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## Impact of Twitter and Instagram Technology Utilization on Reading Habits of Undergraduate Students in Federal Universities in South-South, Nigeria

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### Abstract

The study investigated the influence of Twitter and Instagram Technology Utilization and Reading Habits of Undergraduate Students in Federal Universities in South-South Nigeria. Two research questions and two hypotheses were formulated to guide the study. Literature review was carried out in line with the sub-variables of the study. Survey research design was used for the study. The study sampled 1,315 students out of 6,575 which is 20 percent of the total population of the students registered in 2021/2022academic year in the area of study. The instrument used for data collection was a questionnaire titled; Impact of Twitter and Instagram Technology Utilization on Reading Habits of Undergraduate Students questionnaire [ITTURHUSQ]. The questionnaire was validated by experts in Measurements and Evaluation from the department of Educational Foundations, University of Calabar, Calabar. The reliability of the instrument was determined using Cronbach Coefficient Alpha Reliability and the variables have an index of .71 and above. One-way analysis of variance statistics was used to analyse the data. Each of the hypotheses was tested at .05 level of significance. The result showed that there was a significance influence of twitter usage and instagram usage on reading habits of undergraduate students in Federal universities in Southsouth Nigeria. The study concludes that Twitter and Instagram have a significant influence on the students' study habits. Hence, recommended among others that authorities in tertiary institutions should establish rules and regulations that will limit students excessive used of twitter and instagram during school hours.

Keywords; Twitter, Instagram, Utilization, Undergraduates reading habit

#### 1.1 Introduction

Twitter and Instagram encompass a wide array of technological applications that enable students or users to create, manage and share contents, post comments and engage in discussions anywhere around the world in real time. Social media can be defined as a group

of internet-based applications that build on the ideological and technological foundation of web 2.0 and that allow the creation and exchange of user generated content [Kaplan and Haenlein, 2020]. Reading habits increases intellectual skills, helps in producing ideas and evokes the user to think. Regular reading enhances creativity as it develops the imagination, increases our interest and provides information from all around the world. Reading is the mental process of securing and reacting to the author's message represented by written or printed symbols. According to Pawar [2007) reading helps to grasp the primary and essential details of what the author tried to convey. Reading is not limited to the activity of reading as it is the process of learning and perceiving knowledge from written words.

Reading develops the cognitive abilities. Cognitive means the intellectual powers of understanding. Reading involves meta cognition, meta cognition is a higher order of cognition, where an individual can use the constructed knowledge in mind to evaluate and categorize the new information because information enters the mind in random order (Govindsany, 2006). When we read, cognitive skills are used to understand, interpret and evaluate the information from written words for productive use. Cognitive abilities develop an interest in the individual and force the individual to know about unknown things. Reading habit is a behavior that makes an individual to read a book for knowledge or entertainment or just to pass the time" Sherly (2011) and it is an essential element for the development of personality and intellectual capacities of people. In addition to personal and mental developments, reading is access to social, economic and civic lifestyles (Bano, 2011).

Twitter is an emerging technology that functions like the Facebook, it allows its user to send short message of about 140 characters which are called tweets. Waddell and Barnes (2012) noted that the ease of posting and sharing information on twitter makes it an essential tool for libraries to reach their users. According to Ojerinde (2014), though it is obvious that technology or like Instagram has taken over in almost every aspect of life and the way everything is done all over the world, it is

not enough to alter the reading habit of undergraduate students, rather, there should be an enlightenment campaign on the use of social media technologies and its consequences thereof on the reading habits of students. Therefore, it is based on the forgoing circumstances that the researchers conceived the idea to examine the influence of Twitters and Instagrams technologies among others on the reading habit of undergraduate students in Federal Universities in South-South Nigeria.

### 1.2 Statement of the problem

It has been noticed through series of observations and common discussion with students that the reading habits of undergraduate students in the Universities seems to have slowed down drastically, perhaps because of the presence of social networking such as Facebook, twitter, blogs, YouTube and Instagram among others that have serious influence on their reading culture. The students are always on Instagram or Twitter and the likes, socializing, chatting and sending messages as against use for academic purposes. Despite efforts by government to improve the libraries for students, by providing, electronic information resources and services, subscribing online databases, constant electricity, conducive atmosphere for reading, good furniture to mention but a few, this ugly situation persists. It is against this background that the researchers are poised to examine the influence of Twitter and Instagram technology utilization and the reading habits of undergraduate students in Federal Universities in South-South Nigeria.

### 1.3Purpose of the study

The purpose of this study was to determine the influence of Twitter and Instagram technology utilization and reading habits of undergraduate students in federal universities in South-South. Specifically, the study seeks to:

1. Examine the influence of Twitter

- utilization and reading habits of undergraduate students.
- 2. Examine the influence of Instagram utilization and reading habits of undergraduate students.

### 1.4 Research questions

The following research questions were formulated to guide the study.

- 1. How does Twitter utilization influence the reading habits of undergraduate students?
- 2. How does Instagram utilization influence the reading habits of undergraduate students?

### 1.5 Research hypotheses

The following statement of hypotheses were formulated to answer the research questions.

- **H1;** There is no significant influence of Twitter utilization on reading habits of undergraduate students.
- **H2;** There is no significant influence of Instagram on reading habits of undergraduate students.

### 1.6 Significance of the study

This study may be beneficial to the library users, society, government and researchers. To the library users, the findings of this study may create a desire to improve their reading habits through Twitter and Instagram, which would enhance their ability to study, using new media technology. To the society the findings of this study may be helpful to improve how libraries particularly those in the universities deliver their services to the community they serve. To the government the findings may be helpful in the formulation of educational policies in the present era. Finally, future researchers would find the findings of this study useful and avoid duplication of research works.

### 2.1 Literature Review

### 2.2 Twitter and Students' Reading

### Habits.

Twitter is a messaging technology or platform that functions like the Facebook, it allows its users to send short message of about 140 characters which are called tweets. The concept of twitter relies on messaging service, whether it uses a cell phone, instant messenger, such as yahoo messenger or MSN messenger or through specific website. Waddell and Barnes (2012) noted that the ease of posting and sharing information on twitter makes it an essential tool for libraries to reach their users. Libraries in Nigeria can use this platform to give users first-hand information on the ongoing national election. Users can send instant messages (IM) on complaints or ask questions on a particular issue and get feedback on the sport using twitter.

According to Bell (2012), twitter is a golden opportunity for libraries to connect with members of the library community. Twitter being a global community has millions of users with different twitter handles, the best way to identify or locate your institution or library is by using the search twitter.com feature by placing your library's name in the search box. To sign up to get a twitter account you have to login into www.twitter.com. According to Pew Research Centre (2012) in their study, they noted that 15percent of online adult use twitter, while 8% make of it on a typical day. Smith and Brenner (2012) support the above view by stating that twitter is one social media tool that is gaining relevance amongst the class of young adult who are mainly students and literate adults. This social media tool allows its users to send message known as tweets which are not more than one hundred and forty (140) characters, users of tweeter also enjoy the liberty of posting censured images and video clips. Tweeter can be used by groups, organization, institutions, non-governmental organizations (NGOs), and government bodies to get and disseminate information. A twitter account is usually referred to as twitter handle by users.

Bicen and Cams (2012) conducted a study on the usage habits of undergraduate students on twitter. The study revealed that majority of the participants, spent most of their time on twitter, quotes, photos, videos, music, news, IT news and magazines news are the most shared items on twitter. However, educational materials were observed to be least frequently shared by the students. From this premise, we argued that investigating the most preferred usage habits of students on twitter is an important and hot topic research we believe that in future days more research will be focused on usage of twitter in education due to its characteristics and students' interest in this social network.

Similarly, Kenchakkauavar (2015) in an article titled "twitter for academic libraries in the twenty first century" examined the effectiveness of using online advert on the social networking site twitter in academic libraries. The study revealed that twitter is used in all libraries for reading in the libraries. Reading is particularly important in education as well as for unhindered intellectual growth of a person. Tella and Akande (2007) asserted that the ability to read is at the heart of selfeducation and lifelong learning and that it is an art capable of transforming life and society. Shabi and Udofia (2009) noted that active learning from books is better than passive learning such as watching television and playing games.

## 2.3 Instagram and Students' Reading Habits.

Alongside universities, libraries and students are now using Instagram platform to connect with others in a range of exciting and innovative ways. The lastest platform that students are experimenting with is Instagram, which allows the students to take pictures on their smart phones, apply exciting filters and add hash tags, and then share these images online with their friends, Nna-Etuk *et al* [2024].

Similarly, according to Jung and Lee [2015] Instagram is seen as improving an innovative way of drawing out archived images and video for libraries and other institutions. To them, Boston public library takes advantage of the fact that it is one of America's oldest cities and publishes interesting historical images of the city and the library. Also, San Francisco public library uses pictures of status and the surrounding area in order to highlight the wonderful surroundings, to achieve a similar end. Also noted that social networks like WhatsApp, an individual can initiate and build strong business partnership in any part of the world without meeting that individual in person.

According to Rafia et al (2020), teenagers also use this media for several activities which include delving more in-depth to interest-driven communities and participating in various activities. Therefore, Instagram utilization among students is in varied capacities and they incorporate new information and communication tools such as mobile connectivity, photo and video sharing, instant messaging, sharing of post ideas, events, interest and activities. Mostly, Twitter, Instagram and WhatsApp groups are created with members of the same interest, class, activity, status and level to aid and ease information dissemination, discussions, criticism and dialogue. Rafia, Khan, Asim and Arif (2020) studied Instagram and result revealed that there are positive effects of Instagram on reading habits of students. Instagram is fast becoming an exciting platform through which libraries and librarians can share news, achievements, and images of everyday life among the bookshelves, but it's not only for its novel approach to photosharing that libraries are using Instagram: Instagram platform is growing faster than other social networks

### 3.1 Research Method

The researchers adopted the descriptive

research design. The main purpose of this design was because the study is descriptive in nature and gives a systematic description of the effect of twitter and Instagram and its influence on students' reading habits. The study was conducted in the federal Universities in south-south Nigeria, consisting of the following states, Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers States. Each state in the South-South region has a federal university that is fully funded by the federal government of Nigeria. The universities are University of Calabar, (Unical) University of Uyo (Uniuyo), University of Port Harcourt (Uniport), University of Benin (UniBen), and Federal University of Otuoke, Bayelsa State. These states and the federal Universities in the areas constituted the study area. The population of the study constituted 6,575 undergraduate students who registered in their University libraries in 2021/2022 academic session.

A Sample size of 1,315 undergraduate students which is 20 percent of the total population. Out of the 1,315 copies of questionnaires distributed, 1291 was

correctly filled and retrieved from the respondents. Data was collected through questionnaire. The instrument passed through face and content validation using experts in the department of Measurement and Evaluation in University of Calabar. Cronbach Alpha Reliability Technique was used to measure the reliability of the instrument using 50 undergraduate students from University of Cross River State who were not part of the study. The test produced reliability coefficient of .71 and .92 and this proved that the instrument was reliable for the study. Mean and One-way Analysis of Variance was used to analyse the data collected.

#### 4.1 Results

Research Question 1

How does Twitter utilization influence reading habits of undergraduate students in federal universities in South-South Nigeria. Mean and one-way analysis of variance were used to answer this question. The result of the analysis is as presented in Table 4.1.

Table 4.1: Summary of data and one-way analysis of variance on the influence of twitter usage on reading habits of undergraduate students in federal universities in south-south Nigeria

Twitter usage	N	Mean	Std. I	Deviation
Low usage	253	36.4585	13.57	238
Moderate usage	456	28.8750	9.818	11
High usage	582	28.5206	12.07	843
Total	1291	30.2014	12.05	265
Sum of	Mean square	of		
different	F.Sig			
square				
Between	12351.696		6175.84	45000
Groups			8	443
	175041.942		135.902	
Within				
Groups				
	187393.637			
Total				
P<.05				

This research question 1 stated that how does twitter influence the reading habits of undergraduate students. The independent variable was twitter usage categorized into low usage, moderate usage, and high usage. The scores of the variable were collated and analysed with the use of Mean and one-way Analysis of Variance statistics as the result is seen in Table 4.1. The result in Table 4.1 was conducted to determine the influence of twitter usage on reading habits of undergraduate students in South-South Nigeria. The result revealed that the calculated F-value of 45.443 regarding twitter usage on reading habits of undergraduate students was significant at p-value of .000 with 2 and 1288 degrees of freedom at .05 level of significance. This result therefore implies that twitter usage has impact on reading habits of undergraduate students in the study area.

### 4.2 Hypothesis 1

There is no significance influence on twitter utilization in the reading habits of undergraduate students in federal universities in South-South Nigeria.

Table 4.2 Summary of data and one-way analysis of variance on the influence of twitter usage on reading habits of undergraduate students in South-South Nigeria.

Descriptiv	ve					
Twitter usage	N	Mean	Std. Deviation			
Low usage	253	36.4585	13.57238			
Moderate usage	456	28.8750	9.81811			
High usage	582	28.5206	12.07843			
Total	1291	30.2014	12.05265			
		Sum of	Df	Mean	F	Sig
		Squares		Squar		
D 4		12351.696	2	6175.	45	.00
Between				848	.4	0
Groups					43	
Within		175041.942	1288	135.9		
Groups				02		
Total		187393.637	1290			
D . 0.5						

Table 4.3 Post Hoc tests on the influence of twitter usage on reading habits of undergraduate students in South-South

Multiple Comparisons						
(I) Twitter	(J) Twitter	Mean	Std.	Sig. J)		
		Difference (I-	Error			
Low usage	Moderate usage	27.58350*	.91389	.000		
	High usage	7.93788*	.87788	.000		
Moderate usage	Low usage	-7.58350*	.91389	.000		
	High usage	.35438	.72907	.627		
High usage	Low usage	-7.93788*	.87788	.000		
	Moderate usage	e35438	.72907	.627		
	44.00					

<sup>\*.</sup> The mean difference is significant at the 0.05 level.

It can be seen from Table 4.3 those undergraduate students who used twitter moderately provides more influence on reading habits than those whose twitter usage is low (mean difference = 7.58, p < .05). In a similar vein, undergraduate students with a high twitter usage provides more influence on reading habits than those who whose twitter usage is low (mean difference = 7.94, p < .05). Furthermore, undergraduate students with a high twitter usage provides more influence on their reading habits than those who whose twitter usage is moderate (mean difference = 35, p > .05). Therefore, the null hypothesis is rejected. This implies that there is significant influence of twitter on undergraduate students' utilizations of twitter in federal universities in South-South Nigeria.

### **Research Question 2**

How does Instagram utilization influence undergraduate students reading habits in federal universities in South-South Nigeria.

Table 4.4 Summary of data and one-way analysis of variance on the influence of Instagram utilization on reading habits of undergraduate students in South-South Nigeria

	•	4 0
Descr	in	tive

Descriptive					
Instagram utilization	N	Mean	Std. Devi	ation	
Low usage	242	36.3843	13.58961		
Moderate usage	483	29.2547	10.28491		
High usage	566	28.3657	11.92226		
Total	1291	30.2014	12.05265		
	Sum of		DfMean	F	Sig.
	Squares		Square		
Between	11591.40	)5	2 5795.703	42.462	.000
Groups					
Within	175802.2	232	12 136.492		
Groups			88		
	187393.6	537	12		
Total			90		
P<.05					

The result in Table 4.4 was conducted to determine the influence of Instagram utilization on reading habits of undergraduate students in South-South Nigeria. The result revealed that the calculated F-value of 42.462 regarding Instagram utilization on reading habits of undergraduate students was significant at p-value of .000 with 2 and 1288 degrees of freedom at .05 level of significance. With this result, it implies that Instagram utilization has influence on reading habits of undergraduate students in federal universities in South-South Nigeria.

### 4.3 Hypothesis 2

There is no significance influence of Instagram utilization on reading habits of undergraduate

students in South-South Nigeria. The independent variable of this hypothesis was Instagram usage categorized into low usage, moderate usage, and high usage. The scores of the variable were collated and analysed with the use of one-way Analysis of Variance statistics as the result is seen in Table 4.4

Table 4.5: Summary of data and one-way analysis of variance on the influence of Instagram usage on reading habits of undergraduate students in South-South Nigeria.

(I) Instagram	(J) Instagram	Mean Difference (I-J)	Std. Error	Sig.
Low usage	Moderate usage	7.12964*	.92011	.000
Low usage	High usage	8.01857*	.89731	.000
Moderate usage	Low usage	-7.12964*	.92011	.000
	High usage	.88893	.72370	.220
High usage	Low usage	-8.01857*	.89731	.000
	Moderate usage	88893	.72370	.220

<sup>\*.</sup> The mean difference is significant at the 0.05 level.

The result in Table 4.5 was conducted to determine the influence of Instagram usage on reading habits of undergraduate students in South-South Nigeria. The result revealed that the calculated F-value of 42.462 regarding Instagram usage on reading habits of undergraduate students was significant at pvalue of .000 with 2 and 1288 degrees of freedom at .05 level of significance. With this result, the null hypothesis was rejected. This result therefore implies that Instagram usage has a significant influence on reading habits of undergraduate students. To determine the amount of the influence on each category of Instagram usage on reading habits of undergraduate student, a Fisher Least post-Hoc test was conducted as observed in Table 4.5.

It can be seen from Table 4.5 those undergraduate students who used Instagram moderately provides more influence on reading habits than those who whose Instagram usage is low (mean difference = 7.13, p < .05). In a similar vein, undergraduate students with a high Instagram usage provides more influence on reading habits than those who whose Instagram usage is low (mean difference = 8.02, p < .05). Furthermore, undergraduate

students with a high Instagram usage provides more influence on their reading habits than those who whose Instagram usage is moderate (mean difference = 89, p > .05). However, the difference between students with high Instagram usage and students with moderate Instagram usage was not significance at .05 level of significance.

### 5.1 Discussion of Findings

# **5.2 Twitter and Instagram on Students Reading Habits**

This research hypothesis which addresses the influence of twitter usage on reading habits of undergraduate students revealed that there was a significant influence of twitter usage on the reading habits of undergraduate students. The result agrees with Bart (2009) who remarked that given the high-volume usage of twitter, an obvious and popular concern among faculty, administrators, and parents is the widespread notion that students spend far too much time on non academic activities related to the Internet and social media, stressing that the most salient concern among scholars, educators, and the public however is related to the effects of social

networking sites such as twitter on the time dedicated to studying and offline activities. Hence, twitter usage has been associated with both positive and negative impacts to different aspects of people's lives, including positive impacts, such as improving relationships between friends and family and negative impacts such as low reading culture, health, personal relationships problems and social problems.

The second hypothesis addressed the influence of Instagram usage on reading habits of undergraduate students revealed that there was a significant influence of Instagram usage on the reading habits of undergraduate students. This finding agreed with the work of Rafia, Khan, Asim and Arif [2020] which revealed that there is a positive effect of Instagram on reading habits of students in institutions of higher learning. Thus, the use of online social networks also varies across countries because cultures induce diverse impacts on their members. Absorption in the social networking activity entails extended immersion in these websites, enjoyment while interacting, aid curiosity, but people are also temporally disassociated from their main tasks, whether online or offline, and lose control over the main activity in favour of chatting or checking new updates. Therefore, this research confirmed the impact of Instagram usage on reading habits of undergraduate students in federal universities in South-South, Nigeria.

### Conclusion

Social media networking such as twitter and Instagram has dramatically changed the attitudes and behaviours of undergraduate students in higher institutions, particularly their reading habits. These have posed a challenge to academic libraries to reform or transform their libraries to meet the newer information age. Twitter and Instagram have hampered Students use of libraries in academic institutions in contemporary societies. Besides, the negative effects and experienced in their academic performance, these undermine

students reading habit as many concentrations on the use of twitter and Instagram without concentrating on their academic work.

### Recommendations

Based on the findings of the study, the following recommendations were made:

- 1. Authorities in tertiary institution should establish rules and regulations that will limit student's excessive use of social networking sites during school hours.
- 2. To reduce or eliminate twitter addiction, the students should intentionally turn off all app notification, as this measure will reduce distractions and the urge to check and scroll the notifications.
- 3. To encourage reading habit students should use a productivity browser extension like strict workflow that will block any websites they do not want to visit for a specific duration of time.
- 4. The students should deliberately delete the app on their phones when school is in session.

### References

- Bano, T. (2011). Reading habits among the students of women college, AMU Aligarh: a survey.
- Bart, C. (2009). Eastern European marketing system and Western marketing research voids: A research agenda. *Journal of Business Research*, 14(12):33-46.
- Bell, B. A. (2012). You have been poked: Exploring the uses and gratifications of Facebook among emerging adults. *First Monday*, *12*(11): 456-462.
- Bicen, I. & Cams, I. M. (2012). Response of Nigerian universities to the use of technology-based teaching strategies: Students perspective in Cross River University of Technology, Cross River State, Nigeria. *Journal of Educational and Social Research*, 3(3): 143-147.

- International Journal of Applied Technologies in Library & Information Management 10 (2) 101-110, 2024
- Govindsamy, N. D. (2006). Reading between the lines: the conceptual basis of reading in knowledge construction.
- Jung, I. & Lee, J. (2015). YouTube acceptance by university educators and students: a cross-cultural perspective. *Journal of Innovations in Education and Teaching International Innovations in Education and Teaching International*, 52(3): 243-253.
- Kaplan, A. M. & Haenlein, M. (2020). Users of the world unite the challenges and opportunities of social media. *Business Horizons*, 53(1):59–68.
- Kenchakkauavar, K. (2015). Finding the right notes: An observational study of score and recording seeking behaviors of music students. *The Journal of Academic Librarianship*, 41(1), 61-67. <a href="https://doi.org/10.1016/j.acalib.2014.09.013">https://doi.org/10.1016/j.acalib.2014.09.013</a>.
- Nna-Etuk, G. M, Etefia, E. E. & Umoh, A. G. (2024). The Effect of WhatsApp and Facebook on Students' Use of Library in University of Uyo, Uyo, Nigeria. International Journal of Applied Technology in Library and Information Management. 10[1]: 1-9
- Ojerinde, A. A. (2014). The role of Library and Effective Education Paper presented at 2014 Annual General meeting/ conference and Award ceremony of the Ondo State Chapter of Nigeria library Association on 3rd December, 2014 at Francis Idibuye Auditorium, Federal University of Technology (FUTA), Akure, Ondo State, Nigeria.
- Pawar, S. S. (2007). A study of reading habits, reading skills and their relationship with certain demographical and psychological variables. Dr. Babasaheb Ambedka Marathwada University.
- Pew, D. (2012). Marketing Library Services,

- 17(6). Retrieved from:
- Rafia, C. H. F., Khan, M. S. G., Asim, R. & Arif, C. (2020). Social Media in Higher Education: A Literature Review and Research Directions. Arizona: The Center for the Study of Higher Education at the University of Arizona and Claremont Graduate University.
- Ramos, B. & Piper, O. (2011). Effect of social media tools on consumer buying behaviour in the Indian real estate industry. *International Association of Social Science Research*, 2(1):56-78.
- Shabi, C. & Udofia, A. (2015). Do people purchase what they view from YouTube?: the influence of attitude and perceived credibility of user-generated content on purchase intention. *Global Journal of Advanced Research*, 8(1), 16-21.
- Sherly, B. P. (2011). Reading habits among the readers in people "associated for reading the transformation of libraries in Kanga Kuman District a study (Ph.D.) Manannaaruam Sundaianai University, Tamil Nadu.
- Smith, A. & Brenner, P. (2012). 13% of online adults use twitter pew internet and America life project. Retrieved December, 03 2011 from.
- Tella, N. C. & Akande, U. (2007).Information Resources, Retrieval and Utilization for Effective Research in Tertiary and Research Institutions. *Asian Journal of Humanities and Social Sciences (AJHSS)*, 1(3). Retrieved from: <a href="www.ajhss.org.43116">www.ajhss.org.43116</a>.
- Waddell, G. & Barnes, A. (2012). Social media and academic libraries: current trends and future challenges. Retrieved from <a href="http://www.asis.org/asist2012">http://www.asis.org/asist2012</a>A. ./272. On 30th June, 2018.pdf.