International Journal of advanced humanities Research" (IJAHR)
Online ISSN: - 2812-5940
https://ijahr.journals.ekb.eg/

Mediating Role of Internet Self-Efficacy on the Relationship between Social Networking Sites' Usage and Performance in Physics: Structural Equation Modeling Approach

Olayinka Yahaya[1], Oladimeji Akanbi [2] Quadri. Yahaya[3],

[1] University of Ilorin, University Road, Tanke, Ilorin ,Nigeria

[2] University of Ilorin ,University Road, Tanke, Ilorin ,Nigeria,

[3] University of Ilorin ,University Road, Tanke, Ilorin ,Nigeria

.

E-mail: yahayawasiu361@gmail.com

Abstract

Social networking sites are online applications that were developed for communication and to have access to information. These sites can be accessed via phones, tabs, and other ICT gadgets through an internet connection. The study searched pre-service teachers' usage of social networking sites and their relationship with their performance in physics with internet self-efficacy as the mediating variable. The study sampled three hundred and five (305) pre-service physics teachers across all teacher-producing colleges and universities in Kwara state, Nigeria using a convenient sampling technique. Adapted and researchers-designed instruments titled "Social Networking Sites Usage Questionnaire" which was divided into four sub-dimensions, "Physics Performance Test" and "Internet Self-Efficacy Scale" were used to elicit data from the respondents. A partial least square structural equation modeling approach was used and the data collected were analyzed via Smart PLS software version 4.0.9.2. The results of the study revealed that all four sub-dimensions of social networking sites' usage were significantly related to student's performance in physics. The study also found out that internet self-efficacy mediates the social networking site usage's sub-dimensions relationship with students' performance in physics significantly. The study concluded that proper usage of social networking sites aids students' performance positively

Keywords: Social Networking Sites' Usage, Performance in Physics, Internet Self-Efficacy, Pre-Service Physics Teachers

Introduction

The 21st century otherwise known as the digital age is characterized by the use of computers, smartphones, and internet connection. These gadgets are essential in the life of the people of this century. These devices are an expansion of modern ways of communication and information dissemination through the platform known as social networking sites (social media). The importance of the usage of social networking sites increases daily and the development of media technology has had a great impact on people's modern ways of communication and information dissemination.

Gilbert et al. (2018) view social networking sites as online technology platforms that help to connect people far and near, communicate with each other, even on different continents, listen to music, read books, write up, journal, and much more.

According to Hootnote's annual report on the latest global trends in social media (2018) stated that almost every internet user can now be reached via social media. The Global Web Index study revealed that 50 thousand internet users can now be reached via social media, Ninety-eight percent of the aforementioned internet users are visiting or using social networking sites each month and seventy-eight percent of the aforementioned sample are networking with a mobile device. The report further revealed that forty-two percent of digital consumers use social media to stay in touch with friends, and thirty-nine percent use social networks to access news.

Nusayba (2017) posited that decision-makers, as well as ICT consultants, try to figure out ways by which firms can make profitable use of applications such as Wikipedia, Youtube, Facebook, and Twitter yet there seems to be very limited understanding of what the term social media exactly means. Undergraduate students spend a reasonable part of their time surfing the internet and social networking sites during the day and night because of the enormous contribution of technologies to their daily life activities (Kolhar, 2021).

Higher education institutions (HEIs) are one of the many many sectors that have high usage of social networking sites for multiple purposes. Ayana et al. (2018) posited that social networking sites serve as a means of communication and retrieval of information through the internet connection. Internet connection assessment aids the social networking sites' popularity among school-age and other categories of learners throughout the globe. Many post-secondary institutions across the globe restrict access to social networking sites to help students concentrate on their studies.

Literature Review and Hypotheses Development

Social Networking Sites and Students' Performance

Ghosh et al. (2022) worked on the relationship between social media-based teaching and academic performance during the COVID-19 pandemic. The sample frame of the study was those who attended online classes during the first and second waves of the COVID-19 pandemic in Bangladesh. The study analyzed reports from 302 returned and completed questionnaires that were distributed online through each respondent's electronic mail. The study used adapted measurements and the study results revealed that Facebook feedback, perceived usefulness, and social

bookmarking dimensions of social media use were found positive and significantly related to social media use. The study also found that social media use had a positive and significant relationship with students' academic performance.

Iqbal et al. (2021) searched the effect of emotional intelligence and academic social networking sites on academic performance during the COVID-19 pandemic. The study sampled 400 respondents but 395 completed and useful questionnaires were retrieved and used for data analysis. The study adopted the items of Zhoc on academic social networking sites and academic performance. The finding of this study revealed that academic social networking sites have a moderate, positive, and significant relationship with students' academic performance.

Samad et al. (2019) searched the impact of social networking sites on students' social well-being and academic performance. The study was quantitative research and the sample size was 366 that cut across three faculties of Azman Hashim International Business School. The finding of the study revealed that social networking site usage had a positive relationship with student performance.

Peter (2015) carried out a study on the influence of social media and the academic performance of students at the University of Lagos. The study adopted a descriptive survey method and a total sum of 24,661 students constituted the population and 378 students were selected using a simple random technique. A four-point Likert-type rating scale questionnaire was developed entitled "social media and academic performance of students questionnaire (SMAAPQ) with the adoption of descriptive statistics (frequency counts and percentage) and inferential statistics (chi-square) was used to analyze the data gathered. The findings of the study show that a great number of the institution students were addicted to social media and it's recommended that the platform should be used for educational purposes.

Kola and Dzandza (2018) worked on the effect of social media on the academic performance of students in Ghana. The study samples 200 students who were randomly selected from the total population of thirty-eight thousand students in eight randomly selected halls of residence out of the sixteen halls of residence of the University of Ghana using a cluster sampling technique. The findings of the study's revealed that 50% of the sample spent over two hours on social media daily with the conclusion that the over-involvement of students in social networking sites causes negative impacts on their academic performance.

Mensah and Ismail (2016) researched the impact of social media on students' academic performance: A case study of Malaysia Tertiary Institutions. The study samples 102 students from Erican College through the use of a convenient sampling technique. The study employed the use of a questionnaire for data gathering which contains 42 items with a likert scale of 1-5 (Disagree - Agree). Time appropriateness, Time duration, nature of usage, health addiction, friend-people connection, and security/privacy problems were observed as independent variables. The descriptive statistics (mean) and regression via Special Package for Social Science (SPSS 21) were used to analyze the collected data. The findings of the study revealed that the observed independent variables were not significant.

H_{1a}. The academic dimension of social networking sites' Usage is significantly related to student's academic performance in physics;

H_{1b}: Socialization dimension of social networking sites' Usage significantly related to student's academic performance in physics;
H_{1c}: Entertainment dimension of social networking sites' Usage significantly related to student's academic performance in physics;
H_{1d}: Informativeness dimension social networking sites' Usage significantly related to student's academic performance in physics.

Internet Self-Efficacy

Yavuzalp and Bahcivan (2021) worked on structural equation modeling analysis of relationships among university students' readiness for e-learning, self-regulation skills, satisfaction, and academic achievement. The study engaged 749 university students that were registered for common compulsory computer-based courses. The scale of university student's readiness for e-learning and the revised self-regulated online learning questionnaire (SOL-Q-R) were sued to collect data.
The scale of readiness for e-learning is a latent construct with dimensions like computer self-efficacy, internet self-efficacy, online communication self-efficacy self-directing learning, learning control, and motivation toward e-learning. The findings of the study revealed that university students' internet self-efficacy has a positive relationship with e-learning and the study concluded that university students' internet self-efficacy increases their self-regulated learning skills.
Calaguas and Consunji (2022) search on structural equation model predicting adults' online learning self-efficacy. The study was non-experimental, cross-sectional & analytic survey research. Two hundred and twenty-four (224) students were engaged through a non-randomized convenience sampling technique. G-power computer-based statistical software was used to determine the sample size from the whole population. Internet information and manipulation self-efficacy scale that contains eight items inventory with two sub-scales. The findings of the study revealed that internet & information self-efficacy has a positive and moderate and significant relationship with online learning self-efficacy (OLSE).
Cakir and Erbas (2022) carried out a study on the examination of sports science faculty students' internet self-efficacy. This study was quantitative research and engaged three hundred and fifty-six (356) volunteer university physical education and sports students. Researchers' self-designed internet self-efficacy scale was used for data collection with a reliability index of 0.781. The findings of this study revealed that the internet self-efficacy of university physical education and sports students was significant.

- **H_{2a}.** Internet self-efficacy mediates the relationship between the academic dimension of social networking sites' usage and students' academic performance in physics;
- **H_{2b}**: Internet self-efficacy mediates the relationship between the socialization dimension of social networking sites' usage and students' academic performance in physics;
- **H_{2c}**: Internet self-efficacy mediates the relationship between the entertainment dimension of social networking sites' usage and students' academic performance in physics;

– **H_{2d}**: Internet self-efficacy mediates the relationship between the informativeness dimension of social networking sites' usage and students' academic performance in physics.

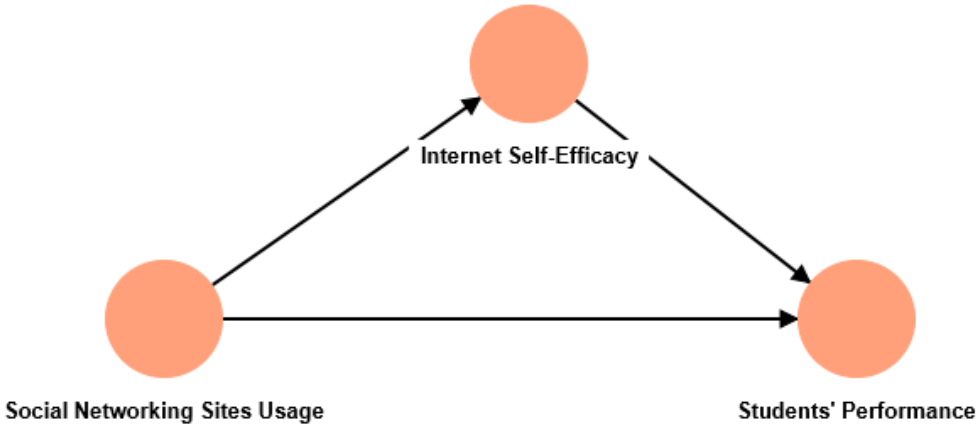

Figure 1:The research framework

Methods

This study was a correlational research type that use structural equation modeling for its analysis. The population for this study was pre-service physics teachers across all the public and private teachers-producing universities and colleges in Kwara state. "Samples to the variable" sample size selection techniques were used to select three hundred and five (305) pre-service physics teachers for this study. The structural equation model encourages many sample size selection techniques like a sample to variables, items to variables, G-power statistical software, Krejie and Morgan table among others. The samples-to-variables technique proposed at least a minimum of five (5) respondents to one (1) variable and this current study considered three constructs.

Measures of Construct

Social Networking Sites' Usage was measured on four different dimensions. This work builds on Gupta and Bashir (2018) that concluded that the usage of social networking sites was divided into five dimensions: academic dimension, socialization dimension, entertainment dimension, informativeness dimension, and constraints dimension. The present study only considered four dimensions from the five dimensions earlier propounded by Gupta and Bashir (2018) except for the constraints' dimension.

The academic dimension of Social Networking Sites Usage items was adapted from Gupta and Bashir (2018). The instrument has seven (7) items which were modified to eight (8) items. The content of the measure ranges from items on solving academic problems through social networking sites, usage of social networking sites for research works, membership of multiple academic social networking sites groups, and usage of social networking sites for academic discussions.

The socialization dimension of social networking sites consists of six (6) items that were rated on four Likert scales of strongly agree, agree, disagree, and strongly

disagree. The content of the measure involves the items on the influence of social networking sites on social life, social engagement, social gathering attendances, and assessment of current social life and events on social networking sites.

The entertainment dimension of social networking sites consists of five (5) items. Four items were adopted and one item was added. The items were rated on four Likert scales strongly agree, agree, disagree, and strongly disagree. The content of the measure was centered on items like sharing personal pictures and short videos on social networking sites and sharing celebrities' and content creators' pictures and videos.

The informativeness dimension of social networking sites measure consists of four (4) items that were adapted and modified. The items of the dimension were rated on four Likert scales of strongly agree, agree, disagree, and strongly disagree. The content of the measure dimension items sampled questions on the reading of news on social networking sites, sharing of ideas and job opportunities, adverts, and useful web pages on social networking sites among others.

Table 1: *Social Networking Sites*

Social Networking Sites Usage Dimension	Source	Number of adapted Items	Number of Items added	Number of Items used
Academic dimension of SNSs	Gupta and Bashir (2018)	7	1	8
Socialization dimension of SNSs	Gupta and Bashir (2018)	6	0	6
Entertainment dimension of SNSs	Gupta and Bashir (2018)	4	1	5
Informativeness dimension of SNSs	Gupta and Bashir (2018)	3	1	4

Source: Field work, 2023

Internet Self-Efficacy Measure

The Internet self-efficacy questionnaire was researchers' designed based on the experience gathered from the available Internet self-efficacy items in online databases. The measure consists of twenty-two (22) items that were rated on a five Likert scale of strongly agree, agree, undecided, disagree, and strongly disagree. The content of the measure focuses on search engines, browser usage, understanding of web icons, usage of online educational platforms, and management of online multiple databases.

Students' Performance in Physics Questionnaire

Student's performance in the physics questionnaire was researchers' designed to measure. The measure consists of ten (10) items. The content of the measure focuses on students' knowledge of conversion, measurement, heat, and energy concepts.

Findings

The data collected for this current study were analyzed using SmartPLS software version 4.0.9.2 due to the software's relationship with the partial least square structural equation model (PLS-SEM). The PLS-SEM is an advanced statistical method that can determine the causal relationship between multiple variables (exogenous and endogenous). Two stages of analysis were undertaken namely: the measurement model and the structural model.

The measurement model analysis part of PLS-SEM shows the psychometric properties (validity and reliability of the constructs). The structural model analysis part of PLS-SEM presents the relationship strength, direction, significance, findings on the coefficient of determination, and predictive relevance.

Table 2: *Demographic Profile of the Respondents*

Gender		N	%
	Female	156	51.1
	Male	148	48.6
	Missing	1	0.3
	Total	305	100
Level			
	100	47	15.4
	200	94	30.8
	300	58	19.0
	400	87	28.5
	Missing	19	6.2
	Total	305	100
Preferred Social Networking Site			
	Facebook	33	10.8
	Instagram	18	5.9
	TikTok	27	8.9
	WhatsApp	192	63.0
	SnapChat	2	0.7
	Twitter	33	10.8
	Others	0	0
	Total	305	100

Results of the Measurement Model

The reliability of the constructs items was assessed using main loadings, Cronbach alpha, and composite reliability. Hair et al. (1998) opined that a factor loading of 0.30 is suitable for items of any construct with a sample size of three hundred and fifty (350) and above. The main loadings and average variance extracted values in Table 4 the convergent validity of the constraints.

Table 3: ***Heterotrait-monotrait (HTMT) of Correlations of the Constructs***

Construct	Academic Dimension	Entertainment Dimension	Informativeness Dimension	Internet Self-Efficacy	Social Dimension	Students' Performance in Physics
Academic Dimension						
Entertainment Dimension	0.486					
Informativeness Dimension	0.616	0.926				
Internet Self-Efficacy	0.632	0.845	0.958			
Social Dimension	0.529	0.952	0.879	0.908		
Students' Performance in Physics	0.542	0.735	0.973	0.943	0.783	

Table 4: Convergent Validity of the first-order constructs' measure

Construct	Items	Factor loadings	Cronbach Alpha (CA)	Composite Reliability (CR)	Average Variance Extracted (AVE)
Academic Dimension	AD1-AD8	0.234-0.891	0.844	0.876	0.477
Entertainment Dimension	ED1-ED5	0.660-0.911	0.878	0.901	0.678
Informativeness Dimension	ID1-ID4	0.379-0.888	0.647	0.781	0.509
Internet Self-Efficacy	ISE1-ISE22	0.371-0.829	0.920	0.929	0.388
Social Dimension	SD1-SD6	0.688-0.816	0.844	0.850	0.562
Students' Performance in Physics	SPP1-SPP10	0.322-0.824	0.879	0.901	0.492

Findings of the Structural Model

Structural model analysis determines the construct's (exogenous and endogenous) relationship strength (weak/moderate/substantial), direction (positive and negative), and significance (p<.05, t>1.96). The direct relationship results in Table 5 indicate that academic, entertainment, socialization, and informativeness dimensions of social networking site users have a positive, weak, moderate, substantial, and significant relationship with students' performance in physics.

This implies that proper usage of social networking sites can aid the students' knowledge and understanding of physics concepts and other subjects/courses. The indirect relationship results in Table 6 revealed that internet self-efficacy mediates the relationship between social networking site usage dimensions and students' performance in physics significantly.

Table 5: Direct Relationship Result of Social Networking Site Usage's Dimension and Students' Performance in Physics

Path Relationship	Path Coefficient	Coefficient Mean	Remark	t-value	p-value	Remark
Academic dimension of SNSs Usage->SPP	0.227	0.232	Moderate/Positive	5.937	0.000	H_{1a} Retained
Entertainment dimension of SNSs Usage->SPP	0.188	0.194	Weak/Positive	3.777	0.000	H_{1b} Retained
Informativeness dimension of SNSs Usage->SPP	0.195	0.189	Weak/Positive	4.859	0.000	H_{1c} Retained
Socialization dimension of SNSs Usage->SPP	0.301	0.296	Moderate/Positive	5.095	0.000	H_{1d} Retained

Table 6: ***Indirect Relationship of Social Networking Sites Usage's Dimension and Students' Performance in Physics***

Path Relationship	Path Coefficient	Coefficient Mean	Remark	t-value	p-value	Remark
Academic dimension of SNSs Usage->Internet Self-Efficacy->SPP	0.220	0.228	Moderate/Positive	5.440	0.000	H_{2a} Retained
Entertainment dimension of SNSs						

Usage-> Internet Self-Efficacy->SPP Informativeness dimension of SNSs	0.162	0.164	Weak/Positive	3.676	0.000	H_{2b} Retained
Usage-> Internet Self-Efficacy->SPP Socialization dimension of SNSs	0.171	0.173	Weak/Positive	4.610	0.000	H_{2c} Retained
Usage-> Internet Self-Efficacy->SPP	0.300	0.289	Moderate/Positive	5.010	0.000	H_{2d} Retained

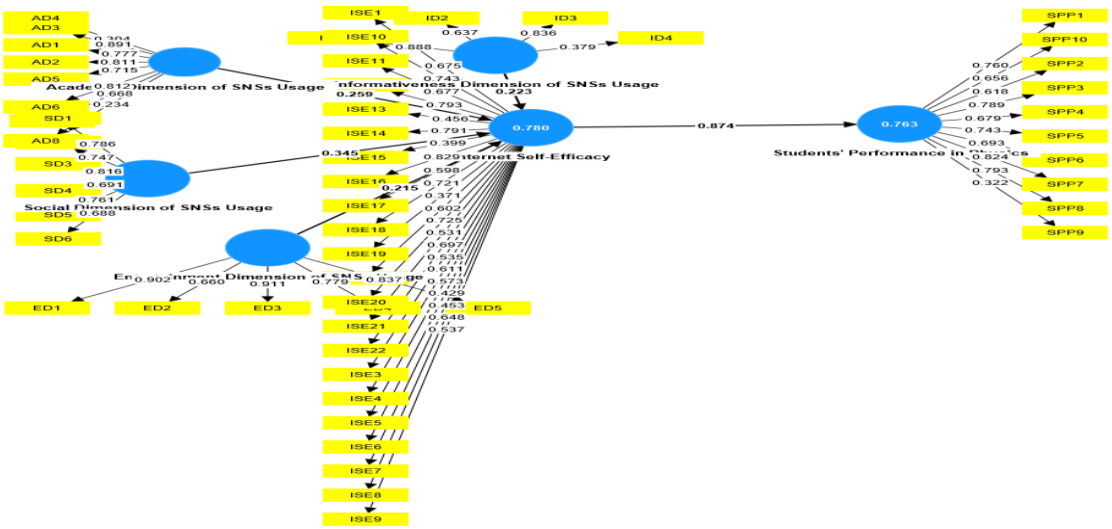

Fig.2: The graphical output of the relationship between social networking site usage, students' performance in physics, and internet self-efficacy.

Discussion and Conclusion

The employment of partial least square structural equation modeling and other multivariate statistical methods has gained more strength, and momentum and experienced growth in all fields of studies for research and analysis purposes. This is due to the ability of the said methods to measure multiple variables/construct relationships simultaneously.

The present study explains the mediating effect of internet self-efficacy on the relationship strength, direction, and significance of social networking site usage's dimension and students' performance in physics in Kwara state, Nigeria. The research hypotheses raised focus on the direct and indirect relationship between social networking site usage dimension and students' performance in physics when mediated by internet self-efficacy. The path coefficients (β), p, and t-statistics' revealed that all social networking sites usage dimensions had weak, moderate,

substantial, and significant relationships with pre-service teachers' performance in physics. The result of the study also revealed that internet self-efficacy mediates the relationship of social networking site usage with pre-service teachers' performance in physics positively and significantly. In conclusion, proper and non-abuse use of social networking sites influences the students' performance in physics based on the findings of the study.

References

- Ayana, A., Tunsisa, A. B., Gizaw, A., Bole, A., & Asferi, B. (2018). The impact of social networking on students' academic performance: the case of Hawassa University. https://www.researchgate.net/publication/346489474
- Cakir, Z., & Erbas, U. (2022). Examination of sports Science faculty students' Internet self-efficacy. *International Journal of Eurasian Education and Culture,* *7*(17), 1316-1333. DOI: https://dx.org/10.35826/ijoecc.588
- Calaguas, N. P., & Consunji, P. M. P. (2022). A structural equation model predicting adults online learning self-efficacy. *Education and Information Technologies*, 27 6233-6249. https://doi.org/10/1007/s10639-021-10871-y
- Ghosh, R., Khatun, A., & Khanam, Z. (2022). The relationship between social media based teaching and academic performance during COVID-19. Quality Assurance in Education. DOI.10.1108/QAE-01-2022-0016
- Gilbert, M.T., Ali, A., Naif, A., Alwaleed, A. & Saad, A. (2018): The impact of social media on academic performance of selected college students. *International Journal of Advanced Information Technology (IJAIT), 8*(4/5),
- Gupta, S., & Bashir, L. (2018). Social networking usage questionnaire: development and validation in an Indian higher education contest. *Turkish Online Journal of Distance Education-TOJDE, 19*(4), 214-227.
- Iqbal, J., Qureshi, N., Ashraf, M. A., Rasool. S. F., & Asghar, M. Z. (2021). The effect of emotional intelligence and academic networking sites on academic performance during COVID-19 pandemic. *Psychology Research and Behavior Management*, 905-920. DOI:10.2147/PRBM.S316664
- Kolan, B. K. & Dzandza, P.D. (2018): Effect of social media on academic performance of students in Ghanaian University: A case study of University of Ghana, Legion. Library Philosophy and Practice (e-journal). 1637. https://digitalcommons.unl.edu/lilphilprac/1637.
- Kolhar, M., Nazir, R., Kazi, A., & Alameen, A. (2021). Effect of social media use on Learning, social interactions, and sleep duration among university students. Saudi *Journal of Biological Sciences,* 28, 2216-2222. https://doi.org/10.1016/j.sjbs2021.01.010
- Nusayba, K. (2017): *A survey on social media use, engagement and addiction as predictors of academic performance*. Unpublished Bachelor of Pharmacy Dissertation, Department of Pharmacy, East West University, Bangladesh.
- Peter, D. (2015): Influence of social media and academic performance of students at the University of Lagos. Conference Proceedings

- Samad, S., Nilashi, M., & Ibrahim, O. (2019). The Impact of social networking sites on Students social well-being and academic performance. Education and Information Technologies. https://doi.org/10.1007/s10639-019-09867-6
- Yavuzalp, N., & Bahcivan, E. (2021). A structural equation modeling analysis of the relationship among university student's readiness for e-learning, self-regulation skills, satisfaction, and academic achievement. *Research and Practice in Technology Enhanced Learning, 16*(15), 1-17. https://doi.org/10.1186/s41039-021-00162-y