International Journal of Economics and Development Policy (IJEDP)
Vol. 7 No. 1, June, 2024
Print - ISSN: 2651-5644
Online - ISSN: 2811-2288

Blended Learning and Student Engagement in Post-Pandemic Northern Nigerian Universities

[1] Aliyu Isah Chikaji, [2] Bala Salisu*, & [3] Paulson Eberechukwu Numan

[1] Faculty of Social and Management Sciences, Yobe State University, Damaturu, Nigeria
[2] School of Management Studies, The Federal Polytechnic Damaturu, Yobe State, Nigeria
[3] Department of Electronic Engineering, Hanyang University, Seoul 04763, South Korea

Corresponding Author's; E – mail: bs.bala.ng@gmail.com

Abstract

This study investigated the impact of blended learning components (pedagogy, place, service, technology, and time) on student engagement in post-pandemic Northern Nigeria universities. A quantitative approach was used. Data were collected through self-reported surveys administered to a sample of 260 final-year undergraduate and postgraduate students at seven Open Distance Learning (ODL) centres. PLS-SEM was used to analyse the hypothesized relationships between the variables. The results revealed that pedagogy and time are significantly and positively associated with student engagement. Technology, however, exhibited a significant negative effect. Also, had a marginally significant effect, while services showed no significant effect. Overall, the model explained a modest portion of the variance in student engagement (adjusted R^2 = 0.178), suggesting the presence of other uncaptured factors influencing student engagement. The findings suggest that educators in blended learning environments should focus on the effective use of pedagogy, time, and technology to promote student engagement. While the specific support services studied did not show a significant effect, further research is needed to explore the types of services most beneficial for student engagement in blended learning settings. This study contributes to the understanding of student engagement in blended learning environments within the under-researched context of post-pandemic Northern Nigerian universities..

Keywords: Blended Learning, Student Engagement, Post-Pandemic Education, Northern Nigeria
JEL Classification: I230

Contribution to/Originality Knowledge

1.0 Introduction

The emergence of COVID-19 in 2019 has had a devastating global impact. As of April 2024, it has caused 7,010,681 confirmed deaths (https://www.worldometers.info/coronavirus/), making it one of the deadliest pandemics in history (Lele and Goswami, 2024). The educational sector has also been heavily impacted. School closures and shifts to online learning disrupted the education of millions (Okoye *et al.*, 2024), with concerns lingering about potential learning gaps and unequal access to technology hindering some students more than others (Jakubowski *et al.*, 2024). However, though the challenges of the COVID-19 pandemic has subsided, the dynamics it has generated still reverberates across diverse facets of the global economy. The education section is not an exception.

The pandemic compelled a rapid shift towards blended learning in universities globally (Singh *et al.*, 2021), including Nigeria (Eli-Chukwu *et al.*, 2022). However, as institutions move beyond this reactive phase, blended learning emerges as a strategic approach for the post-pandemic education industry. Blended learning combines face-to-face classroom methods with online educational materials and opportunities for interaction, creating a flexible and potentially engaging learning experience (Cronje, 2020). However, despite the growing adoption of blended learning (Jeong and Hwang, 2023; Sugandini *et al.*, 2024) and the mounting evidence of its positive effects on student engagement in various settings (Cao, 2023; Li and Xue, 2023; Yu *et al.*, 2023), such studies often overlook context-specific factors and challenges in their analyses (Singh, 2015; Tian and Song, 2023). In other words, crucial context-relevant factors (such as infrastructure limitations, cultural norms, time and locational differences, and pedagogical approaches) responsible for increased student engagement in blended learning environments largely remain unexplored.

This knowledge gap has significant consequences. Overlooking context-specific factors may risk suboptimal implementation of blended learning initiatives, leading to a limited impact on student engagement (Boelens *et al.*, 2017). Specifically, the unique challenges and opportunities present in Nigerian universities may require specific adaptations to blended learning approaches for optimal student engagement (Eli-Chukwu *et al.*, 2022). However, the lack of sufficient specificity in extant research regarding this may hinder the development of targeted strategies to address potential barriers to student engagement in blended learning in Nigerian universities. Addressing these critical problems is vital. Furthermore, extant studies (e.g., Gopinathan *et al.*, 2020; Sahni, 2019; Shohel *et al.*, 2020) suggest that while blended learning gives fillip to student engagement, academic self-efficacy, performance, and motivation in Nigerian universities, there is less coverage in the literature on students' perspectives relating to challenges associated with pedagogy, place, service, technology, and time in hybrid learning environment. the current study contributes towards bridging this gap.

Given the foregoing, this research aims to investigate the influence of blended learning on student engagement in Nigeria's post-Covid 19 universities. To address this overarching objective and contribute to the ongoing conversation on blended learning and student engagement, the literature review section situated the study within the field and justified its significance by providing strong conceptual, theoretical and empirical foundations to the study. The methodology section detailed the research design, data collection methods, and analysis techniques employed. The results and discussion section presented the findings and explored their meaning in relation to the research objective and existing literature. Finally, the conclusion highlighted the study's contributions to the understanding of blended learning and student engagement, and acknowledged some limitations that might guide future research.

2.0 Literature Review

2.1 Conceptual Review

It is germane to give working definitions of the two key concepts investigated in this study: namely, blended learning and student engagement. Blended learning is a combination of face-to-face learning experience and online education delivery, resulting in a dynamic and flexible

learning experience. The learning experience is mediated through time, place, technology, pedagogy and service elements of the learning environment (Cronje, 2022). In terms of place, it goes beyond traditional physical classrooms, allowing students to engage in learning activities across diverse settings such as home environments, libraries, or virtual spaces (Glassman and Burbidge, 2014; Korson, 2023). Time in blended learning is not bound by rigid schedules; instead, it offers flexibility, enabling students to access course materials and participate in discussions at their convenience, fostering autonomy and accommodating diverse schedules (Müller and Mildenberger, 2021). Service aspects of blended learning encompass support structures such as academic advising, tutoring, and technical assistance, providing students with resources and assistance tailored to their individual needs (Brown and Forcheh, 2023). Technology forms the backbone of blended learning, offering a wide array of digital tools and platforms to facilitate communication, collaboration, and content delivery, enhancing accessibility and interactivity (Martín-García, 2020). Pedagogically, blended learning combines traditional instructional methods with innovative approaches such as flipped classrooms, collaborative learning, and experiential activities, catering to diverse learning styles and fostering deeper engagement and understanding among students (Vásquez Astudillo, 2020). Finally, place in blended learning refers to the physical and online environments where learners access content, interact, and engage in the learning process (Korson, 2023). Together, these dimensions of blended learning create a holistic and learner-centred approach to education, enhancing flexibility, accessibility, and effectiveness in teaching and learning processes.

The study's outcome variable, student engagement, encompasses cognitive, behavioural, and emotional involvement in learning activities (Zepke, 2024). The cognitive dimension involves mental processes such as critical thinking, problem-solving, and information processing, while the behavioural dimension encompasses observable actions like participation, attendance, and completion of tasks (Kelly *et al.*, 2024). Affective engagement pertains to students' emotional investment, motivation, and sense of belonging in the learning environment (Kelly *et al.*, 2024). These three aspects of student engagement coalesced to inform the student's learning experience. Bozan *et al.* (2024), Li and Xue (2023), and Moges *et al.* (2024) collectively underscore its profound impact on academic success, retention rates, and overall student satisfaction.

2.2 Empirical Review

The general picture emerging from the extant empirical literature is that blended learning has a positive and significant influence on student engagement, academic self-efficacy, learning achievement, and satisfaction in post-pandemic educational environments (Eralita and Amriyati Azzizzah, 2023; Haruna *et al.*, 2022; Nong *et al.*, 2023), although it may also increase cognitive load which could negatively affect academic self-confidence (Almasi and Zhu, 2020; Tokuno *et al.*, 2024). Specifically, the literature seems to infer that blended learning pedagogy influences student engagement in a positive manner by promoting student-centred learning, enhancing satisfaction, self-efficacy, critical thinking, and autonomy (Buchan and Precey, 2023; Fisher *et al.*, 2021; Shorey *et al.*, 2018). Similarly, some researchers suggest that the concept and physical/virtual environment of a place, such as a university campus and online

learning platforms, positively influence student engagement, community identity, and well-being, which are important for learning and retention (Cicchino *et al.*, 2023; Stave, 2020). Regarding service in blended learning, the empirical literature suggests that its various forms including online resources (He *et al.*, 2019), social support (Vayre and Vonthron, 2017), and service-learning programmes (Celio *et al.*, 2011), positively impact student engagement, academic performance, and educational equity. While some caveats have been entertained concerning the relationships of pedagogy, place, and service with student engagement, that with technology seems to command a near universal recognition. This is because the empirical literature strongly holds that technology has a positive association with student engagement across behavioural, cognitive, and affective dimensions, and can enhance self-directed learning, active and collaborative learning, and teacher-student interactions (Bedenlier *et al.*, 2020; Greener, 2022; Rashid and Asghar, 2016). Finally, Baragash and Al-Samarraie (2018) and Dwivedi *et al.* (2019) suggest that the time dimension of blended learning, including time spent online and promptness of teachers' responses to students' needs, positively shapes student engagement.

2.3 Theoretical Review

This study examines how blended learning design, through its dimensions of place, time, service, technology, and pedagogy, generates student engagement in Nigerian universities by nurturing the three core psychological needs (i.e., autonomy, competence, relatedness) of the Self-Determination Theory (SDT) (Ryan and Deci, 2019). For instance, the flexibility of blended learning in terms of place and time fosters autonomy (McHone, 2020), while diverse learning spaces and personalised services enhance competence (Mynard and Shelton-Strong, 2022). However, poorly designed technology or limited digital skills can hinder these benefits (Rasheed *et al.*, 2020; Teane, 2024).

SDT offers a lens to understand how blended learning can promote student engagement in post-pandemic Nigerian universities (Noour and Hubbard, 2015). Its concept of autonomy provides choices in pedagogy and time (McHone, 2020), while the competence concept explains the possibility of personalized learning through technology. Finally, SDT's relatedness construct provide the basis for explaining student connection through collaborative activities and service-learning (Rahayu *et al.*, 2024). Overall, the SDT explains how blended learning can enhance intrinsic motivation and ultimately student engagement (Chiu, 2021; Noour and Hubbard, 2015). However, the design of the blended learning environment needs to consider all these aspects to avoid hindering student motivation in the post-pandemic context (Ameloot *et al.*, 2024).

While lockdowns and social distancing restrictions forced a shift towards online learning (Oyediran *et al.*, 2020), limited internet access (Ibrahim, 2023), inadequate technological infrastructure (Nwankwor *et al.*, 2018), and unreliable electricity supply in the North (Naibbi and Tukur, 2017), severally and collectively hampered online delivery (Rasheed *et al.*, 2020). The rapid shift also exposed the need for pedagogical adjustments to effectively engage students in virtual environments, a reality the teachers were least prepared for in the North (Doghonadze *et al.*, 2020). While blended learning offered some flexibility post-Coronatimes,

pre-existing inequities in access to technology and limited digital literacy skills as earlier noted exacerbated challenges. How fare blended learning in that contested environment? The current study unravels that phenomenon based on its effects on student engagement. Accordingly, this study was guided by the following assumed relationships:

H_1: There is a significant relationship between pedagogical approaches in blended learning and student engagement.

H_2: There is a significant relationship between the learning spaces (place) in blended learning programme and student engagement.

H_3: There is a significant relationship between the support services offered in blended learning and student engagement.

H_4: There is a significant relationship between the technology tools used in blended learning and student engagement.

H_5: There is a significant relationship between time flexibility in blended learning and student engagement.

3.0 Methodology

3.1 Study Context and Population

In Nigerian universities, the implementation of blended learning is intertwined with the sector's unique characteristics. The sector consists of universities, polytechnics, and colleges of education. Each sub-sector has its unique expertise domain and concomitant challenges and opportunities. However, they are all influenced by infrastructure and resource deficits as well as student demographics (Salisu, 2023). For instance, challenges arise from limited internet access, outdated technological infrastructure, and overcrowded classrooms, necessitating innovative solutions and strategic resource allocation to ensure equitable access and optimal technology utilisation (Nwuke and Nwanguma, 2024). Also, the digital divide and socio-economic disparities compound issues, requiring initiatives to address inequalities to promote inclusive access to blended learning benefits (Martens *et al.*, 2020). Nigeria's cultural diversity and linguistic landscape further underscore the need for culturally sensitive content and support for diverse learning styles to foster meaningful engagement and inclusivity within blended learning environments (Brown and Nthoi, 2022).

It was against this general background that this study investigated the effects of blended learning on student engagement in universities with approved Open Distance Learning (ODL) centres in Northern Nigeria. The universities meeting this criterion are presented in Table 1. The existence of pre-COVID-19 online learning infrastructure in these universities facilitated the ease with which they transitioned to online education delivery during the 2019 pandemic. This placed them in a unique position to be candidates for this study on blended learning in the post-COVID-19 era. However, the nominal rolls of the student population were not accessible at the time of conducting the research. Thus, the population was considered infinite. To determine the study sample size, we assumed a 50% potential access to the population (thus

becoming our target population) and calculated the planned sample size of 384 respondents using the following Charan and Biswas' (2013, p. 122) formula, thus:

$$\text{Sample Size} = \frac{Z_{1-\frac{\alpha}{2}}^{2} p(1-p)}{d^2}$$

where: $Z_{1-\alpha/2}^{2}$ = Z-score at 95% confidence level (i.e., 1.96); $P_{(1-p)}$ = Expected proportion of study population (i.e., 50% or 0.5); and d = Absolute precision (proxied by level of significance) (i.e., 5%). Thus,

$$\text{Sample Size} = \frac{1.96^2 \text{x } 0.5(1-0.5)}{0.05^2} = 384.16 \approx 384$$

Table 1. **Northern Nigeria Universities with Approved ODL Centres and Sample Sizes**

SN	University	*n*	%
1	Ahmadu Bello University, Zaria	89	23.18
2	University of Maiduguri, Maiduguri	81	21.09
3	University of Abuja, Abuja	74	19.27
4	Modibbo Adama University of Technology, Yola	66	17.18
5	Usmanu Danfodio University, Sokoto	37	9.64
6	Federal University of Technology, Minna	22	5.73
7	University of Ilorin, Ilorin	15	3.91
Total		**384**	**100.00**

Source: https://www.nuc.edu.ng/distance-learning-centers/

In apportioning the planned sample size among the seven university-based ODLs, we relied on an expert's suggestion from one of the universities that Ahmadu Bello University, University of Maiduguri, University of Abuja, and Usmanu Danfodio University potentially had larger ODL students, as shown in Table 1.

3.2 Data Collection and Sampled Respondents

The survey instrument was produced in Google Forms and its link was distributed via WhatsApp to the 384 students. Unengaged responses were determined using a standard deviation (SD) < 0.05 indicating low engagement based on intra-individual response variability analysis (Dunn *et al.*, 2018). This approach ensured data collection from engaged respondents using a popular user-friendly platform and a targeted distribution method. Eventually, a 67.71% response rate was realised (i.e., 260 students) across the seven ODL centres. The realised sample emerged as follows: Ahmadu Bello University, Zaria (60, 23.08%), University of Maiduguri, Maiduguri (55, 21.15%), University of Abuja, Abuja (50, 19.23%), Modibbo Adama University of Technology, Yola (45, 17.31%), Usmanu Danfodio University, Sokoto (25, 9.62%), Federal University of Technology, Minna (15, 5.77%), and University of Ilorin, Ilorin (10, 3.85%).

3.3 Measures

Guided by Cronje's (2022) five-dimensional conceptualisation of blended learning, the current study measures blended learning as a multidimensional construct consisting of place, time, service, technology, and pedagogy. An initial set of ten items was adopted from Shakeel *et al.* (2023) to evaluate the technology factor. The service dimension was also initially assessed using ten items adapted from Seo and Um (2023), while time, place, and pedagogy were measured using ten items each developed based on Norberg *et al.* (2011), Korson (2023), and Oke and Salaam (2023), respectively. All items were rated on a 5-point Likert scale, ranging from 1 = Strongly disagree to 5 = Strongly agree.

Student engagement was assessed using an initial ten-item scale adapted from Almutairi and White (2018), Heilporn *et al.* (2020), Ma *et al.* (2017), and Zhao *et al.* (2023). The items were also rated on a 5-point Likert scale, ranging from 1 = Strongly disagree to 5 = Strongly agree.

The instrument containing the two scales was pilot-tested for content validity and internal consistency reliability in a sample of 70 students drawn from the University of Maiduguri. The Content validity index (CVI) was used in assessing the content validity (Yusoff, 2019), and the results (i.e., blended learning, CVI = 0.93; student engagement, CVI = 0.93) confirm that the two scales are content valid. Also, the scales' Cronbach alphas (i.e., blended learning, α = 0. 789; student engagement, α = 0.830), computed in JASP, exceeds the recommended threshold of 0.70 (Njeri *et al.*, 2024).

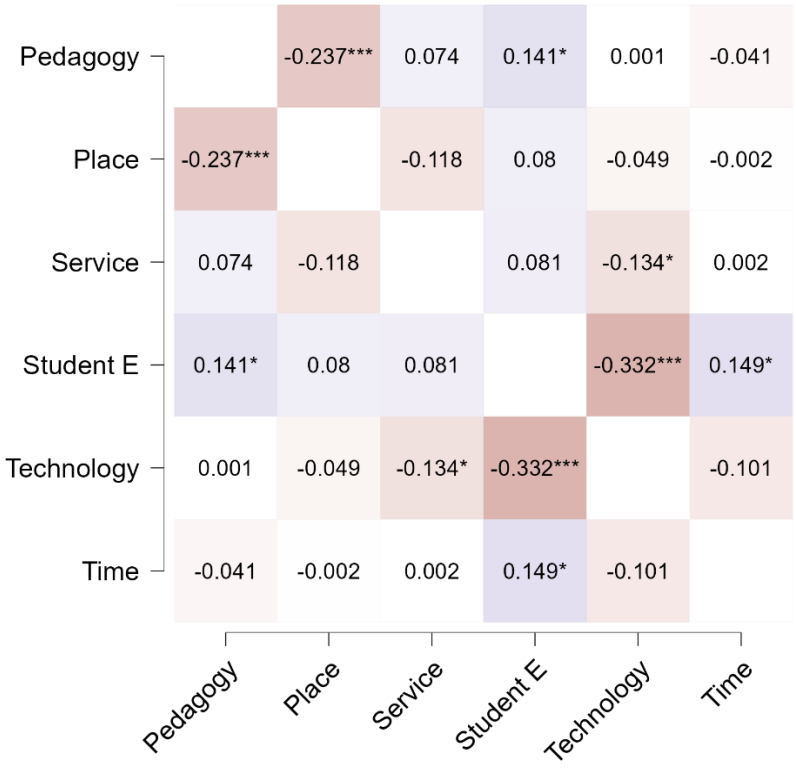
3.4 Data Analytic Techniques

Data analysis was conducted using SmartPLS (for model testing) and SPSS (for descriptive analysis). Data pre-processing included outlier detection via Mahalanobis Distance, multicollinearity assessment with variance inflation factor (VIF), and correlation analysis using Spearman's rho (Ethington *et al.*, 2002). Measurement model assessment employed Cronbach's alpha (α), composite reliability (CR), and item loadings for reliability, and average variance extracted (AVE), Fornell-Larcker Criterion, and Homotrait-Monotrait Ratio (HTMT) for validity (Hair *et al.*, 2022). The structural model was evaluated through a bootstrapping technique (Hair *et al.*, 2022). Finally, model fit was determined using the Unweighted Least Squares discrepancy (d_{ULS}), the Geodesic discrepancy (d_G), the standardized root mean square residual (SRMR), and R-squared (R^2) supported by the f^2 statistic(Hair *et al.*, 2022).

4.0 Results and Discussion

The heatmap of Spearman's rank correlations (Figure 1) revealed several interesting relationships among the variables: a moderate negative correlation between pedagogy and place (r = -0.237, p < .001), suggesting the inability of teachers' dominant pedagogical inclination to align with the various learning spaces; a moderate positive correlation between pedagogy and student engagement (r = 0.141, p < .05), suggesting an increase in student engagement alongside the familiar pedagogical approach in universities; and a strong negative correlation between student engagement and technology (r = -0.332, p < .001), highlighting the difficulty students face in dealing with learning technologies often used in blended learning

environments. Interestingly, a weak negative correlation was found between service and technology (r = -0.134, $p < .05$), indicating a modest decrease in service as more online education delivery technologies are deployed.



Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 1. Spearman's Rho Heatmap

Before the regression analyses were run, we utilised Variance Inflation Factor (VIF) values to assess the presence of multicollinearity among predictor variables. The results, shown in Table 2, show the VIF values ranging from 1.022 to 2.674. Thus, all of the constructs' VIF values fall within Hair *et al.*'s (2022) recommended threshold of VIF ≤ 3, suggesting the absence of problematic multicollinearity in the study dataset, thus justifying the subsequent measurement and structural analysis. Thus, the internal consistency analysis, also shown in Table 2, revealed good reliability for all constructs, supporting the instruments' suitability for the study. Alpha values exceeded the recommended 0.7 and CR values surpassed the threshold of 0.8 for pedagogy, place, service, student engagement, and technology, indicating strong internal consistency within these constructs. However, the time construct exhibited acceptable, yet slightly lower, reliability (α = 0.708, CR = 0.807).

Table 2. Reliabilities and Collinearity Statistics

Constructs	Items	Item Loadings	VIF Values		CA	CR
			Outer	Inner		
Pedagogy	PEDA1	0.673	1.427	1.072	0.767	0.841
	PEDA4	0.900	1.883			
	PEDA5	0.795	1.507			
	PEDA6	0.632	1.485			
Place	PLAC1	0.649	1.678	1.091	0.766	0.832
	PLAC4	0.766	1.613			
	PLAC6	0.876	1.454			
	PLAC7	0.673	1.751			
Service	SERV1	0.578	1.313	1.042	0.849	0.879
	SERV2	0.744	2.169			
	SERV3	0.818	2.601			
	SERV4	0.595	1.589			
	SERV5	0.789	2.674			
	SERV6	0.776	1.687			
	SERV7	0.679	2.231			
Student Engagement	STEN1	0.721	1.616	—	0.785	0.854
	STEN2	0.774	1.625			
	STEN3	0.838	1.952			
	STEN7	0.808	1.672			
	STEN8	0.506	1.152			
Technology	TECH1	0.823	2.597	1.034	0.818	0.868
	TECH2	0.706	1.661			
	TECH3	0.795	2.255			
	TECH5	0.643	1.418			
	TECH7	0.726	1.864			
	TECH8	0.638	1.580			
Time	TIME2	0.646	1.334	1.022	0.708	0.807
	TIME3	0.551	1.275			
	TIME4	0.850	1.509			
	TIME6	0.791	1.363			

Convergent and discriminant validity analyses supported the robustness of the measurement instruments. As shown in Table 3, all constructs achieved acceptable convergent validity with AVE exceeding 0.5, indicating their measures effectively capture the intended variance. Moreover, discriminant validity was established through the Fornell-Larcker criterion, wherein the square roots of the AVE values for each construct were found to be higher than their correlations with other constructs, indicating adequate differentiation between the constructs. Additionally, Table 4 presents a more robust discriminant validity index, the HTMT ratio,

where the HTMT values for the study constructs are all below 0.85. This suggests these constructs share minimal variance and are distinct in the model.

Table 3. Average Variance Extracted (AVE) and Fornell-Larcker Criterion

Constructs	AVE	PEDA	PLAC	SERV	STEN	TECH	TIME
Pedagogy	0.574	**0.758**					
Place	0.557	-0.256	**0.746**				
Service	0.514	0.077	-0.132	**0.717**			
Student Engagement	0.546	0.148	0.113	0.106	**0.739**		
Technology	0.526	0.008	-0.046	-0.125	-0.353	**0.725**	
Time	0.517	0.018	-0.046	0.087	0.194	-0.122	**0.719**

Table 4. Homotrait-Monotrait Ratio

Constructs	PEDA	PLAC	SERV	STEN	TECH	TIME
Pedagogy	—					
Place	0.337	—				
Service	0.143	0.138	—			
Student Engagement	0.165	0.165	0.118	—		
Technology	0.082	0.08	0.168	0.431	—	
Time	0.071	0.094	0.137	0.239	0.178	—

The data shown in Table 5 (and displayed structurally in Figure 2) indicate that the hypothesised relationships between the five blended learning factors and student engagement were partially supported. Pedagogical approaches ($\beta = 0.183$, $p = 0.004$) and time flexibility ($\beta = 0.153$, $p = 0.016$) exhibited significant positive associations with student engagement, while technology use displayed a significant negative effect ($\beta = -0.320$, $p < 0.001$). The relationship between learning spaces and student engagement was, however, marginally significant ($\beta = 0.161$, $p = 0.045$), and support services showed no significant effect ($\beta = 0.060$, $p = 0.431$). These findings suggest that pedagogical approaches, time management practices, and technology integration strategies all play a role in fostering student engagement in blended learning environments.

Table 5. Hypotheses' Test Results

Hypotheses	β	SD	*t*-Stat	*p*	Comment
H1: Pedagogy → Student Engagement	0.183	0.064	2.859	0.004	Supported
H2: Place → Student Engagement	0.161	0.080	2.009	0.045	Supported
H3: Service → Student Engagement	0.060	0.076	0.788	0.431	Not Supported
H4: Technology → Student Engagement	-0.320	0.054	5.959	0.000	Supported
H5: Time → Student Engagement	0.153	0.063	2.422	0.016	Supported

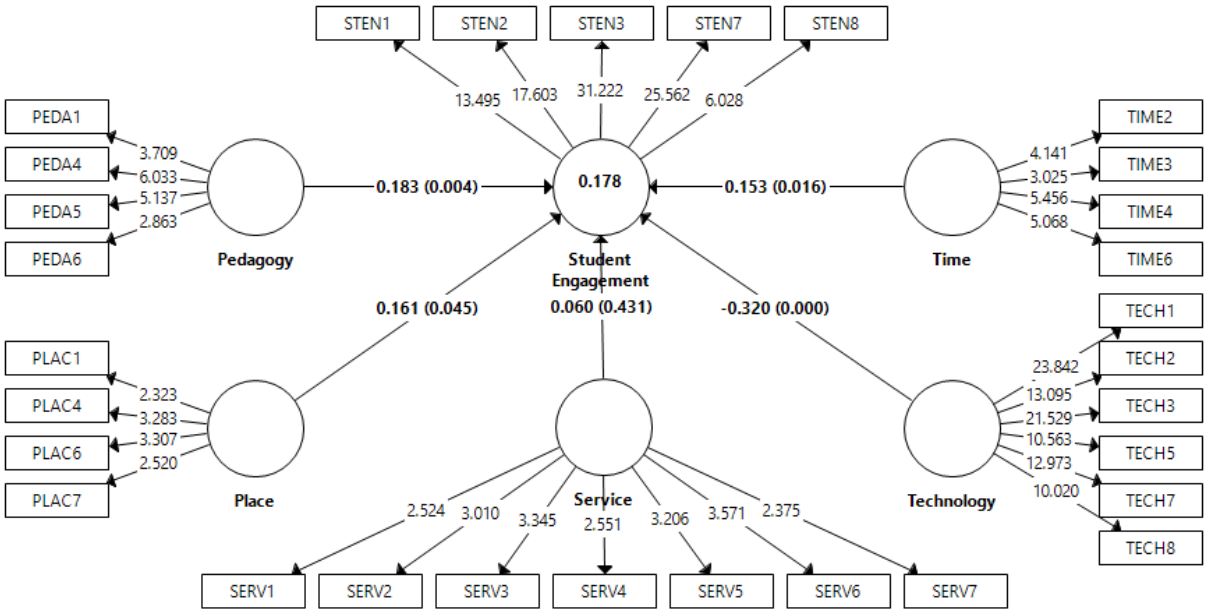


Figure 2. Structural Model Analysis

The fit of the study model was determined using four indices: d_{ULS}, d_G, the SRMR, and f^2-supported R^2. The model fit using the two discrepancy indices (d_{ULS} and d_G) revealed mixed results. The discrepancy between the two (i.e., $d_{ULS} = 2.291$ and $d_G = 0.679$) is not insignificant, thus pointing towards acceptance of the model as of good fit (Cheah *et al.*, 2018). Furthermore, SRMR = 0.070, which is lower than Hu and Bentler's (1999) 0.08 cut-off threshold, indicates that the discrepancy between the model-implied and the empirical correlation matrix may not have been substantial, implying a good fit for the model. Thus, the discrepancies between the model's predicted relationships and the actual observed data are relatively small, supporting the hypothesised relationships between pedagogy, place, service, technology, and time, on the one hand, and student engagement, on the other.

However, despite this good fit, the model only explained a modest portion of the variance in student engagement ($R^2 = 0.178$). While technology use exhibited a moderate negative effect size ($f^2 = 0.123$, $p = 0.011$), suggesting a stronger influence on student engagement compared to other factors, the effects of pedagogy ($f^2 = 0.039$, $p = 0.138$) and time flexibility ($f^2 = 0.028$, $p = 0.206$) were statistically significant but potentially weak. Place or learning spaces ($f^2 = 0.029$, $p = 0.203$) and service ($f^2 = 0.004$, $p = 0.726$) showed negligible and non-significant effects. This pattern suggests the presence of other relevant factors not captured by the model that likely influence student engagement in blended learning environments.

The findings of the current study regarding the impact of blended learning components on student engagement align with some aspects of existing research while raising questions for further exploration. For example, The positive influence of blended learning pedagogy on student engagement ($\beta = 0.183$, $p = 0.004$) aligns with studies by Heilporn *et al.* (2021) and Holbrey (2020). These studies suggest that the relevant pedagogical approaches, tailored for blended learning environments, are known to give fillip to active participation and deeper learning, ultimately leading to higher student engagement. Theoretically, the result also supports the *autonomy* postulate of the SDT. From an SDT perspective, well-designed blended learning pedagogy likely provides students with more *choice* in how they learn (e.g., offering various learning activities, allowing for different learning paces). This increased autonomy can contribute to feelings of control and satisfaction, leading to higher student engagement (Chiu, 2021). Similarly, the positive association between time flexibility and student engagement ($\beta = 0.153$, $p = 0.016$) is supported by Dixit and Pathak (2023). These authors emphasise how blended learning's accommodative tendencies enable individual learning paces and schedules, empowering students and fostering a sense of control, ultimately contributing to student engagement. From an SDT lens, time flexibility inherent in blended learning likely allows students more control over their learning schedule through such mechanisms like asynchronous online modules or options for self-paced learning (Law, 2022).

However, the negative association between technology use and student engagement in blended learning ($\beta = -0.320$, $p < 0.001$) presents a contrasting viewpoint. While some studies (e.g., Ihnatova *et al.*, 2021; Serrano *et al.*, 2019) emphasise technology's role in enhancing interactivity and access to learning materials, findings of the current study align with concerns raised by other researchers (e.g., Günüç and Kuzu, 2014; Heflin *et al.*, 2017) on the deleterious effects of technology on student engagement. These studies highlight technology's distractive ability, usability issues, and the crucial role of proper integration strategies to ensure technology fosters, rather than hinders, student engagement. In tandem with these views is SDT's proposition that the negative association between technology use and engagement suggests a need for improvement (Rashid and Asghar, 2016). Poor design, technical difficulties, or overreliance on technology can thwart student autonomy, competence, and relatedness, hindering motivation, thus defeating student engagement.

Furthermore, the marginally significant positive effect of learning spaces on student engagement ($\beta = 0.161$, $p = 0.045$) aligns somewhat with de Brito Lima *et al.*'s (2021) and Holley and Dobson's (2008) research, suggesting that well-designed physical and online

learning spaces can support collaboration and focus. This position is theoretically strengthened by the relatedness construct of the SDT (Ryan and Deci, 2019). Optimally-designed learning spaces in blended learning can promote a sense of belonging through face-to-face/virtual interaction and social support, attenuating feelings of aloneness often experienced in purely online environments (Hansen-Brown *et al.*, 2022). This enhanced sense of connection with fellow students and teachers may lead to enhanced student engagement. However, further research is needed, as highlighted by the non-significant effect of support services on student engagement ($\beta = 0.060$, $p = 0.431$). This might be due to limited scope (failing to address all of the students' needs for autonomy, competence, relatedness): lack of accessibility or awareness (thereby hindering student autonomy), or even poor quality/delivery of services, thus failing to fulfil students' competence needs (Shin and Johnson, 2021). Additional studies are thus required investigate the specific types, accessibility, and quality of support services offered to gauge if they better reflect the SDT needs. Nevertheless, contrary to the findings of the current study, Raphael (2016) and Raphael and Mtebe (2016) underscore the importance of readily available academic and technical support for students and teachers, respectively, in blended learning environments. The current findings might be due to the specific services studied or their implementation in a post-crisis era.

Finally, the study's adjusted R^2 of 0.178 indicates that the model explains a modest, but statistically significant, portion of the variance in student engagement within blended learning environments. However, despite the significance, a low R^2 also suggests that a substantial portion of the variance in student engagement (82.2%) remains unexplained by the current model. In other words, blended learning pedagogy, learning spaces or place, support services, educational technology, and time flexibility collectively explains only a limited portion of student engagement variance in blended learning at Nigerian universities. This might be due to unobserved variables like student dispositions or faculty quality (not explored in the study) (Permadi and Aditya, 2021), limitations in how student engagement was measured (Lishner *et al.*, 2008), or even complex interactions between the study variables that the current model did not feature. Nevertheless, the model identified statistically significant relationships between some of the blended learning components and student engagement. This highlights the core influences within the blended learning context, even if the model fails to account for all possible explanatory factors. This does not necessarily invalidate the model, but it highlights its limitations and the need to consider other factors that might be influencing student engagement.

5. Conclusion

This study examined how blended learning dimensions (i.e., teaching methods, learning spaces or place, support services, technology, and time) influence student engagement of final-year students at universities in Northern Nigeria after the COVID-19 pandemic. The study found that engaging teaching methods and flexible learning schedules boosted engagement, while technology use had the opposite effect. Support services did not seem to make a significant difference. In general, the study highlighted factors that makes blended learning successful in this under-studied context, emphasizing the importance of good teaching, flexible scheduling, and thoughtful technology use to keep students engaged.

This study advances theory, practice, and policy for blended learning and student engagement. Firstly, it highlights how instructional design (pedagogy, time, technology) affects engagement in a post-pandemic context. It confirms the positive effects of pedagogy and time but identifies drawbacks of using less integrated technology. Secondly, the study offers guidance for designing and implementing blended learning in universities, especially in Northern Nigeria. It emphasises effective pedagogy, flexible schedules, and seamless technology integration. It also highlights the need for improved support services. Finally, the study suggests initiatives for faculty development in blended learning pedagogy and time management. It also points to the need for investment in technology infrastructure, support services, and student engagement metrics for program evaluation.

Notwithstanding the foregoing contributions, the study model only explained a modest portion of the variance in student engagement. This suggests there might be other relevant factors influencing student engagement that the model did not capture. Furthermore, the study focused on a specific geographical region (Northern Nigeria) and may not be generalisable to other contexts. To address the limitations of a partially explained variance and potential regional bias, future research on blended learning and student engagement can benefit from two approaches. First, refining the model by incorporating additional factors or using qualitative methods can offer a more comprehensive understanding of student experiences. Second, replicating the study in diverse settings and conducting comparative analysis can enhance generalizability and illuminate the influence of cultural and contextual variations on student engagement in blended learning environments.

Acknowledgment

This work was supported by a research grant by Tertiary Education Trust Fund (TETFund) Nigeria awarded to the first author (Dr Aliyu Isah Chikaji).

References

Almasi, M. and Zhu, C. (2020). Investigating Students' Perceptions of Cognitive Presence in Relation to Learner Performance in Blended Learning Courses: A Mixed-Methods Approach. *Electronic Journal of e-Learning*, ***18***(4), 324-336. doi:10.34190/ejel.20.18.4.005

Almutairi, F. and White, S. (2018). How to Measure Student Engagement in the Context of Blended-Mooc. *Interactive Technology and Smart Education*, ***15***(3), 262-278. doi:10.1108/itse-07-2018-0046

Ameloot, E., Rotsaert, T., Ameloot, T., Rienties, B. and Schellens, T. (2024). Supporting Students' Basic Psychological Needs and Satisfaction in a Blended Learning Environment through Learning Analytics. *Computers & Education*, ***209***, 1-15. doi:10.1016/j.compedu.2023.104949

Baragash, R. S. and Al-Samarraie, H. (2018). Blended Learning: Investigating the Influence of Engagement in Multiple Learning Delivery Modes on Students' Performance. *Telematics and Informatics, **35***(7), 2082-2098. doi:10.1016/j.tele.2018.07.010

Bedenlier, S., Bond, M., Buntins, K., Zawacki-Richter, O. and Kerres, M. (2020). Facilitating Student Engagement through Educational Technology in Higher Education: A Systematic Review in the Field of Arts and Humanities. *Australasian Journal of Educational Technology, **36***(4), 126-150. doi:10.14742/ajet.5477

Boelens, R., De Wever, B. and Voet, M. (2017). Four Key Challenges to the Design of Blended Learning: A systematic Literature Review. *Educational Research Review, **22***, 1-18. doi:10.1016/j.edurev.2017.06.001

Bozan, K., Gaskin, J. and Stoner, C. (2024). Student Engagement in the Hyflex and Online Classrooms: Lessons from the Covid-19 Pandemic. *Technology, Knowledge and Learning, **29***(1), 509-536. doi:10.1007/s10758-023-09661-x

Brown, B. and Forcheh, N. (2023). Development Implications of Pedagogical and Academic Service Interventions to Cope with Covid-19 Influences in African Colleges and Universities. *Cogent Social Sciences, **9***(2), 1-18. doi:10.1080/23311886.2023.2268331

Brown, B. A. and Nthoi, O. (2022). Cultural Influences in Online Pedagogy and the Final Ends of African Higher Education. In B. A. Brown and A. Irons (Eds.), *The Emerald Handbook of Higher Education in a Post-Covid World: New Approaches and Technologies for Teaching and Learning* (pp. 289-314). Bingley, UK: Emerald Publishing Limited. doi:10.1108/978-1-80382-193-120221014.

Buchan, A. and Precey, R. (2023). Propelling Student Engagement in Blended Learning Courses. *Journal of Perspectives in Applied Academic Practice, **11***(3), 17-32. doi:10.56433/jpaap.v11i3.578

Cao, W. (2023). A Meta-Analysis of Effects of Blended Learning on Performance, Attitude, Achievement, and Engagement across Different Countries. *Frontiers in Psychology, **14***, 1-15. doi:10.3389/fpsyg.2023.1212056

Celio, C. I., Durlak, J. and Dymnicki, A. (2011). A Meta-Analysis of the Impact of Service-Learning on Students. *Journal of Experiential Education, **34***(2), 164-181. doi:10.1177/105382591103400205

Charan, J. and Biswas, T. (2013). How to Calculate Sample Size for Different Study Designs in Medical Research? *Indian Journal of Psychological Medicine, **35***(2), 121-126. doi:10.4103/0253-7176.116232

Cheah, J.-H., Memon, M. A., Chuah, F., Ting, H. and Ramayah, T. (2018). Assessing Reflective Models in Marketing Research: A Comparison between Pls and Plsc Estimates. *International Journal of Business and Society, **19***(1), 139-160.

Chiu, T. K. F. (2021). Digital Support for Student Engagement in Blended Learning Based on Self-Determination Theory. *Computers in Human Behavior, **124**,* 1-10. doi:10.1016/j.chb.2021.106909

Cicchino, A. S., Weinberg, A. E., McMeeking, L. B. S. and Balgopal, M. M. (2023). Critical Pedagogy of Place to Enhance Ecological Engagement Activities. *Conservation Biology, **37***(2), 1-10. doi:10.1111/cobi.14023

Cronje, J. (2020). Towards a New Definition of Blended Learning. *Electronic Journal of e-Learning, **18***(2), 114-121. doi:10.34190/ejel.20.18.2.001

Cronje, J. C. (2022). From Face-to-Face to Distance: Towards Flexibility in Five Dimensions of Blended Learning: Lessons Learnt from the Covid-19 Pandemic. *The Electronic Journal of e-Learning, **20***(4), 436-450.

de Brito Lima, F., Lautert, S. L. and Gomes, A. S. (2021). Contrasting Levels of Student Engagement in Blended and Non-Blended Learning Scenarios. *Computers & Education, **172**,* 1-13. doi:10.1016/j.compedu.2021.104241

Dixit, P. and Pathak, U. (2023). Students' Learning Outcomes and Emerging Practices of Blended Learning: A Case Study. In N. J. Ahuja, A. Kumar, and A. Nayyar (Eds.), *Sustainable Blended Learning in STEM Education for Students with Additional Needs* (pp. 247-277). Singapore: Springer Nature Singapore Pte Ltd. doi:10.1007/978-981-99-3497-3_11.

Doghonadze, N., Aliyev, A., Halawachy, H., Knodel, L. and Adedoyin, A. S. (2020). The Degree of Readiness to Total Distance Learning in the Face of Covid-19 - Teachers' View (Case of Azerbaijan, Georgia, Iraq, Nigeria, UK and Ukraine). *Journal of Education in Black Sea Region, **5***(2), 2-41. doi:10.31578/jebs.v5i2.197

Dunn, A. M., Heggestad, E. D., Shanock, L. R. and Theilgard, N. (2018). Intra-Individual Response Variability as an Indicator of Insufficient Effort Responding: Comparison to Other Indicators and Relationships with Individual Differences. *Journal of Business and Psychology, **33***(1), 105-121. doi:10.1007/s10869-016-9479-0

Dwivedi, A., Dwivedi, P., Bobek, S. and Sternad Zabukovšek, S. (2019). Factors Affecting Students' Engagement with Online Content in Blended Learning. *Kybernetes, **48***(7), 1500-1515. doi:10.1108/k-10-2018-0559

Eli-Chukwu, N. C., Igbokwe, I. C., Ifebude, B., Nmadu, D., Iguodala, W., Uma, U., Onyeneke, R. U. and Akudo, F. U. (2022). Challenges Confronting E-Learning in Higher Education Institutions in Nigeria Amid Covid -19. *Journal of Applied Research in Higher Education, **15***(1), 238-253. doi:10.1108/jarhe-09-2021-0346

Eralita, N. and Amriyati Azzizzah, F. (2023). Blended Learning's Effect toward Learning Achievement Post Covid 19 Pandemic. *International Journal of Chemistry Education Research, **7***(1), 1-5. doi:10.20885/ijcer.vol7.iss1.art1

Ethington, C. A., Thomas, S. L. and Pike, G. R. (2002). Back to the Basics: Regression as It Should Be. In J. C. Smart and W. G. Tierney (Eds.), *Higher Education: Handbook of Theory and Research* (pp. 263-293). Dordrecht, Netherlands: Springer. doi:10.1007/978-94-010-0245-5_6.

Fisher, R., Perényi, Á. and Birdthistle, N. (2021). The Positive Relationship between Flipped and Blended Learning and Student Engagement, Performance and Satisfaction. *Active Learning in Higher Education, **22***(2), 97-113. doi:10.1177/1469787418801702

Glassman, M. and Burbidge, J. (2014). The Dialectical Relationship between Place and Space in Education: How the Internet Is Changing Our Perceptions of Teaching and Learning. *Educational Theory, **64***(1), 15-32. doi:10.1111/edth.12048

Gopinathan, S., Raman, M., Subbarao, A. and Kaur, A. H. (2020). The Role of Blended Learning Technologies in Enhancing Student Engagement in Theory Dominant Subjects. *International Journal of Creative Multimedia, **1***(1), 64-69. doi:10.33093/ijcm.2020.1.X1.6

Greener, S. (2022). The Tensions of Student Engagement with Technology. *Interactive Learning Environments, **30***(3), 397-399. doi:10.1080/10494820.2022.2048550

Günüç, S. and Kuzu, A. (2014). Factors Influencing Student Engagement and the Role of Technology in Student Engagement in Higher Education: Campus-Class-Technology Theory. *Turkish Online Journal of Qualitative Inquiry, **5***(4), 86-113.

Hair, J. F., Hult, G. T. M., Ringle, C. M. and Sarstedt, M. (2022). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (Third edition). Thousand Oaks, California: SAGE Publications, Inc.

Hansen-Brown, A., Sullivan, S., Jacobson, B., Holt, B. and Donovan, S. (2022). College Students' Belonging and Loneliness in the Context of Remote Online Classes During the Covid-19 Pandemic. *Online Learning, **26***(4), 323-346. doi:10.24059/olj.v26i4.3123

Haruna, H. A., Kabara, M. Y. and Enriquez, A. (2022). Face-to-Face, Online, or Hybrid Learning in Post Covid-19 Recovery? Scrutinizing Nigerian Students' Preferences. *Journal of Educational Management and Instruction (JEMIN), **2***(2), 63-74. doi:10.22515/jemin.v2i2.5026

He, H., Zheng, Q., Di, D. and Dong, B. (2019). How Learner Support Services Affect Student Engagement in Online Learning Environments. *IEEE Access, **7***, 49961-49973. doi:10.1109/access.2019.2910589

Heflin, H., Shewmaker, J. and Nguyen, J. (2017). Impact of Mobile Technology on Student Attitudes, Engagement, and Learning. *Computers & Education,* ***107***, 91-99. doi:10.1016/j.compedu.2017.01.006

Heilporn, G., Lakhal, S. and Belisle, M. (2021). An Examination of Teachers' Strategies to Foster Student Engagement in Blended Learning in Higher Education. *International Journal of Educational Technology in Higher Education,* ***18***(1), 1-25. doi:10.1186/s41239-021-00260-3

Heilporn, G., Lakhal, S., Bélisle, M. and St-Onge, C. (2020). Student Engagement: A Multidimensional Measurement Scale Applied to Blended Course Modalities at the University Level. *Mesure et évaluation en éducation,* ***43***(spécial), 1-31. doi:10.7202/1089051ar

Holbrey, C. E. (2020). Kahoot! Using a Game-Based Approach to Blended Learning to Support Effective Learning Environments and Student Engagement in Traditional Lecture Theatres. *Technology, Pedagogy and Education,* ***29***(2), 191-202. doi:10.1080/1475939x.2020.1737568

Holley, D. and Dobson, C. (2008). Encouraging Student Engagement in a Blended Learning Environment: The Use of Contemporary Learning Spaces. *Learning, Media and Technology,* ***33***(2), 139-150. doi:10.1080/17439880802097683

Hu, L. t. and Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling: A Multidisciplinary Journal,* ***6***(1), 1-55. doi:10.1080/10705519909540118

Ibrahim, A. U. L. H. (2023). Awareness and Utilization of Information Services. (Students of North-East, Nigeria's Polytechnics). *International Journal of Computer Science and Mathematical Theory,* ***9***(5), 67-81. doi:10.56201/ijcsmt.v9.no5.2023.pg67.81

Ihnatova, O., Poseletska, K., Matiiuk, D., Hapchuk, Y. and Borovska, O. (2021). The Application of Digital Technologies in Teaching a Foreign Language in a Blended Learning Environment. *Linguistics and Culture Review,* ***5***, 114-127. doi:10.37028/lingcure.v5nS4.1571

Jakubowski, M., Gajderowicz, T. and Patrinos, H. (2024). *Covid-19, School Closures, and Student Learning Outcomes: New Global Evidence from PISA.* Global Labor Organization (GLO) Discussion Paper, No. 1372: Global Labor Organization, Essen. Retrieved from https://hdl.handle.net/10419/281116

Jeong, S. and Hwang, H. (2023). Do We Need Moodle in Medical Education? A Review of Its Impact and Utility. *Kosin Medical Journal,* ***38***(3), 159-168. doi:10.7180/kmj.23.139

Kelly, M. L., Yeigh, T. and Hudson, S. (2024). Secondary Teachers' Beliefs About the Importance of Teaching Strategies That Support Behavioural, Emotional and Cognitive

Engagement in the Classroom. *Social Sciences & Humanities Open, **9**,* 1-10. doi:10.1016/j.ssaho.2024.100891

Korson, C. (2023). A Place-Based Approach to Blended Learning. *Journal of Geography in Higher Education, **47***(4), 569-588. doi:10.1080/03098265.2022.2122032

Law, M. L. (2022). *The Pedagogical Practice of Blended Learning and Its Relationship with Students' Self-Regulated Learning and Learning Motivation in the Hong Kong Secondary Context.* (Doctoral Dissertation), The Education University of Hong Kong, Hong Kong.

Lele, U. and Goswami, S. (2024). Lessons from Covid-19. *Medical Research Archives, **12***(2), 1-16. doi:10.18103/mra.v12i2.5039

Li, J. and Xue, E. (2023). Dynamic Interaction between Student Learning Behaviour and Learning Environment: Meta-Analysis of Student Engagement and Its Influencing Factors. *Behavioral Sciences, **13***(1), 1-15. doi:10.3390/bs13010059

Lishner, D. A., Cooter, A. B. and Zald, D. H. (2008). Addressing Measurement Limitations in Affective Rating Scales: Development of an Empirical Valence Scale. *Cognition and Emotion, **22***(1), 180-192. doi:10.1080/02699930701319139

Ma, J., Cheng, J. and Han, X. (2017). *Initial Development Process of a Student Engagement Scale in Blended Learning Environment*. Paper presented at the 2017 International Conference of Educational Innovation through Technology (EITT).

Martens, M., Hajibayova, L., Campana, K., Rinnert, G. C., Caniglia, J., Bakori, I. G., Kamiyama, T., Mohammed, L. A., Mupinga, D. M. and Oh, O. J. (2020). "Being on the Wrong Side of the Digital Divide": Seeking Technological Interventions for Education in Northeast Nigeria. *Aslib Journal of Information Management, **72***(6), 963-978. doi:10.1108/ajim-05-2020-0172

Martín-García, A. V. (Ed.) (2020). *Blended Learning: Convergence between Technology and Pedagogy*. Cham, Switzerland: Springer Nature Switzerland AG.

McHone, C. A. (2020). *Blended Learning Integration: Student Motivation and Autonomy in a Blended Learning Environment.* (Doctoral Dissertation), East Tennessee State University, Tennessee. USA.

Moges, B. T., Gebremeskel, M. M., Tilwani, S. A. and Assefa, Y. (2024). Student Engagement in a Differentiated Higher Education System in Ethiopia: A multilevel Analysis. *Journal of Applied Research in Higher Education, **00***(0), 1-14. doi:10.1108/jarhe-11-2023-0507

Müller, C. and Mildenberger, T. (2021). Facilitating Flexible Learning by Replacing Classroom Time with an Online Learning Environment: A Systematic Review of Blended Learning in Higher Education. *Educational Research Review, **34***, 1-16. doi:10.1016/j.edurev.2021.100394

Mynard, J. and Shelton-Strong, S. (2022). Self-Determination Theory: A Proposed Framework for Self-Access Language Learning. *Journal for the Psychology of Language Learning, **4***(1), 1-14. doi:10.52598/jpll/4/1/5

Naibbi, A. I. and Tukur, Y. M. (2017). Ensuring Optimal Electricity Generation and Supply: The Paradox of Nigeria's Situation. *International Research Journal of Environmental Sciences and Studies, **2***(1), 1-14.

Njeri, M., Khader, M., Ali, F. and Line, N. D. (2024). Revisiting Internal Consistency in Hospitality Research: Toward a More Comprehensive Assessment of Scale Quality. *International Journal of Contemporary Hospitality Management, **00***(0), 1-21. doi:10.1108/ijchm-05-2023-0624

Nong, W., Ye, J. H., Chen, P. and Lee, Y. S. (2023). A Study on the Blended Learning Effects on Students Majoring in Preschool Education in the Post-Pandemic Era: An Example of a Research-Method Course in a Chinese University. *Frontiers in Psychology, **13***, 1-13. doi:10.3389/fpsyg.2022.962707

Noour, A. T. and Hubbard, N. (2015). Self-Determination Theory: Opportunities and Challenges for Blended E-Learning in Motivating Egyptian Learners. *Procedia - Social and Behavioral Sciences, **182***, 513-521. doi:10.1016/j.sbspro.2015.04.836

Norberg, A., Dziuban, C. D. and Moskal, P. D. (2011). A Time-Based Blended Learning Model. *On the Horizon, **19***(3), 207-216. doi:10.1108/10748121111163913

Nwankwor, N. A., Gadzama, S. K. and Ibrahim, S. (2018). Internet Access and Usage Patterns as Teaching and Learning Facilities among Lecturers and Students of Modibbo Adama University of Technology, Yola, Nigeria. *Integrity Journal of Education and Training, **2***(3), 21-31. doi:10.31248/ijet2018.028

Nwuke, T. J. and Nwanguma, T. K. (2024). Provision and Utilization of Physical Resources for Effective Teaching and Learning Effectiveness in Public Universities in Rivers State. *International Journal of Applied and Scientific Research, **2***(2), 227-244. doi:10.59890/ijasr.v2i2.1412

Oke, J. O. and Salaam, S. I. (2023). Pedagogy and Technical Implication of Blended Learning in Obafemi Awolowo University Centre for Distance Learning, Nigeria. *KIU Journal of Humanities, **8***(3), 79-85.

Okoye, O., Enimiworimini, E. C., Sani, A. and John, E. E. (2024). Educational Management Crisis under the Post-Covid-19 Pandemic Realities in Nigeria. *FUOYE Journal of Public Administration and Management, **2***(2), 37-48.

Oyediran, W. O., Omoare, A. M., Owoyemi, M. A., Adejobi, A. O. and Fasasi, R. B. (2020). Prospects and Limitations of E-Learning Application in Private Tertiary Institutions

Amidst Covid-19 Lockdown in Nigeria. *Heliyon,* ***6***(11), 1-8. doi:10.1016/j.heliyon.2020.e05457

Permadi, A. and Aditya, B. R. (2021). The Influence of Student Characteristics, Design Learning Features, and Learning Outcomes on Blended Learning Effectiveness (Case Study: Higher Education in Indonesia). *Edunesia : Jurnal Ilmiah Pendidikan,* ***2***(1), 308-318. doi:10.51276/edu.v2i1.126

Rahayu, W. P., Sulistyowati, R., Pratikto, H., Hidayat, R., Narmaditya, B. S., Zainuddin, Z., Zumroh, S. and Indarwati, R. A. A. (2024). Using Self-Determination and Expectancy Theory to Evaluate Hybrid Learning. *Cogent Education,* ***11***(1), 1-15. doi:10.1080/2331186x.2024.2303535

Raphael, C. (2016). Students Support Services: A Case of Blended Learning in Higher Learning Institutions in Tanzania. In J. Keengwe, J. G. Mbae, and G. Onchwari (Eds.), *Handbook of Research on Global Issues in Next-Generation Teacher Education* (pp. 188-205). Hershey, PA: IGI Global.

Raphael, C. and Mtebe, J. S. (2016). Instructor Support Services: An Inevitable Critical Success Factor in Blended Learning in Higher Education in Tanzania. *International Journal of Education and Development using Information and Communication Technology,* ***12***(2), 123-138.

Rasheed, R. A., Kamsin, A. and Abdullah, N. A. (2020). Challenges in the Online Component of Blended Learning: A Systematic Review. *Computers & Education*, ***144***, 1-17. doi:10.1016/j.compedu.2019.103701

Rashid, T. and Asghar, H. M. (2016). Technology Use, Self-Directed Learning, Student Engagement and Academic Performance: Examining the Interrelations. *Computers in Human Behavior,* ***63***, 604-612. doi:10.1016/j.chb.2016.05.084

Ryan, R. M. and Deci, E. L. (2019). Brick by Brick: The Origins, Development, and Future of Self-Determination Theory. In A. J. Elliot (Ed.), *Advances in Motivation Science* (Vol. 6, pp. 111-156). Cambridge, MA: Academic Press. doi:10.1016/bs.adms.2019.01.001.

Sahni, J. (2019). Does Blended Learning Enhance Student Engagement? Evidence from Higher Education. *Journal of e-Learning and Higher Education,* ***2019***, 1-14. doi:10.5171/2019.121518

Salisu, B. (2023). *Political Skill and Self-Efficacy as Sequential Mediators between Trait Emotional Intelligence and Contextual Performance of Teacher-Leaders.* (PhD Thesis), Universiti Teknologi Malaysia, Johor Bahru, Malaysia.

Seo, Y. J. and Um, K. H. (2023). The Role of Service Quality in Fostering Different Types of Perceived Value for Student Blended Learning Satisfaction. *Journal of Computing in Higher Education,* ***35***, 521–549. doi:10.1007/s12528-022-09336-z

Serrano, D. R., Dea-Ayuela, M. A., Gonzalez-Burgos, E., Serrano-Gil, A. and Lalatsa, A. (2019). Technology-Enhanced Learning in Higher Education: How to Enhance Student Engagement through Blended Learning. *European Journal of Education, **54***(2), 273-286. doi:10.1111/ejed.12330

Shakeel, S. I., Haolader, M. F. A. and Sultana, M. S. (2023). Exploring Dimensions of Blended Learning Readiness: Validation of Scale and Assessing Blended Learning Readiness in the Context of TVET Bangladesh. *Heliyon, **9***(1), e12766. doi:10.1016/j.heliyon.2022.e12766

Shin, M. and Johnson, Z. D. (2021). From Student-to-Student Confirmation to Students' Self-Determination: An Integrated Peer-Centered Model of Self-Determination Theory in the Classroom. *Communication Education, **70***(4), 365-383. doi:10.1080/03634523.2021.1912372

Shohel, M. M. C., Cann, R. and Atherton, S. (2020). Enhancing Student Engagement Using a Blended Learning Approach. *International Journal of Mobile and Blended Learning, **12***(4), 51-68. doi:10.4018/ijmbl.2020100104

Shorey, S., Kowitlawakul, Y., Devi, M. K., Chen, H. C., Soong, S. K. A. and Ang, E. (2018). Blended Learning Pedagogy Designed for Communication Module among Undergraduate Nursing Students: A Quasi-Experimental Study. *Nurse Education Today, **61***, 120-126. doi:10.1016/j.nedt.2017.11.011

Singh, J., Steele, K. and Singh, L. (2021). Combining the Best of Online and Face-to-Face Learning: Hybrid and Blended Learning Approach for Covid-19, Post Vaccine, & Post-Pandemic World. *Journal of Educational Technology Systems, **50***(2), 140-171. doi:10.1177/00472395211047865

Singh, R. J. (2015). Use of Blended Learning in Higher Education − Some Experiences. *Progressio, **37***(1), 54-67.

Stave, K. (2020). *In Search of a Third Place on Campus: An Exploration of the Effects of Built Space on Students' Sense of Belonging.* (Doctoral Dissertation), Portland State University, Oregon.

Sugandini, D., Garaika, Istanto, Y., Purnama, R. F. and Arundati, R. (2024). Blended Learning Adoption on Higher Education. In R. E. Khoury and N. Nasrallah (Eds.), *Intelligent Systems, Business, and Innovation Research* (pp. 703-715). Cham, Switzerland: Springer Nature. doi:10.1007/978-3-031-36895-0_59.

Teane, F. M. (2024). Technological Literacy and Its Influence on Teachers' Adoption of a Blended Learning Approach. *Reading & Writing - Journal of the Literacy Association of South Africa, **15***(1), 1-10. doi:10.4102/rw.v15i1.426

Tian, H. and Song, Y. (2023). The Relationship between Teaching Practices, Dedication to Learning, and the Learning Effect of Blended Learning from the Perspective of Adults. *International Journal of Innovative Research and Scientific Studies, **7***(1), 36-55. doi:10.53894/ijirss.v7i1.2413

Tokuno, J., Valanci-Aroesty, S., Uchino, H., Ghitulescu, G., Sirois, C., Kaneva, P., Fried, G. M. and Carver, T. E. (2024). Teaching Chest Tube Insertion by Blended Learning: A Multi-Dimensional Analysis. *Surgical Innovation, **31***(1), 92-102. doi:10.1177/15533506231211049

Vásquez Astudillo, M. (2020). The Blended Learning Pedagogical Model in Higher Education. In A. V. Martín-García (Ed.), *Blended Learning: Convergence between Technology and Pedagogy* (pp. 141-166). Cham, Switzerland: Springer Nature Switzerland AG. doi:10.1007/978-3-030-45781-5_7.

Vayre, E. and Vonthron, A.-M. (2017). Psychological Engagement of Students in Distance and Online Learning:Effects of Self-Efficacy and Psychosocial Processes. *Journal of Educational Computing Research, **55***(2), 197-218. doi:10.1177/0735633116656849

Yu, Q., Yu, K., Li, B. and Wang, Q. (2023). Effectiveness of Blended Learning on Students' Learning Performance: A Meta-Analysis. *Journal of Research on Technology in Education, **00***(0), 1-22. doi:10.1080/15391523.2023.2264984

Yusoff, M. S. B. (2019). Abc of Content Validation and Content Validity Index Calculation. *Education in Medicine Journal, **11***(2), 49-54. doi:10.21315/eimj2019.11.2.6

Zepke, N. (2024). Mapping Student Engagement Using a Theoretical Lens. *Teaching in Higher Education, **29***(1), 176-193. doi:10.1080/13562517.2021.1973406

Zhao, X., Ismail, I. S. and Narasuman, S. (2023). Measurement Indicators of Student Engagement and Investigation on Student Engagement in Blended Learning. In B. Fox, C. Zhao, and M. T. Anthony (Eds.), *Proceedings of the 2022 3rd International Conference on Artificial Intelligence and Education (IC-ICAIE 2022)*, (Vol. 9, pp. 823-829). doi:10.2991/978-94-6463-040-4_125.