguo et al., 2020). Social networking exists to provide communication among people regardless of distance, allowing people to easily share information, files, pictures, and videos, create blogs, send messages, and conduct real-time conversations even in corporate meetings. These activities are termed social because they allow communication with buddies and co-workers easily and effectively (Al-Rahmi and Othman, 2013).

It has been reported that most users of social networks are representative of the younger generation (Talaue et al., 2018; Oguguo et al., 2020). During the period spent discovering individuals for acquaintances, youngsters go into different connections and get the chance to speak with a relatively boundless number of individuals and premium gatherings with a wide range of identities, take in a considerable measure of stories, and trade suppositions, and discuss issues important to them. According to Paul, Baker & Cochran, (2012) social media usage has become so popular among students of different ages and schools that various institutions have no choice but to use them to market their programs as well as use them to communicate with the students who are already used to them. The students have the advantage of using them to increase their within-classroom and outside-classroom connections and information sharing between them and their classmates in the same or other schools as well as with their teachers making learning come with variety and fun (Lim & Richardson, 2016). Most of these students have access to Android phones, which they use for social networking after school each day, regardless of their school type (Kolan and Dzandza, 2018; Omachonu and Akanya, 2019). Oguguo et al. (2020) discovered that senior secondary school students use social media to make new friends, chat with friends, upload their photos and videos, research their assignments and other educational materials, stay up-to-date with the latest trends and news, reach out to their classmates for group assignments, research future academic careers, and discuss trending topics like Big Brother Naija and the Champions League.

The amount of time students spend on social media has raised concerns. They usually multitask by visiting several sites and accessing volumes of content (Rideout et al., 2010). It has been noted that almost 55% of teenagers have created profiles on social networking sites, with 47% having uploaded photos, while 14% have posted videos, and almost all of them have posted an image or comment on a platform. Ajewole and Fasola (2012) reported that an average Nigerian student spends about 6-7 hours on the internet daily, with some spending more hours doing all-night browsing. Olowo et al., (2020) opined that social media as an interactive tool for teaching and learning activities could result in better performance in WASSCE. Depending on how they use this time, the time they spend on social networking on their phone can reduce the time they spend studying, which can negatively affect their academic performance (Kuppuswamy & Narayan, 2010; Lee & Louis, 2016; Mensah, 2016). Masrom, Busalim, Abuhassna & Mahmood (2021) carried out a review of literature on “understanding students' behaviour in online social networks” and they found mixed results on the relationship that existed between social media usage and students' academic performance and students' behaviour. They found that the disparate results were as a result multi-tasking and students class rank. Their reviews also show that between 2010 and 2012, researchers focused on studying the benefits of social media usage by students and found that they were mostly for academic results and educational purposes. While between 2013 and 2015, most studies focused on psychological issues that explained the effects of social media usage on students' levels of stress, anxiety and depression. Between 2016 and 2018, studies on social media usage focused on cyber victimization, cyber bullying and addictions to mostly facebook and behaviours among students like sharing information among themselves. On how social media usage can affect behaviour, they also found out from their reviews that most of the students had either experienced or knew someone who had experienced cyber victimization and cyber bullying in one way or the other, or had become addicted to social media usage and this has resulted to mood modification, withdrawal, conflict, and relapse. They concluded that the use of social media sites has become a daily habit among students and there is need for caution against its excesses.

Both public and private schools face varying levels of challenges that affect students' performance. Previous studies suggest that the type of school where the child learns can positively or negatively influence the child, with feedback felt in the quality of education and outputs. Some researchers found that school type and environment affect achievement (Chepkonga, 2017; Folami & Musolihu, 2021), while others concluded that they do not affect students' performance and behavior (Igboko and Ibeneme, 2005). Parents, teachers, and researchers have different opinions on whether public schools are better than private schools using various parameters (Braun et al., 2006; Lubienski and Lubienski, 2006; Igbinedion and Epumepu, 2011; NAEP-US, 2012; Adeyemi, 2014; NEDS, 2015). While some researchers have found that public schools are better in achievements (Igbinedion and Epumepu, 2011), others found that private schools are better in students' achievements (Braun, Jenkins & Grigg, 2006, Lubienski & Lubienski, 2006; NAEP-US, 2012; Adeyemi, 2014; NEDS, 2015). Thus, previous studies have yielded conflicting and inconclusive results on the effect of school type on students' achievements and behavior.

There have been controversies and inconclusive arguments on how social media usage times affect students' achievement and behavior in both public and private schools (Otrar & Argin 2014; Onge & Hoehn, 2015; Yaviz, 2018). Similarly, interviews carried out by the researchers during the fieldwork showed that many parents have the impression that students who pay more attention to social media time do poorly than those who do not. Parents also believe that students from private schools spend more time on social media platforms than their counterparts from public schools

because they are richer and have more money for phones and data (Researchers fieldwork, 2021). Students' science achievements and behavior have continued to decline over the years and are worsening in Nigeria with advancements in technology. Both public and private school students who have access to Android phones for social networking are spending less time studying after school, which can negatively impact their academic performance and behavior. The researchers intended to substantiate this claim which is also contrary to the results of a study carried out by Peter, Douglas & Patient (2022) on university students' behaviour and how the use of social media can affect the academic achievement of students. They found an insignificant relationship between social media usage and students' academic performance. They also found out that helping other students through the use of social media had a positive and significant impact on their academic performance and behaviour. These controversies in results led to this study that was carried out in Nigeria.

1.1 Aim of the Research

The main aim of this study was to compare the academic performance and behavior of students in public and private schools, based on their usage of social media platforms after school hours. The study was guided by five research hypotheses.

- Research Hypotheses
    - The social media usage times of students on the various networking sites concerning their school types are not significantly different.
    - There is no significant difference in the basic science achievement of the public and private school students who use social media sites.
    - There is no significant difference in the behavior of the public and private school students who use social media sites.
    - There is no significant interaction between heavy, moderate, and low usage of social media sites on the basic science achievements of public and private school students.
    - There is no significant interaction of heavy, moderate, and low usage of social media sites on the behavior of public and private school students.

2. Methods

This study adopted the method of Oguguo et al. (2020) with modifications. A descriptive survey research design was used where data was obtained from a representative of the entire student group, and it is consistent with the nature of the problem being investigated. The population of the study was made up of 962,847 public and private secondary school students in Delta State. Only students in junior secondary school three (JSS 3) were selected because these students have spent three years in secondary levels. The sample consisted of 180 students from six secondary schools randomly selected from the three senatorial districts of Delta State. For equal representation, a total of 30 students from each of the six secondary schools were used. To qualify for the sample selection, the students must consent to have full or partial access to an active phone at home. Those students who spend more than 4 hours on their social media platforms after school hours were classified as heavy users, those who spend between 2 and 4 hours as moderate users, and those who spend from 0-2 hours as low users. The number of students who were in each category exceeded 60. Simple balloting without replacement was done because there were only 60 yes papers (30 from public and 30 from private schools) in each of the three categories (high, moderate, and low users). In the end, only the 180 who said yes were used for the research.

Two instruments were used for data collection. The social media time questionnaire (SMTQ) and the students' 1st term 2020/2021 basic science examination result. The questionnaire had two sections. Section 1 contained demographic data to obtain personal information such as name, class, school type, gender, and number of hours spent on the internet after school hours each time. Section 2 listed the social networking sites students engaged in after school hours. The students were required to tick each box showing the site he/she prefers to engage in after school and also indicate the length of time spent on the site. The first term basic science result contained the basic science cognitive assessment score for the students as well as the psycho-motor assessment of the students which were transposed as behavior scores for the students.

The instruments were presented to the professionals in Measurement and Evaluation who ascertained their face and content validity. Their observations and corrections were made accordingly. To determine the reliability of the SMTQ questionnaire, a pilot test was undertaken on 50 students of another secondary school who were not used for this study.

The data collected was subjected to the Cronbach Alpha reliability test. The justification for its use was that although the questions were dichotomous, the test would measure the internal reliability of the questionnaire. Consequently, a reliability coefficient of alpha level of 0.66 was obtained and was considered adequate for the internal consistencies of the instrument. The researchers and basic science teachers administered the questionnaires. The 1st term examination results sheets containing the basic science cognitive score as well as the assessment for the affective and psycho-motor of all the students were obtained from the school's examination officer after obtaining due permission from the heads of the schools.

Descriptive statistics was used in presenting the demographic data and answering the research questions; t-tests and two-way ANOVA were used in testing the hypotheses. The basic science achievement score was already on their result. To get the behavior score for each of the students, the 10 items in the behavior indices in their result were rated on a scale of 1-5 and the total was multiplied by 2 to get a total score of 100. All hypotheses were tested at a 0.05 level of significance to determine those retained and rejected.

3. Results

3.1 Normality of Data Sets

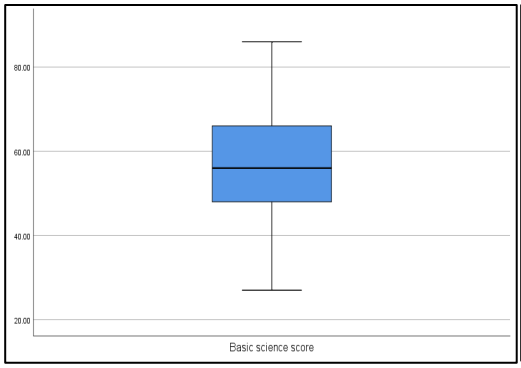

Figure 1a. Kolmogorov-Smirnov Test for Basic Science Achievement

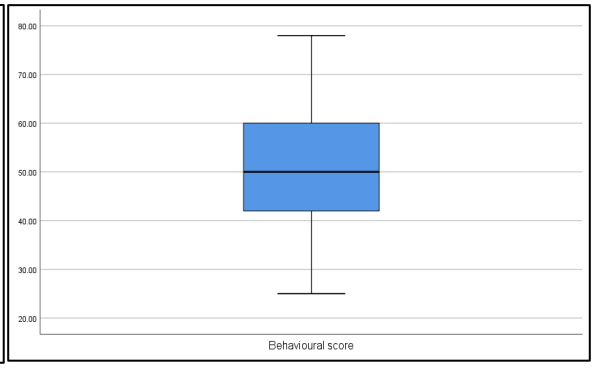

Figure 1b…..K-S Test for Behavior Scores

Figure 1a and 1b are the results of a Kolmogorov-Smirnov test conducted to show normality of the data sets for Basic science and behavior scores of the students respectively. The results showed that data was normally distributed for both Figure (1a and 1b) (p= 0.054). The data did not contain any significant outlier.

3.2 Analysis of Research Hypotheses

RH1: There is no significant difference between social media times of public and private school students who use the various networking site

Table 1. Social Networking Sites Used by Public and Private School Students

S/N	Social media sites	No who use sites after school hours regardless of time spent	Breakdown of users by school types			
			Public school users in %	Private school users in %	diff in %	X-chi test
1	Zoom	40	0 (0%)	40(100%)	100(pr>pu)	0.000*
2	Facebook	159	86(54%)	73(46%)	8(pu>pr)	0.303**
3	Whats App	101	52(51%)	49(49%)	3(pu>pr)	0.765**
4	Instagram	102	31(30%)	71(70%)	40(pr>pu)	0.00007*
5	Snapchat	47	28(60%)	19(40%)	9(pu>pr)	0.189**
6	Twitter	44	14(32%)	30(68%)	16(pr>pu)	0.016*
7.	Tiktok	180	90(50%)	90(50%)	pr=pu	1.000**

*significant difference found between public and private school users; ** no significant difference found

Table 1 clearly shows that there are differences in usage of various social media times between students of public and private schools across various sites. The private school students engaged more in social media sites than the public school students. Although Tiktok had equal percentage usage by public and private school students (50%); in Zoom, Instagram, and Twitter, the private school students who used social media sites had higher usage times and the percentage differences were far higher (100%,40% and 16%) than the percentage differences in Facebook, Whatsapp, and Snapchat sites (8%, 3%, 9%) where public school students had higher usage times.

The Chi-square analysis showed significant differences between public and private school social media usage times for Zoom, Instagram, and Twitter sites and no significant differences between public and private school students' social media usage times for Facebook, Whatsapp, Snapchat and Tiktok.

RH2: There is no significant difference in the basic science achievement of the public and private school students that use social media sites.

Table 2. t-test for Comparison of Basic Science Achievement of Public and Private School Students

School type		N	Mean	Mean dif	df	T- cal	T-cri	decision
Basic science score	Private	90	58.21	2.30	178	1.175	1.96	Accept
	Public	90	55.91					Ho

k*p=0.242>0.05

Table 2 shows that there were differences in the mean basic science scores of students in public schools and those in Private Schools. The mean basic science score for those in public schools was 55.91 while the mean basic science score for those in private schools was 58.21 the mean difference was 2.30.

Although the students in private schools that used social media sites had better performance in basic science than those in private schools an independent sample t-test showed the result (p= 0.242) was not significant at 0.05 level of significance. Also, the t-calculated (1.175) was lesser than the table value t= 1.196). This shows that though there was a difference in favour of private schools, the difference was insignificant. Thus, hypothesis two is upheld.

RH3: There is no significant difference in the behavior of the public and private school students that use social media sites.

Table 3. t-test Summary Table for School Type and Basic Science Achievement

*p= 0.656 School type		N	Mean	Mean diff	df	T- cal	T-cri	decision
Basic science score	Private	90	50.73	-0.80	178	0.446	1.96	Accept
	Public	90	51.53					Ho

Table 3 shows that there were differences in the mean behavior score for private school students and public school students. According to the data, the average behavior score for students in public schools was 51.53, while the average behavior score for students in private schools was 50.73. The difference in mean score was -0.80, indicating that private schools had a slightly better score than public schools.

An independent sample t-test was conducted to determine whether this difference was significant. The result was not significant at the 0.05 level of significance, with a p-value of 0.656 and a calculated t-value of -0.446. This means that there was no significant difference in behavior between students from public and private schools. Even though private schools had a slightly better score, the difference was not large enough to be considered significant. Therefore, hypothesis three was supported, indicating that there was no significant difference in the behavior of students from public and private schools.

RH4: There is no significant interaction effects of heavy, moderate and low usage of social media sites on basic science achievements of public and private school students.

Table 4. School Type, Social Media Usage Times and Achievement and Behavior

Social media usage time	School type	Basic science mean scores
low users	Public school	61.5333
	Private school	62.0667
moderate users	Public school	60.7333
	Private school	57.2000
heavy users	Public school	48.0333
	Private school	52.6500

Table 4 presents a comparison of the achievement scores among social media users, with public and private school students being categorized as heavy, moderate, or low users of social media sites. Mean scores reveal differences within and across school types and social media usage times regarding basic science achievement. Private school students performed better than public school students in achievement for both low users and heavy users (X= 62.06>61.63; 52.65>48.03). However, for moderate users, public school students did better in basic science achievement. Nevertheless, the mean differences, which ranged between 4.62 and 0.54, were low in all cases. The interaction effect was analyzed in Table 5, which shows the results of the group interactions.

Table 5. Anova Table on Interactions of Social Media Times and School Type on Basic Science Achievement

Dependent Variable:	Basic science score				
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4633.894[a]	5	926.779	6.131	.000
Intercept	586074.672	1	586074.672	3877.388	.000
Social media _use	4214.211	2	2107.106	13.940	.000
school_type	238.050	1	238.050	1.575	.211
Heavy, moderate and low social media usage _ * school_type	181.633	2	90.817	.601	.549
Error	26300.433	174	151.152		
Total	617009.000	180			
Corrected Total	30934.328	179			
a. R Squared = .150 (Adjusted R Squared = .125)					

The study utilized a two-way ANOVA statistic and the resulting p-value of 0.549 indicated that there was no significant interaction effect between social media usage and school types on the basic science achievement scores of students. This confirms that Hypothesis 4 is true, which states that there is no significant interaction effect of heavy, moderate, and low usage of social media on the basic science achievements of students in public and private.

RH 5: There is no significant interaction effects of heavy, moderate and low usage of social media sites on behavior of public and private school students

Table 6. School Type, Social Media Usage Times and Achievement and Behavior

Social media usage time	School type	behavior mean scores
low users	Public school	57.4000
	Private school	55.2333
moderate users	Public school	48.7667
	Private school	45.2000
heavy users	Public school	51.8667
	Private school	49.7000

Table 6 presents a comparison of behavior scores among social media users, with public and private school students classified as heavy, moderate, or low users of social media sites. The mean scores indicate that there are differences in behavior among students of various school types and social media usage patterns. In all usage categories, public school students had better behavior scores than private school students (X=57.40>55.23; 48.76>45.20; 51.86>49.70). However, the mean differences observed were not significant.

Table 7. 2-way Anova Table of Interactions of Social Media Times School Types on Behavior

Dependent Variable: behavior score					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3052.267[a]	5	610.453	4.666	.001
Intercept	470631.200	1	470631.200	3597.571	.000
student_use	2825.033	2	1412.517	10.797	.000
school_type	28.800	1	28.800	.220	.640
Social media usage _ * and school_type	198.433	2	99.217	.758	.470
Error	22762.533	174	130.819		
Total	496446.000	180			
Corrected Total	25814.800	179			
a. R Squared = .118 (Adjusted R Squared = .093)					

According to the 2-way ANOVA result presented in Table 7, the analysis shows that there is no interaction between the amount of time spent on social media and the type of school attended with respect to the behavior of students in Nigeria. Hypothesis 5 is upheld, as the calculated F value of 0.758 is less than the table value of 3.09, indicating no significant interaction effect of social media usage time, type of school, and behavior of the students.

4. Discussion

The objective of this study was to explore the influence of school types and social media usage on the academic and behavioral performance of students. The findings showed that there were similarities and differences between this research and previous studies. The analysis of the four research questions revealed that there were variations in the basic science achievements and behavior of students who use social media sites after school hours, for both private and public school students. However, these differences were not statistically significant.

Regarding basic science achievement, the study found that private school students performed better than public school students, with a mean score of 58.21 and 55.91, respectively. This result supports previous research, which reported that private school students who use social media sites perform better in basic science than their public school counterparts (Adeyemi, 2014; Lubienski & Lubienski, 2006). However, the small mean difference of 2.30 was not statistically significant. This is in line with Barrington's (2022) research, which found that private and public school students perform equally well in science when variables such as income are taken into account. Other studies have reported opposite findings, indicating that public school students perform better in science than private school students who use social media sites (Igbinedion & Epumepu, 2011).

Overall, the scores for both basic science and behavior were not excellent. The highest score was 62.07 in basic science achieved by low users of social media sites from private schools. In contrast, heavy users from public schools did not even reach the average 50% pass mark in basic science. In terms of behavior, the scores ranged from average to failure rates, with no significant differences between private and public school students. These results suggest that social media usage may be a factor contributing to the general low academic and behavioral performance across the board. It should be noted that students who were not included in the study, such as those who do not use social media sites or do not have access to phones, could have altered the results.

Several studies have shown that students who do not use or are low users of social media sites perform better academically than those who use them frequently (Kirschner & Karpinski, 2010; Muhammad, Muhammad, & Asim, 2019). A study by Mingle and Adams (2015) also found that using social media sites can lead to a reduction in grades. The study also showed that irrespective of school type, students who engaged in social media usage had similar

behavior, with no significant differences between them. However, Mingle and Adam's research found that most students who used social media sites became addicted to them, leading to negative effects on their behavior.

In conclusion, the study found that there was no significant effect of school type and social media usage times on both academic achievement and behavior. Thus, students in the same categories of social media usage times (high, moderate, and low) will perform and behave similarly, irrespective of their school type.

6. Conclusion

The use of social media by science students in secondary schools has been found to have both positive and negative impact on performance of students globally. This study which was carried out in Nigeria, was found to have more of negative impact on the performance and behavior of students. The students from both public and private schools generally had low grades in basic science achievements and behavior, regardless of their school type. Although there were some differences among the various users, these differences were mostly not significant, irrespective of the time of use and school type.

The study focused on students who used social media sites after school hours, and there were no significant differences in the interactions among school types and social media usage times on achievements and behavior. Most studies that showed social media usage had positive effects on students' academic and behavior were carried out on mature students or students from tertiary institutions and not lower levels. Therefore, students at the lower levels must be guided if they are allowed access to phones after school hours, regardless of their school type. They should not be allowed access to phones for up to two hours unattended. The educational sector needs to review current measures to help lower-level students regulate phone usage. Parents also have a crucial role to play in this regard. Although this study showed that not much difference is found in students' achievement and behavior ratings, in terms of school types, there is a need to improve the shortcomings in the type of schools the students attend and the time the students spend in social media usage after school. This will help them perform better in sciences as well as exhibit proper behavior, and thus fit positively well into the modern world of technological advancement.

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Dr. Rachel Atomatofa developed the article, the framework, and the methodology. Dr. Crescentia O. Sekegor, Dr. Eseoghene Umoru-Sule, Mrs Folashade Atare, and Ms Rita Ogbodu were responsible for the literature reviews. The study design was done by Mr Oghenevwarie Emefe. Mr Agadaigho and Mrs Ewesor Stella were responsible for data collection. Dr. Atomatofa drafted the manuscript and Dr. Crescentia O. Sekegor revised it. All authors read and approved the final manuscript. Each author contributed in one way or the other to the successful completion of the article and also contributed equally financially.

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