

## Impact of Social Media on Science Teacher's Effectiveness in Secondary Schools in Cross River State

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### ABSTRACT

**Background:** This study investigated the impact of social media, a component of cloud computing, on science teachers' effectiveness in secondary schools in Cross River State. Three (3) research questions and three (3) alternative hypotheses guided the study. **Methods:** A descriptive survey design was adopted for the study. The population of the study comprised 1209 science teachers in public secondary schools in Cross River State. A sample of 487 teachers was drawn from the population using stratified random sampling techniques. The researcher-made structured questionnaire with 18 items was used for data collection for the study. Research question one was answered using the Pearson Product Moment Correlation, while research questions two and three and the hypotheses were answered using the Analysis of Variance (ANOVA) statistics in the Statistical Package for Social Sciences (SPSS) at a 0.05 level of significance. **Results:** The results of the study revealed that there is a positive correlation between the utilization of social media in teaching and teaching effectiveness among science teachers in secondary schools in Cross River State; there is a negative correlation between gender and utilization of social media among science teachers in secondary schools in Cross River State; and there is a significant correlation between teaching experience and the utilization of social media among science teachers in secondary schools in Cross River State. **Conclusion:** The study justifies the effectiveness of the Cross River State government policy of introducing cloud computing into the education sector. The study recommends that the policy should be sustained.

**Keywords:** *Cloud Computing; Social Media; Science Teachers; Effectiveness*

### 1. Background

Science and Technology are important factors in the development of nations all over the world. As a result, education in the sciences and science education becomes critical for developing countries to compete favourably with developed countries (Jayampathy & Mohammed, 2023; Ranta *et al.*, 2023). Against this background, so much is spent on the procurement and deployment of technologies to aid

the teaching and learning process, especially in science and technology. Cloud computing is the latest area of technology deployed to make teaching and learning seamless and effective, especially in this post-COVID-19 era.

Cloud computing is a form of technology that enables computer resources, from computing power to computing infrastructure, applications, business processes to personal collaboration, to be delivered to you as a service wherever and whenever you need (Souley & Aniobi, 2014) Within the cloud computing space is social media (Asemah, Okpanachi & Edegoh, 2013). All the data and information used on social media are held in the cloud and form part of the cloud computing called social cloud (Blaisdell, 2015). By implementing cloud computing, it becomes possible to bring teachers and learners together on a unified, all-purpose platform (Misra & Adewumi, 2015). Users do not need any background knowledge of the services. A user on the Internet could communicate with many servers at the same time and these servers exchange information among themselves (Abdulkarim, 2022). Over a decade ago, teaching and learning were confined to textbooks and classrooms in the education industry otherwise described as onsite teaching and learning. However, today, learners and teachers have access to computers and mobile devices that are always connected. Cloud computing is key to this disruptive change (Abdulkarim, 2022)

Students can now pursue courses in colleges located thousands of miles away from them using cloud computing. Essentially, cloud computing eliminates the need for physical technological infrastructure and up scales virtual services. To facilitate teaching and learning, effective instructional delivery is a must in the field of science education. The term "effective" refers to the ability to produce the desired outcome. It is the capacity to complete a task successfully, and according to plan (Iji *et al.*, 2017). Effectiveness, according to Etim *et al.*, (2016) is the ability to get things done correctly. Teaching effectiveness refers to a teacher's capacity to achieve the desired learning outcome as decided by the teacher during lesson preparation, as measured by the level of information acquired by students during the instructional process (Ebohon *et al.*, 2021) Only if students attain the predetermined learning outcomes can a teacher be considered effective. To achieve effectiveness, a teacher must have a thorough understanding of the subject matter and be able to use technology to make teaching and learning interesting leading to positive learning outcome. The usage of social media component of cloud computing is suspected to be one very possible way that could help teachers be more effective while teaching science subjects. So, this study is aimed at investigating the impact of social media component of cloud on the effectiveness of science teachers in Cross River state.

In Cross River state of Nigeria, premium is placed highly on science education (Edu & Edu, 2013) Teachers are trained regularly in workshops and seminars to build their capacity and improve the approach in delivering the scientific knowledge to the students. Nta (2015) identified three keys' challenges of science education in Cross River state to include large classes and unavailability of practical materials, inadequate provision of practical session in school timetable, and instructional methodology.

Quality practical teaching calls for space modification to accommodate all activities at all levels of education and enough laboratory equipment for the entire students. There is a shortage of laboratory space, equipment, and furniture. There are up to two hundred students sharing a chemistry laboratory space originally designed for fifty seats. Basic chemical reagents for analysis and other apparatus are insufficient and, in some cases, not available (Ahmad, 2019).

The timetable currently in use in public secondary schools in Cross River state is not designed to encourage effective teaching of science (Edu & Edu, 2013). Because of the introduction of so many subjects into the curriculum of senior secondary education in Cross River state like Tourism studies and Civic education, it is difficult to allocate double periods to science subjects that require adequate time for practical's. Nta (2015) argued that all science subjects ought to be given double periods at least twice

a week if the teaching of science is considered important and for the effectiveness of the teacher. This position is agreed to by (Etim *et al.*, 2016) in their research on cloud utilization for English teachers in Cross River state where they found out that little time is allocated for core subjects in public schools for which English language was one.

Beyond the challenge of adequate time frame for science subjects in the timetable, the challenge of the teacher's readiness and method of teaching science subjects is another critical issue affecting the smooth teaching of science in Cross River state. Ekuri, (2012) discovered that only 27 percent of the 300 science teachers sampled are vested with requisite knowledge of how to use the lab for practical and 20% of this number regularly conduct practical sessions with students. With this background, the stage is set for us to critically examine if the utilization of cloud computing tool will have a positive or negative impact of the effectiveness of the science teacher in Cross River state. Statistically, Cross River state has 293 public secondary school and 1209 science teachers in the three educational zones of the state.

## **1.1 Social Media and Education**

Educational use of social media by teachers for classroom teaching and learning is growing while uses by students on their own for learning purposes seems to be abundant but also incidental and informal (Greenhow and Lewin, 2021). A review of the literature shows that social media is used more extensively in education. Haşiloğlu, Çalhan and Ustaoglu (2020) evaluated the use of social media in education by science teachers in terms of its impact upon students, parents, and colleagues and found out that social media is one strong tool that will help to enhance the effectiveness of science teachers in Turkey. Although the setting of the study was in a rural and remote town of Agri, its findings show that social media use by the teachers to communicate with their students helps the parties share relevant and useful information including posting course materials (animations, images, videos, etc.) as well as questions of practice; by using social media, the parties also establish fast and easy communication. Although the setting of the study is in Turkey, and the population was tertiary institution lecturers, our study is in Nigeria and the population is 1209 secondary school science teachers in Cross River state.

In addition, a study by Habes *et al.*, (2018) reveals that social media contributes to mutual learning by enabling the teachers to share their insights on social problems and to promote curiosity of the students.

Abraham and Fanny (2019) conducted a study to measure the impact of the use of WhatsApp in the teaching and learning process. The population for the study comprised of one hundred and twenty-eight (128) lecturers and one thousand six hundred and three (1603) first year undergraduate students at the University of Port Harcourt, Faculty of Education for the year 2017. The results revealed that although both the lecturers and the students possess Internet enabled mobile phones, they were not properly utilizing WhatsApp instant messaging for effective academic activities because only 15(11.7%) of lecturers and 243(22.9%) of students use it for academic purposes. The result further revealed that 100% of both lecturers and students never received any form of training for the use of WhatsApp mobile technology. This study only focused on the use of one out of the five social media sites we want to investigate about. Again, the population of the study is drawn from a tertiary institution in River state while we desire to research on science teachers in secondary school in Cross River state. Also, the research did not measure the effectiveness of the teacher arising from the use of WhatsApp in the teaching and learning process.

In 2016 a survey was administered at a large public university located in the Mid-Atlantic region of the United States. Sixteen instructors from the College of Education were asked to forward an email to their students asking them to complete an online survey regarding their use of social networking. Most of the participants (56 %) reported spending less than one-hour social networking per day while 34% of the

participants reported to spend up to five hours social networking per day. It is also reported that 67% of internet users in the U.S. whose age ranges between 18 and 29 use social networking sites (SNS) such as Facebook, Twitter, Pinterest, Instagram, and Tumblr, while only 44.1 % of faculty members in higher education use social media in their teaching with a higher percentage in the Humanities and Arts disciplines.

Chawinga, (2017) conducted a study about how the use of social media facilitates in teaching and learning. This study incorporated Twitter and blogs into two undergraduate courses offered in the Department of Library and Information Science at Mzuzu University which is a public university in Malawi. Data were collected in two ways: first, analysis of blog and Twitter posts by students and second, a questionnaire was sent to 64 students to find out their perception towards the use of blogs and Twitter in a classroom environment. Results suggest that if appropriately deployed, Twitter and blogs are catalysts for the much-hyped learner-centred approach to teaching because using these technologies, it emerged that students shared and discussed course materials, posted their course reflections, and interacted amongst themselves and with their teachers<sup>24/7</sup>. It is clear from the findings that Twitter was hailed mainly for its timeliness i.e., students could receive instant messages on their mobile phones as attested by the following comment by one respondent: “Mostly, feedback was instant, as at least some colleagues were always online including the lecturer”. The fact that Twitter has a limit of 140 characters; it required students to think critically to communicate their point within such a limited number of words or characters (Chawinga, 2017).

In a review of related literature conducted by Hassan and Kommers, (2018) on the impact of social media in education in Sudan clearly indicated that social media was useful in making the teacher effective in his class delivery in Sudan. Teachers in tertiary institutions in Sudan deploy social media in the teaching and learning process and their effectiveness was found to be enhanced. This claim is yet to be verified in Nigeria in the secondary school sector.

In Nigeria, Ogbonnaya (2019), understudied pre service teachers to find out their perception toward the use of social media as they prepare to start teaching in secondary school and had a mixed result. The objective of the study was to explore to what extent pre-service teachers from a college of education in Nigeria adopted social media technology in their teaching and what they perceived the benefits to be. The study found that Facebook and WhatsApp were the social media most frequently used by the pre-service teachers with Facebook being the most popular application adopted by them. It was found that the participants adopted social media mainly as tools for socialising and communication and not for preparing their lessons. In addition, it was found that half of the pre-service teachers spend at least two hours a day on social media and the majority (69%) have more than one social media account subscription. The high adoption of social media by the pre-service teachers found in this study and its high perceived usefulness indicate that, if the students were to use social media as an educational aid, they would likely become more involved in learning and become more knowledgeable and better trained teachers.

## **1.2 Social Media and Gender Utilisation**

Over the years, it has been the interest of researchers to investigate if there exist a relationship between how the genders use technology especially in the education sector. Many studies around the world reported significant findings about gender variations in social media usage among university students. Alkaabi *et al.*, (2017) reported about a study Muscanell and Guadagno conducted a study in 2012 (Muscanell & Guadagno, 2012) to explore the influence of gender and personality on an individual’s use of social networking. They found that females use social media for educational purposes more than males. A similar study in the United Arab Emirates (2010) revealed that Facebook looked further essential for female university students to extend their social network, access more information, and

experiences than their male counterpart (Alnjadat *et al.*, 2019). The studies conducted by Akpanobong & Frank, (2018) found out that gender was not an issue in the utilisation of social media by the university lecturers the studied. According to them, the differences were only statistical but could not be considered significant enough to change the narrative.

### 1.3 Social Media and Teaching Experience

There is a growing relationship between the age of a person on a job and the expertise displayed in that job specification. The utilization of Information and communication technology tools in the teaching and learning process require two basic components. First the ability to use the tool and secondly, knowing the timing to use the tool. Etim *et al.*, (2016) found out in their study that teachers with long years of service tend to reject the use of cloud resources and generally are not easily motivated to adjust to the use of technology in their lecture process. However, a study carried out in Kenya does not seem to agree that the relationship seems to exist. Machii *et al.*, (2016) found out that more experience teachers are easily persuaded to use new technology and quickly blends their teaching method with the technological tool they see as easy to help them transfer the knowledge to the learners. Further studies by Akpanobong and Frank, (2018) revealed that the choice of a “tech tool” by a teacher depends greatly on the perceived usefulness of that tool in the teaching and learning process by the teacher.

In all that have been said about social media and teacher effectiveness, little or no research in Nigeria is targeted at the secondary school level which account for over 513,000 teachers (Nta 2015). All the research work reviewed focused on social media utilisation and tertiary education level. The thinking is that since social media utilisation in tertiary institution is leading to positive learning outcome, therefore introducing it to the secondary school will generate the same effect. This claim needs to be subjected to empirical study and this has prompted this study. This population is too huge to be ignored. This is summarised in Table 1.

**Table 1: Extent of Research Covered**

S/N	Category	Comment
1	Tertiary School Lecturers	Researched
2	Secondary School Level Teachers/Tutors	Not Researched
3	Primary School Level Teachers	Not Researched

## 2. Methods

### 2.1 Objective of the Study

The objective of this study therefore is to investigate the impact of social media on science teacher’s effectiveness in Secondary school in Cross River state.

Specifically, the study intends to

1. Investigate the correlation between the use of social media and teaching effectiveness among science teachers in secondary schools in Cross River state.
2. Examine the correlation between gender and social media utilization among science teachers in secondary schools in Cross River state.
3. Examine the correlation between teaching experience and social media utilization among science teachers in secondary schools in Cross River state.

### 2.2 Research Questions

The study intends to answer these research questions:

1. What is the correlation between the use of social media and teaching effectiveness among science teachers in secondary schools in Cross River state?
2. What is the correlation between gender and social media utilization among science teachers in secondary schools in Cross River state?
3. What is the correlation between Teaching Experience and social media utilization among science teachers in secondary schools in Cross River state?

### 2.3 Research Hypothesis

The following research hypothesis were developed for the study:

- H<sub>1</sub> There is a significant correlation between the use of social media and teaching effectiveness among science teachers in secondary schools in Cross River state.
- H<sub>2</sub> There is a significant correlation between gender and the utilization of social media among science teachers in secondary schools in Cross River State.
- H<sub>3</sub> There is a significant correlation between teaching experience and the utilization of social media among science teachers in secondary schools in Cross River state.

The correlation design was adopted for the study. Social media is the independent variable while the teacher effectiveness is the dependent variable. Gender and Teaching Experience are moderating variables. The study was conducted in Cross River State of Nigeria. The population of the study comprised 1209 science teachers in Cross River state. A sample of 487 teachers was drawn from the population using simple random sampling technique. The researcher-made structured questionnaire with 18 items which was titled: Impact of Social Media on Science Teacher's Effectiveness in Secondary School Questionnaire (ISMSTESSQ) was used for data collection for the study. The questionnaire was divided into three sections (A, B and C).

Section 'A' contained the personal data of the respondents. Section 'B' contained the questions on Social Media sub variables grouped into three clusters (1-3) namely, WhatsApp, Facebook, and YouTube. Section 'C' contained questions on Teacher Effectiveness. The response options were drawn from a Four-point Likert scale: Strongly Disagree - 1 point, Disagree - 2 points, Agree - 3 points. And Strongly Agree – 4 points. The instrument was subjected to face- validity by three validators in the Department of Educational Foundation of Veritas University Abuja, Nigeria. The internal consistency of the instrument was determined using Cronbach Alpha's technique and a reliability coefficient of 0.87 was obtained. 500 questionnaires were administered on the respondents by the researchers and only 487 copies were returned.

The calculated values of Pearson's product moment correlation statistics ( $r$ ) were employed to answer the research questions. While interpreting the results of the research questions, any calculated correlation of  $r$  below 0.50 was considered weak while the ones above 0.05 was considered as strong. Each hypothesis was tested at 0.05 level of significance by comparing the p-value Pearson's product moment correlation with the level of significance of 0.05. Hypotheses whose p-values are less than or equal to 0.05 was rejected while the ones that are greater than 0.05 was accepted.

## 3. Results

The results are presented below:

### 3.1 Research Questions 1

What is the correlation between the use of social media and teaching effectiveness among science teachers in secondary schools in Cross River State?

**Table 2: Mean and Standard Deviation of the Use of Social Media and Teaching Effectiveness**

	Mean	Std. Deviation	N
Social Media	3.4130	0.26626	487
Teacher Effectiveness	3.6009	0.16876	487

**Table 3: Pearson Product Moment Correlation of the Use of Social Media and Teaching Effectiveness**

		Teacher Effectiveness	Social Media
Teacher Effectiveness	Pearson Correlation	1	0.748**
	Sig. (2-tailed)		0.000
	N	487	487
Social Media	Pearson Correlation	0.748**	1
	Sig. (2-tailed)	0.000	
	N	487	487

The summary of the result in Table 2 shows that the use of social media in teaching generated a mean of 3.41 with a standard deviation of 0.27 while their effectiveness yielded a mean of 3.60 with a standard deviation of 0.17. Though the mean of social media utilisation is higher than that of their effectiveness, the two means are above the average of 2.50 (in a 4-point scale), indicating that both science teachers’ use of social media and their effectiveness are related. Moreover, in Table 3 above, it is shown that the correlation index (r) between social media and teaching effectiveness is 0.748 (0.75). This shows that there is a positive correlation between social media utilisation in teaching and teaching effectiveness among science teachers in secondary schools in Cross River State.

### 3.2 Research Questions 2

What is the correlation between gender and social media utilization among science teachers in secondary schools in Cross River State?

**Table 4 Mean and Standard Deviations of the Two Gender Categories**

Gender	Mean	Std. Deviation	N
Male	3.3978	0.28817	274
Female	3.4325	0.23431	213
<b>Total</b>	3.4130	0.26626	487

The summary of the result in Table 4 shows that male science teachers use of social media yielded a mean of 3.40 with a standard deviation of 0.29 while their female colleagues had a mean of 3.43 with a standard deviation score of 0.23 This shows that female science teachers used social media in teaching more than their male counterparts in Cross River State.

### 3.3 Research Questions 3

What is the correlation between Teaching Experience and social media utilization among science teachers in secondary schools in Cross River state?

**Table 5 Mean and Standard Deviations the Categories of Teaching Experience**

Category	N	Mean	Std. Deviation
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Less than 10 years	179	3.7039	0.10993
11 - 20 years	146	3.2791	0.11470
21 – 30 years	81	3.3256	0.06149
31 years and above	81	3.0988	0.21534
<b>Total</b>	487	3.4130	0.26626

The summary of the result in Table 5 shows that the use of social media by science teachers with less than 10 years experiences is 3.70 and standard deviation of 0.11. It was followed those with 21 to 30 years' experience with a mean of 3.32 and standard deviation of 0.06; then those with 11 to 20 years' experience, 3.28 and 0.11 mean and standard deviation respectively, while teachers with 31 years and above experience had mean and standard deviation of 3.41 and 0.27 respectively. This means that teacher with less than 10 years experiences are more in tune with the used social media in teaching, while those with 31 years and above experience are less in the use of social media in teaching.

### 3.4 Research Hypothesis

Results are presented below:

#### 3.4.1 Hypothesis One

There is significant correlation between the use of social media and teaching effectiveness among science teachers in secondary schools in Cross River state.

**Table 6: ANOVA Table Showing Correlation between the Use Social Media Utilization and Teaching Effectiveness**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.296	5	4.259	155.704	0.000
Within Groups	13.157	481	0.027		
<b>Total</b>	34.453	486			

Table 6 above shows that the p-value of 0.00 is less than the level of significance ( $p-v < 0.05$ ). The alternative hypothesis is accepted. Therefore, it is concluded that there is significant correlation between the use of social media utilization in teaching and teaching effectiveness among science teachers in secondary schools in Cross River state.

#### 3.4.2 Hypothesis Two

There is significant correlation between gender and the utilization of social media among science teachers in secondary schools in Cross River state.

**Table 7: ANOVA Table showing Correlation between Gender and Utilization of Social Media**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.144	1	0.144	2.040	0.154
Within Groups	34.309	485	0.071		
<b>Total</b>	34.453	486			

Table 7 above shows that the p-value of 0.154 is greater than the level of significance ( $p-v > 0.05$ ). The alternative hypothesis is not accepted. Therefore, it is concluded that there is no significant correlation between gender and utilization of social media among science teachers in secondary schools in Cross



River State. This is the case because there is no digital divide among genders, as no gender (male or female) is disadvantaged in the utilization of social media in Cross River State.

### 3.4.3 Hypothesis Three

There is significant correlation between teaching experience and the utilization of social media among science teachers in secondary schools in Cross River state.

**Table 8: ANOVA Table Showing Correlation between Teaching Experience and Utilization of Social Media**

	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
Between Groups	26.383	3	8.794	526.286	0.000
Within Groups	8.071	483	0.017		
<b>Total</b>	34.453	486			

Table 8 above shows that the p-value of 0.00 is less than the level of significance ( $p < 0.05$ ). The alternative hypothesis is accepted. Therefore, it is concluded that there is significant correlation between teaching experience and utilization of social media among science teachers in secondary schools in Cross River State. This is the case because the younger teachers make use of social media more effectively than the older teachers who encounter more challenges in adapting to the modern-day technology.

## 4. Discussion

The study was designed to find out if there exit a relation between the utilisation of social media by science teachers in Cross River state of Nigeria and their teaching effectiveness.

The findings of the study clearly indicate that there is significant correlation between the use of social media and teaching effectiveness among science teachers in secondary schools in Cross River state. The finding agrees with the studies of Habes *et al.*, (2018) and Haşiloğlu *et al.*, (2020). The continuous use of social media by science teachers is a strong support for the effectiveness noticed in the teaching and learning process leading to positive learning outcomes.

Also, the study discovered that there is no significant correlation between gender and the utilization of social media among science teachers in secondary schools in Cross River state. The finding disagreed with the research work of Alkaabi *et al.*, (2017) and Alnjadat *et al.* (2019) that indicated that females tend to use social media more than males and are perceived to be more effective than males in the teaching and learning environment. Interestingly, the findings of this study agree with the studies of Akpanobong and Frank, (2018). The study further posited that there is significant correlation between teaching experience and the utilization of social media among science teachers in secondary schools in Cross River state. This finding is in line with the findings of Etim *et al.*, (2016), Akpanobong and Frank, (2018). Both studies agree that younger teachers are more ICT savvy and tend to quickly deploy cloud tools in the teaching and learning process. The finding does not agree with Machii *et al.*, (2016), who posited that teacher with old teaching experience tend to use technology better.

## 5. Conclusion and Recommendations

### 5.1 Summary of Findings

- 1 There is significant correlation between the use of social media and teaching effectiveness among science teachers in secondary schools in Cross River state.
- 2 There is no significant correlation between gender and the utilization of social media among science teachers in secondary schools in Cross River state.

- 3 There is significant correlation between teaching experience and the utilization of social media among science teachers in secondary schools in Cross River state.

The use of social media component of Cloud Technology by science teachers in Cross River state of Nigeria is a well thought out policy of the Cross River state government. Teaching and learning have been made interesting with the introduction and utilisation of social media by teachers.

Arising from the study, the following are the recommendations:

1. The use of social media in the teaching and learning process should be sustained.
2. There should be training for the older and more experienced teachers who are generally challenged in the use of social media to help them come up.
3. There should be regular retraining of all teachers in ICT, especially in cloud computing, so that the teachers will be kept abreast of current innovations in technology and education and the modalities to deploy both in the teaching and learning process.

## 6. Declarations

**6.1 Ethics Approval and Consent to Participate:** The approval of the Secondary Education Board of the Ministry of Education Cross River state was sought before the conduct of the data collection process. The teachers were assured that their privacy is protected. Specifically, no name or personal contact of the respondent was included in the demographic section of the questionnaire to protect their identity.

**6.2 Conflict of Interests:** Not applicable.

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