

Perception Of Teacher's Technology Adoption On Students' Achievement In Social Studies In Osun State, Nigeria

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Abstract

Effective integration of technology in education heavily relies on teachers' perceptions, readiness, and pedagogical skills. The study assessed the current level of technology adoption and utilization among social studies teachers in Osun State, investigated the correlation between their perceived effectiveness and students' academic achievement, and identified influencing factors. The descriptive survey research design was adopted in the study. A sample of 144 teachers was used through the multi-stage sampling procedure. A self-developed instrument titled Perception of Teacher's Technology Adoption Questionnaire (PTTAQ) and student exam records in Social Studies were used as research instruments for data collection. The Cronbach Alpha estimate of the PTTAQ was 0.86. Data collected were analysed using appropriate descriptive and inferential statistics. The result showed that the level of adoption is moderate (mean = 2.48, S.D=1.48), and utilization is moderate (mean = 2.46, S.D=1.37). Also, results show there is no correlation between teachers' perceived effectiveness of technology adoption and students' academic achievement in social studies ($r = -.081, p > .05$). The factors influencing include technology self-efficacy, attitudes toward change, school culture, support, professional development, perceptions of effectiveness, and resource constraints. This study emphasizes the need for ongoing support and resources to enhance teachers' technology self-efficacy, highlighting that adequate training and development can strengthen technology-based teaching practices.

Kata kunci:

persepsi Guru,
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Abstrak

Integrasi teknologi yang efektif dalam pendidikan sangat bergantung pada persepsi, kesiapan, dan keterampilan pedagogis para guru. Penelitian ini menilai tingkat adopsi dan pemanfaatan teknologi saat ini di kalangan guru studi sosial di Negara Bagian Osun, menyelidiki korelasi antara efektivitas yang mereka persepsikan dan pencapaian akademik siswa, serta mengidentifikasi faktor-faktor yang memengaruhi. Desain penelitian survei deskriptif diadopsi dalam studi ini. Sampel sebanyak 144 guru diambil melalui prosedur pengambilan sampel multistage. Instrumen yang dikembangkan sendiri dengan judul Kuesioner Persepsi Adopsi Teknologi Guru (PTTAQ) dan catatan ujian siswa dalam Studi Sosial digunakan sebagai instrumen penelitian untuk pengumpulan data. Estimasi Cronbach Alpha dari PTTAQ adalah 0,86. Data yang dikumpulkan dianalisis menggunakan statistik deskriptif dan inferensial yang tepat. Hasil menunjukkan bahwa tingkat adopsi berada pada tingkat sedang (rata-rata = 2,48, S.D = 1,48), dan pemanfaatan juga sedang (rata-rata = 2,46, S.D = 1,37). Selain itu, hasil menunjukkan tidak ada korelasi antara efektivitas yang dipersepsikan guru dalam adopsi teknologi dan pencapaian akademik siswa dalam studi sosial ($r = -0,081, p > 0,05$). Faktor-faktor yang memengaruhi termasuk efikasi diri teknologi, sikap terhadap perubahan, budaya sekolah, dukungan, pengembangan profesional, persepsi efektivitas, dan kendala sumber daya. Studi ini menekankan perlunya dukungan dan sumber daya yang berkelanjutan untuk meningkatkan efikasi diri teknologi guru, menyoroti bahwa pelatihan dan pengembangan yang memadai dapat memperkuat praktik pengajaran berbasis teknologi.

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INTRODUCTION

In the current digital era, technology integration in education is becoming more and more commonplace globally (Burns & Santally 2019). Nigeria, like many other nations, has encouraged the use of technology in the classroom to improve instruction and student outcomes (Nwokeocha, 2015). To enhance educational outcomes, the National Policy on Education places a strong emphasis on integrating technology into the teaching and learning process. The Nigerian educational system has been incorporating technology into the classroom more and more in recent years, especially in subjects like social studies, which are crucial for encouraging critical thinking, civic involvement, and cultural understanding (Atubi, 2022).

Social Studies explores the intricacies of human society, giving students the chance to learn about many cultures, investigate historical events, and have conversations about current social issues. By incorporating technology into Social Studies instruction, students not only learn the material more effectively but also develop essential critical thinking and citizenship skills needed in today's digital society (Atubi, 2022). Interactive multimedia tools, such as educational videos and simulations, can also make abstract concepts more tangible and engaging for students, fostering deeper and collaborative learning experiences. Osun State, located in southwestern Nigeria, is no exception to the nationwide push for educational reform and technology integration. However, despite efforts to promote technology adoption among teachers, challenges persist in effectively implementing these initiatives. One such challenge is the gap between policy intentions and practical implementation, which often results in varied levels of technology integration among teachers.

Education experts and policymakers have therefore generally agreed that technology should be used to support universal access to education, bridge learning divides, support teacher development, enhance the quality and relevance of learning, strengthen inclusion, and improve educational administration and governance. It can therefore enrich, complement, and transform education for sustainable development (UNESCO, 2022, p.1). Technology adoption has been found by researchers to assist learning when it is correctly integrated with teaching practices, curriculum, and assessments (Mintah et al., 2023). Research also suggests that technology can facilitate active learning, collaboration, and engagement among students, leading to improved academic performance (Ajayi, 2016; Adeoye & Aderinoye, 2017). However, the successful integration of technology depends on teachers' readiness to adopt and effectively use these tools in their teaching practices (Mintah et al., 2023). An equally significant discovery was that material components that provide high-quality technology integration include suitable hardware, technical support, a steady Internet connection, etc. (Hatlevik & Hatlevik, 2018; Seifu, 2020). In Nigeria, studies have highlighted various challenges hindering the effective integration of technology in

education, including inadequate infrastructure, lack of technical support, and limited teacher training (Aduwa-Ogiegbaen & Iyamu, 2005; Ololube, 2006; Bećirović, 2023).

The primary determinant of the effectiveness of new technology adoption is the attitudes of teachers about the use of ICT in instruction and learning (Eickelmann & Vennemann, 2017). Regarding teachers, it may be said that their disposition reveals whether or not they find the use of technology in the classroom enjoyable (European Commission/Eurydice, 2019). Teachers' responses to technology are influenced by their opinions regarding computers, whether positive or negative. This affects how important teachers think computers are in the classroom (Mintah et al., 2023) and how they use computers now and in the future. Boakye and Banini (2008) claimed that there is a direct correlation between instructors' opinions and computer use, and they provided evidence to support their conclusion. According to Daggert and Pedinott (2005), a lot of individuals view technology and computer use with skepticism at first but they soon come to understand that life would be meaningless without them.

Additionally, teachers' attitudes towards technology and their perceived self-efficacy in using it significantly influence the extent to which technology is integrated into teaching and learning processes (Clipa et al., 2023). Hence, understanding teachers' perceptions of technology adoption and its impact on student achievement in Social Studies is essential for addressing the challenges faced by educators in Osun State. Factors such as teachers' technological skills, attitudes toward technology, access to resources, and support systems play pivotal roles in determining the successful integration of technology into classroom practices. The adoption of technology in teaching practices is crucial for enhancing the quality of education and preparing students for the demands of the modern world. However, the extent to which teachers in Osun State have embraced technology in teaching Social Studies and how this adoption affects students' academic achievement remains underexplored.

In this study, Davis's (1985, 1989) Technology Acceptance Model (TAM) serves as the theoretical framework to guide and explain the data collected from Social Studies teachers. TAM, initially proposed by Davis (1985) and later expanded by Bagozzi and Warshaw (1989), was the first model developed to predict users' acceptance of Information Systems. It added two new variables (perceived usefulness and simplicity of use) to preexisting theories. Perceived utility measures how much teachers think technological resources will help Social Studies teachers in their teaching, whereas thought to be user-friendly measures how much teachers think adopting technology would be simple. According to Amin and Li (2014), TAM aims to explain how external constructs influence internal ones, such as beliefs, attitudes, and intentions. Recent studies by Elsayed and Saad (2023) and Naimipour, Guzdial, and Shreiner (2020) have used TAM to predict users' behavior, intentions, and adoption of Information Systems, showing its applicability across various contexts. Naimipour et al. (2020) found a correlation between perceived ease of use and perceived usefulness, suggesting that when teachers find technology easy to use, they are more likely to perceive it as useful. The robustness of TAM has led to its widespread use in research (Soun et al., 2022;

Shaikh & Karjaluoto, 2015). Therefore, the adoption of TAM in this study is based on its relevance to technology adoption and utilization in Social Studies teaching in Osun State schools.

Studies have examined the relationship between teachers' technology adoption and students' academic achievement and yielded mixed results (Edwards, 2012; Harris, Al-Bataineh & Al-Bataineh, 2016; Lalitha, 2021). Some studies have found a positive correlation between teachers' use of technology and students' performance (Harris et al., 2016; Lalitha, 2021). Conversely, others have reported no significant impact or even negative effects of technology integration on students' achievement (Rathore & Sonawat, 2015; Eshet-Alkalai, 2004). By investigating the perception of teachers' technology adoption and its influence on students' achievement in Social Studies, this study aims to contribute to the existing knowledge base on technology integration in education, particularly in the context of Osun State, Nigeria. Identifying the factors that hinder or facilitate technology adoption among teachers can inform policymakers, education administrators, and teacher training programs in developing effective strategies to promote the use of technology in classrooms and improve educational outcomes for students.

The purpose of this study is to investigate the influence of teachers' technology adoption on students' academic achievement in Social Studies. Specifically, it seeks to examine the current level of technology adoption and utilization among Social Studies teachers in Osun State, identify the factors influencing teachers' attitudes toward technology adoption, and explore the correlation between teachers' perceived effectiveness of technology adoption and students' academic performance.

RESEARCH METHOD

This study adopted a descriptive research survey design and employed the Technology Adoption Model (TAM). The targeted population for this study was the social studies teachers in both public and private secondary schools in Osun State. A sample of 144 teachers was selected using the multi-stage sampling procedure. The selection of Local Government Areas (LGAs) from three senatorial districts namely Osun West, East, and Central was conducted randomly using a simple random sampling technique, where three LGAs were chosen from each district. From each selected LGA, four schools (two public and two private) were selected using the same simple random sampling technique. Subsequently, from each selected school, four Social Studies teachers were chosen using a convenient sampling method. This procedure was designed to enhance transparency and facilitate the reproducibility of the research in the future.

The instrument PTTQA was divided into two sections (A and B). The first section sought the respondents' demographic data like gender, age distribution, and academic level. Section B which consisted of items based on a response points Likert Scale Model of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) to elicit information from the respondents based on the research questions. The instrument was

subjected to face and content validity. The reliability approach used was analysed using Cronbach Alpha estimate to obtain a reasonable reliability coefficient of 0.86. The collected data was analysed using appropriate descriptive and inferential statistics. Research questions were answered using the Pearson correlation and central tendencies such as mean and standard deviation.

RESULTS AND DISCUSSION

Result

Research Question One: What is the current level of technology adoption and utilisation among social studies teachers in Osun State?

To address this research question, data collected using a 10-item instrument on technology adoption and utilization were scored using a four-point Likert scale. Responses of "Strongly Agree" (SA) were assigned a score of '4', "Agree" (A) was assigned '3', "Disagree" (D) was assigned '2', and "Strongly Disagree" (SD) was assigned '1'. These scores can be interpreted such that average scores above 2.5 indicate a positive attitude toward technology adoption, while scores below that suggest a more negative or neutral attitude. The 10 items were used to measure the level of technology adoption and utilization among Social Studies teachers in Osun State, as presented in Tables 1 and 2.

Table 1

Mean and Standard Deviation of the Level of Technology Adoption

STATEMENTS	SA	A	D	SD	Mean	Std. Dev
Frequency = 144						
I feel technology should be adopted in social studies lessons	64	21	41	18	2.43	1.79
I regularly integrate technology into my Social Studies curriculum.	70	11	43	20	2.46	1.73
I actively seek out new technology resources to enhance my teaching.	42	25	52	25	2.33	0.93
I believe technology enhances student engagement in my Social Studies classes.	56	15	57	16	2.39	1.04
I effectively use multimedia tools (e.g., videos, and presentations) in my Social Studies instruction.	55	10	60	19	2.37	0.97
I adapt my teaching methods to incorporate technology for better student understanding.	57	8	65	14	2.30	0.93
I encourage students to use technology for research and project-based learning in Social Studies.	65	11	61	7	2.32	0.90
I collaborate with colleagues to share best practices for integrating technology into Social Studies.	77	9	46	12	2.98	1.78
I attend professional development workshops to improve my technology skills for teaching Social Studies.	70	2	70	2	2.50	1.50
I assess students' technology skills and provide support as needed in my Social Studies lessons	58	78	7	4	2.41	1.39
Grand Mean					2.48	1.48

Table 1 presents the frequency of response options, mean scores, and standard deviations for all items. The results show that 8 items have mean scores below the criterion mean of 2.5, while only 2 items have mean scores of 2.5 and above.

Additionally, the grand average for mean and standard deviation is 2.48 and 1.48, respectively. These results indicate a moderate level of technology adoption by Social Studies teachers in Osun State

Table 2
Mean and Standard Deviation of the Level of Technology Utilisation

STATEMENTS	SA	A	D	SD	Mean	Std. Dev
Frequency = 144						
I create digital assignments or activities for students to complete using technology.	56	15	57	16	2.38	1.05
I encourage students to conduct online research for Social Studies projects.	55	10	60	19	2.36	1.04
I incorporate multimedia resources (e.g., videos, and interactive websites) to enhance student learning in Social Studies.	70	11	43	20	2.46	1.63
I integrate technology-based assessments (e.g., online quizzes, digital portfolios) into my Social Studies teaching.	65	11	61	7	2.31	0.90
I provide opportunities for students to collaborate on projects using technology tools.	77	9	46	12	2.98	1.72
I regularly update and adapt my technology use based on feedback and emerging educational trends.	58	78	7	4	2.40	1.35
I regularly use technology tools (e.g., computers and interactive whiteboards) in my Social Studies lessons.	77	9	46	12	2.95	1.78
I use educational software or applications to supplement Social Studies instruction.	42	25	52	25	2.33	0.93
I use technology to differentiate instruction and meet the diverse needs of my students in Social Studies.	70	2	70	2	2.40	1.35
I utilize digital platforms (e.g., learning management systems) to distribute materials and communicate with students.	57	8	65	14	2.30	0.98
Grand Mean					2.46	1.37

Table 2 presents the frequency of response options, mean scores, and standard deviations for all items. The results show that 8 items have mean scores below the criterion mean of 2.5, while only 2 items have mean scores above 2.5. Additionally, the grand average for mean and standard deviation is 2.46 and 1.37, respectively. These results indicate a moderate level of technology utilisation by Social Studies teachers in Osun State.

Research Question Two: Is there a correlation between their perceived effectiveness of technology adoption and students' academic achievement?

Table 3
Correlation between Perceived Effectiveness of Technology Adoption and Students Academic Achievement

Variable	N	Mean	SD	df	r	P	Remark
Technology Adoption Effectiveness	144	2.87	1.45	142	-0.081	0.108	No Relationship
Student's Academic Achievement	144	3.52	1.85				

Table 3 shows the Pearson product-moment correlation between the perceived effectiveness of technology adoption and students' academic achievement. The result showed mean and standard deviation of technology adoption effectiveness were 2.87 and 1.45 respectively. In addition, the mean and standard deviation of student's academic achievement were 3.52 and 1.85 respectively. The result also shows that $r = -0.081$, $p > 0.05$ indicating there is no relationship between teachers' perceived effectiveness of technology adoption and students' academic achievement in social studies.

Research Question Three: What are the factors influencing teachers' attitudes toward technology adoption in social studies?

Table 4
Mean and Standard Deviation of the Factors Influencing Teachers' Attitudes toward Technology Adoption

STATEMENTS	SA	A	D	SD	Mean	Std. Dev
Frequency = 144						
Teacher's confidence in using technology tools during Social Studies lessons.	110	30	0	4	4.69	0.65
Teacher's belief in their ability to effectively incorporate new technology into their teaching.	94	46	0	4	4.56	0.68
Teacher's comfort level in troubleshooting technology issues in the classroom.	76	61	7	0	4.44	0.68
Teacher's confidence in adapting to new technology resources.	46	91	0	7	4.27	0.58
Teacher's openness to trying new teaching methods that involve technology.	68	60	6	10	4.21	0.94
Teachers' belief that integrating technology into Social Studies instruction can enhance student learning.	50	86	7	1	4.19	0.73
Teacher's enthusiasm for exploring new technologies for teaching purposes.	44	90	2	8	4.15	0.79
Teacher's perception of technology as an opportunity to improve their teaching practices.	50	80	6	8	4.13	0.82
Availability of support and resources for technology integration in the school.	51	76	10	7	4.11	0.86
Teacher's perception of encouragement from school leadership to use technology in teaching.	57	63	12	12	4.05	1.01

Presence of a culture of collaboration among teachers to share technology integration strategies.	57	63	12	12	4.05	1.01
Teacher's feeling of support from colleagues in integrating technology into Social Studies teaching.	52	69	9	14	4.02	1.05
Access to professional development opportunities focused on technology integration.	52	69	9	14	4.02	1.05
Teacher's satisfaction with the training provided for using technology tools in teaching.	43	59	17	25	3.80	1.06
Teacher's interest in attending workshops or training sessions to improve technology skills.	62	41	22	19	3.66	1.30
Teacher's perception of ongoing support and training for using technology in Social Studies.	94	50	0	0	4.56	0.68
Teachers' belief that using technology enhances student engagement in Social Studies.	79	61	3	0	4.44	0.68
Teacher's perception of technology as an effective tool for delivering content and fostering student learning.	50	91	0	3	4.27	0.58
Teachers struggle to find enough time to integrate technology effectively into Social Studies lessons.	50	80	6	8	4.13	0.82
Teacher's perception of limited access to technology resources hinders technology use.	57	76	10	1	4.11	0.86
Grand Mean					4.19	0.81

Table 4 shows the frequency of the response options, mean, and standard deviation for all the items. These 20 items were arranged according to factors that can influence teachers' attitudes toward technology adoption such as technology self-efficacy, attitudes toward change, school culture and support, development and training opportunities on technology, perceptions of effectiveness, and time and resource constraints. The results show that all items have their mean scores above the criterion mean of 2.5. This implies that all the items were accepted as the factors that influence teachers' attitudes toward technology adoption by the respondents and the most influential factor was self-efficacy

Discussion

The findings revealed that the majority of the items have mean scores below the criterion mean suggesting that Social Studies teachers in Osun State are not fully embracing technology in their teaching practices. This indicates a need for targeted interventions to address the barriers to technology adoption among Social Studies teachers. Similarly, findings show that the majority of the items have mean scores below the criterion mean, indicating that technology utilization by Social Studies teachers is moderate. This implies that while some technology is being used, it may not be fully integrated into teaching practices or utilized to its full potential. Furthermore, The Pearson product-moment correlation coefficient indicates a weak negative correlation between teachers' perceived effectiveness of technology adoption and students' academic achievement in social studies. This implies that there is no meaningful relationship between how teachers perceive the effectiveness of technology adoption and the academic achievement of students in social studies as agreed by Funke and

Oluwafemi (2019) as against Boakye and Banini (2008). It also indicates that simply perceiving technology as effective does not guarantee improved academic achievement. The findings are in agreement with the findings (Rathore & Sonawat, 2015).

Moreover, the lack of a significant relationship between teachers' perceived effectiveness of technology adoption and students' academic achievement suggests that other factors may have a more significant influence on student performance in social studies. Other factors, such as teaching quality, student engagement, classroom management, and socio-economic background, may play more significant roles in determining students' academic performance. Finally, findings show that while teachers in Osun State recognize various factors as influential in shaping their attitudes toward technology adoption, self-efficacy emerges as the most significant factor in agreement with Ololube (2006) and Bećirović (2023). Addressing factors such as self-efficacy, attitudes toward change, and support mechanisms is essential for promoting positive attitudes toward technology adoption among teachers, ultimately leading to more effective integration of technology in teaching and learning among social studies teachers as supported by the findings (Mintah et al., 2023)..

CONCLUSION

The study concluded that while technology adoption and utilization among Social Studies teachers in Osun State are at a moderate level, their effectiveness in improving students' academic achievement is not statistically significant. Therefore, a more comprehensive approach is needed to enhance technology integration in teaching practices and improve student outcomes in social studies.

Based on the findings, the study recommends that ongoing support and resources should be offered to teachers to promote continuous learning and experimentation with technology in their classrooms. Additionally, interventions should be developed to improve teachers' attitudes toward technology adoption, focusing on factors such as self-efficacy, attitudes toward change, and perceptions of effectiveness. For further research, it is recommended to conduct comparative studies that assess the levels of technology adoption and utilization among teachers in public versus private schools. Such studies could provide deeper insights into the variations in attitudes and practices across different educational contexts. Furthermore, exploring students' perceptions of technology use in the classroom and its impact on their learning experiences and academic achievement would also be beneficial. This multifaceted approach will help to identify specific factors influencing technology adoption and its effectiveness in enhancing educational outcomes

REFERENCES

Adeoye, A. O., & Aderinoye, R. A. (2017). Influence of information and communication technology on learning and teaching among lecturers in tertiary institutions in Oyo State, Nigeria. *International Journal of Advanced Academic Research*, 3(1), 5-20.

- Ajayi, A. O. (2016). Impact of information and communication technology on teaching and learning in tertiary institutions. *International Journal of Education and Research*, 4(4), 1-14.
- Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. (2005). Using information and communication technology in secondary schools in Nigeria: Problems and prospects. *Educational Technology & Society*, 8(1), 104-112.
- Almekhlafi, A. G., & Almeqdadi, F. A. (2010). Teachers' perceptions of technology integration in the United Arab Emirates school classrooms. *Educational Technology & Society*, 13(1), 165-175.
- Atubi, A. (2022). Enhancing teaching and learning of Social Studies in secondary schools for national development. *Journal of Education and Practice*, 13(16), 123-128.
- Bećirović, S. (2023). Challenges and barriers for effective integration of technologies into teaching and learning. In M. M. Khyade & M. S. Obaidat (Eds.), *Smart Technologies and Innovations in ICT*, 85- 97. Springer. doi:10.1007/978-981-99-0444-0_10.
- Boakye, K., & Banini, G. K. (2008). Determining factors influencing teachers' computer use in classrooms: Evidence from Ghana. *International Journal of Education and Development using Information and Communication Technology*, 4(1), 104-115.
- Burns, M. & Santally, M.. (2019). Information And Communications Technologies In Secondary Education In Sub-Saharan Africa. Policies, Practices, Trends, and Recommendations.
- Clipa, O., Delibas, C.-S., & Măță, L. (2023). Teachers' self-efficacy and attitudes towards the use of information technology in classrooms. *Education Sciences*, 13, 1001. <https://doi.org/10.3390/educsci13101001>
- Davis, F. D. (1985). A technology acceptance model for empirically testing new end-user information systems: Theory and results (Unpublished doctoral dissertation). MIT Sloan School of Management, Cambridge, MA.
- Eickelmann, B., & Vennemann, M. (2017). Teachers' attitudes and beliefs regarding ICT in teaching and learning in European countries. *European Educational Research Journal*, 16, 733-761.
- European Commission/Eurydice. (2019). Digital education at school in Europe. Brussels, Belgium: European Commission.
- Funke, F. M., & Oluwafemi, A. M. (2019). Teachers' Perception of the usefulness of ICT in Colleges of Education in Osun State, Nigeria. *Makere Journal of Higher Education*, 11(2), 149-159.
- Hatlevik, I. K. R., & Hatlevik, O. E. (2018). Examining the relationship between teachers' ICT self-efficacy for educational purposes, collegial collaboration, lack of facilitation and the use of ICT in teaching practice. *Frontiers in Psychology*.
- Harris, J. L., Al-Bataineh, M. T., & Al-Bataineh, A. (2016). One to One Technology and its Effect on Student Academic Achievement and Motivation. *Contemporary Educational Technology*, 7(4), 368-381.

- Lalitha, B. S. (2021). Impact of ICT Adoption on Students Learning. *Journal of Advances in Education and Philosophy*, 5, 90-97. <https://doi.org/10.36348/jaep.2021.v05i04.001>
- Mintah, B. O., Owusu-Darko, I., & Apoenchir, H. (2023). The Perception of Teachers on Integration of Information and Communication Technology (ICT) Into Mathematics Teaching and Learning. *European Journal of Education and Pedagogy*, 4(3), 65–77. <https://doi.org/10.24018/ejedu.2023.4.3.230>
- Nwokeocha, S. (2015). The adoption of instructional technologies in teacher education: Re-conceptualising instructional technologies within the context of Nigeria's level of development. In N. P. Ololube & P. J. Kpolovie (Eds.), *Handbook of Research on Enhancing Teacher Education with Advanced Instructional Technologies* (pp. 83-96). doi:10.4018/978-1-4666-8162-0.ch007.
- Ololube, N. P. (2006). Teacher preparation and professional development in Nigeria: The vision and the challenges. *Journal of International Cooperation in Education*, 9(1), 185-196.
- Rathore, M. K., & Sonawat, R. (2015). Integration of technology in education and its impact on learning of students. *International Journal of Applied Home Science*, 2(7&8), 235-246.
- Seifu, K. (2020). Determinants of information and communication technology integration in teaching-learning process at Aksum University. *Cogent Education*, 7.
- Soun, L., Chov, S., & Ou, K. (2022). Factors affecting the acceptance of technology by Cambodian teachers: A case study of high schools in Cambodia. *International Journal of Educational Technology in Higher Education*, 19(1), 1-23.
- UNESCO. (2022). Sustainable development goal 4: Education 2030. Paris, France: UNESCO