EXAMINING THE ROLE OF STUDENT-CENTERED DIGITAL TOOLS IN ENHANCING ENGAGEMENT AND ACADEMIC PERFORMANCE IN HIGHER EDUCATION CURRICULUM INNOVATION

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DOI: https://doi.org/10.64633/wissj.v10i2.27

Keywords

Pedagogy, Technology-Enabled Learning, Curriculum Innovation, Student Engagement, Higher Education, Digital Tools

Abstract

Research Problem
The need for curriculum innovation in higher education has become increasingly important with the rise of digital technologies. However, there is limited empirical evidence on how pedagogy-driven, technology-enabled approaches influence teaching, learning, and assessment outcomes among social sciences students in Nigerian universities.
Methods
The study adopts a quantitative research design, using primary data collected from 400 students at the University of Ilorin, Nigeria. Data were analyzed to assess the effects of technology use, pedagogical innovation, and institutional support on student engagement and learning outcomes.
Theory
The study is grounded in constructivist learning theory and technology integration frameworks, which emphasize student-centered learning, active engagement, and the role of digital tools in enhancing educational experiences.
Results
Findings reveal that technology use significantly improves student learning outcomes and engagement. In contrast, pedagogical innovation and institutional support showed non-significant effects within the study context. The study also identifies discipline-specific differences, with students in economics and political science benefiting more from digital tools compared to those in sociology and public administration. Additionally, access to digital tools and equitable distribution of technological resources were found to be critical factors influencing outcomes.
Conclusion
The study concludes that technology use is a key driver of improved

learning outcomes in higher education, though its effectiveness depends on accessibility and alignment with student needs. Pedagogical and institutional factors may require further strengthening to yield significant impact.

Key Contribution to Knowledge

This study contributes to existing literature by providing empirical evidence on the effectiveness of technology-enabled curriculum innovation in a Nigerian university context, highlighting discipline-specific variations and the importance of equitable access to digital resources.

Recommendations

The study recommends prioritizing student-focused digital infrastructure, promoting digital literacy, and ensuring equitable access to technological tools. It also suggests tailoring curriculum innovations to discipline-specific needs to maximize learning outcomes in higher education institutions in developing countries.

1. Introduction

The rapid evolution of educational technologies has fundamentally reshaped the landscape of higher education, prompting universities worldwide to reconsider traditional pedagogical practices. In particular, pedagogy-driven, technology-enabled curriculum innovations have emerged as critical strategies to enhance teaching, learning, and assessment processes (Zhang, Yang, & Zheng, 2025). These innovations enable educators to integrate digital tools while maintaining alignment with pedagogical objectives, thereby fostering interactive learning environments and supporting knowledge construction. Despite their potential, the implementation of such innovations in developing countries, including Nigeria, remains uneven due to infrastructural limitations, inadequate teacher preparedness, and limited empirical studies on localized contexts (Fitrah, 2025). Consequently, there is a pressing need to explore how Nigerian universities, such as the University of Ilorin (Unilorin), can leverage digital technologies to drive effective curriculum transformation and enhance student engagement and learning outcomes in social sciences programs.

Effective curriculum innovation requires a careful alignment of pedagogy and technology to optimize learning outcomes. Research demonstrates that integrating technology into teaching practices can significantly improve critical thinking, problem-solving skills, and student motivation (Bhuttah, Xusheng, Abid, & Sharma, 2024; Shalgimbekova, Smagliya, Kalimzhanova, &Suleimenova, 2024). For social sciences students, whose learning often involves abstract reasoning and interdisciplinary thinking, technology-enhanced pedagogical strategies can provide visualizations, simulations, and collaborative tools to reinforce conceptual understanding. However, gaps persist regarding how these strategies are adopted in Nigerian universities, particularly concerning the capacity of faculty to implement technology-enabled teaching effectively (Ajani, 2025). The present study aims to bridge this gap by investigating the role of technology-driven pedagogy in social sciences education, identifying both enablers and barriers to adoption in a real-world Nigerian university setting.

The post-pandemic era has accelerated the need for digital transformation in higher education. While global literature highlights the

effectiveness of technology integration in curricula, evidence from African contexts remains scarce, with most studies focusing on general digital education trends rather than discipline-specific applications (Theodorio, Waghid, & Wambua, 2024). In particular, social sciences curricula in Nigerian universities often rely heavily on lecture-based delivery and limited practical engagement, which may not fully exploit the pedagogical potential of emerging digital tools (Fitrah, 2025). Therefore, empirical studies investigating the integration of technology in these programs are crucial. This research contributes to addressing this gap by providing primary data on how social sciences students at Unilorin interact with technology-enabled pedagogical innovations, thereby informing context-specific strategies for curriculum enhancement.

Artificial intelligence (AI) and personalized learning approaches are increasingly recognized as transformative tools in higher education. Studies indicate that AI-enabled pedagogies can tailor learning experiences to individual student needs, enhancing engagement and performance (Khoza & van der Walt, 2025; Vorobyeva, Belous, Savchenko, Smirnova, Nikitina, & Zhdanov, 2025). However, in the Nigerian higher education context, adoption remains limited due to low digital literacy among faculty and inadequate institutional support (Ajani, 2025). These challenges underscore a research gap: while global studies provide insights into AI's role in curriculum innovation, there is minimal evidence on its practical implementation in Nigerian social sciences programs. The current study aims to investigate the readiness students at Unilorin to adopt AI-supported teaching tools, identify institutional barriers, and propose interventions that align technology integration with pedagogical objectives.

Student engagement is a critical determinant of learning success, particularly in digital learning environments. Evidence suggests that pedagogy-driven digital platforms enhance engagement by providing interactive, learner-centered experiences (Ayanwalea, Molefib, Kurata, Agunbiade, Olatunbosun, & Sannie, 2025; Majini Bella, 2025). Nevertheless, in many Nigerian universities, engagement strategies often remain passive, with technology used primarily for content delivery rather than as a catalyst for active learning. This study addresses this gap by examining how technology-enabled curriculum innovations at Unilorin influence student motivation, participation, and collaborative learning. By analyzing empirical data, the research identifies both the effectiveness of these strategies and areas where pedagogical practices must evolve to maximize the benefits of digital learning for social sciences students.

Despite growing advocacy for technology integration, faculty preparedness and digital competence remain central barriers in implementing innovative curricula (Zhang, Yang, & Zheng, 2025; Fitrah, 2025). Many educators lack adequate training in selecting, implementing, and assessing technology-enhanced teaching methods, particularly in resource-constrained environments. Consequently, curriculum innovation efforts often fail to produce the intended improvements in learning outcomes. Recognizing this, the present study evaluates faculty competencies, institutional support structures, and resource availability at Unilorin. The objective is to provide actionable insights into how pedagogical training and institutional investment can enhance technology-driven curriculum adoption, thereby fostering sustainable improvements in social sciences teaching and learning.

Finally, this study seeks to contribute to the literature by providing context-specific empirical evidence on pedagogy-driven, technology-enabled curriculum innovations in Nigerian universities. Two primary objectives guide the research: (1) to examine the extent to which technology-enabled pedagogical strategies influence teaching, learning, and assessment outcomes in social sciences programs at Unilorin, and (2) to identify the key barriers and enablers of technology adoption for curriculum transformation. To achieve these objectives, primary data analysis is conducted through surveys and interviews with and students. The article is structured as follows: after this introduction, the methodology outlines the research design, data collection, and analysis procedures; results and discussion present empirical findings; and the conclusion offers implications for policy, practice, and future research in technology-enhanced curriculum innovation.

2. Literature Review

2.1 Technology-Enabled Curriculum Innovation: Conceptual Perspectives

Educational reform in the 21st century increasingly emphasizes curriculum innovation that aligns pedagogical goals with technology integration (Zhang, Yang, & Zheng, 2025). Pedagogy-driven technology use refers to the intentional alignment of instructional design with teaching strategies that support learning outcomes, rather than technology being an add-on or superficial enhancement. This aligns with constructivist and socio-cultural theories of learning, which stress active knowledge construction through learner interaction with educational tools (Zhang et al., 2025). Instructional technologists and curriculum designers argue that effective curriculum innovation requires instructional strategies that are grounded in sound pedagogical theory while leveraging digital technologies to enhance cognitive engagement.

The integration of technology is not merely additive but transformative when it enables educators to redesign learning environments, assessment practices, and content delivery modes (Shalgimbekova, Smagliya, Kalimzhanova, &Suleimenova, 2024). In contrast to traditional lecture-based curriculum models, pedagogy-driven technology innovation focuses on learner-centred, collaborative, and authentic learning experiences. Such approaches align with social constructivist views of learning, suggesting that knowledge is co-constructed through active engagement facilitated by appropriate technological mediators. This body of research underlines a shift from teacher-centred instruction toward learner autonomy, scaffolding, and feedback loops that are mediated by digital tools.

Emerging research further highlights that curriculum innovation must consider educational contexts, including institutional readiness, digital competencies, and resource availability (Ajani, 2025). While theoretical frameworks such as Technological Pedagogical Content Knowledge (TPACK) and the SAMR model have been proposed to guide integration, practical application in resource-constrained environments remains underdeveloped. This observation establishes a research gap in understanding how pedagogy-driven curriculum innovations can be adapted within specific contexts, such as Nigerian universities.

2.2 Global Evidence on Technology-Enhanced Curriculum Transformation

Globally, research on technology-enabled curriculum innovation demonstrates positive effects on learning outcomes, student motivation, and instructional agility. Bhuttah, Xusheng, Abid, and Sharma (2024) found that innovative pedagogical approaches mediated by inclusive leadership significantly improved critical thinking and academic achievement in higher education settings. Their findings underscore technology's potential when aligned with institutional leadership and pedagogical strategy. Similarly, Shalgimbekova and colleagues (2024) reported that teaching technologies foster learner motivation and engagement when they are embedded in curriculum structures that emphasize interactivity and real-world applicability.

Studies from the Global South highlight unique challenges and opportunities for technology integration. Khoza and van der Walt's (2025) systematic review on AI-enhanced pedagogies suggests that while artificial intelligence can personalise learning and facilitate adaptive instruction, institutional barriers such as digital infrastructure deficits and faculty digital competence gaps remain pervasive. The authors argue that without robust pedagogical frameworks and capacity building, AI implementation risks reinforcing existing inequalities rather than closing them. This is especially relevant for social sciences disciplines, where AI tools must be thoughtfully integrated to support qualitative reasoning and disciplinary inquiry, not just quantitative analysis.

Another global perspective comes from Vorobyeva and colleagues (2025), who explored personalised learning through AI. Their work reveals that technology can facilitate differentiated instruction and timely feedback, contributing to improved academic outcomes. However, this potential depends on teachers' ability to interpret analytics and integrate adaptive feedback into instructional planning, a capacity that is often underestimated in curriculum reform efforts. These studies collectively signal that while digital innovations offer significant promise, translating technological potential into effective pedagogical practice requires deliberate curriculum design and professional development.

2.3 Pedagogical Innovation in Social Sciences Education

Curriculum innovation in social sciences education presents unique challenges and opportunities distinct from STEM fields. Social sciences curricula encompass critical inquiry, ethical reasoning, historical analysis, and contextual understanding, pedagogical domains that are not always compatible with solely digitised instructional formats. However, innovative pedagogical frameworks can harness technology to enhance discourse, collaborative inquiry, and access to diverse perspectives. Majini Bella (2025) found that innovative pedagogical practices significantly improved student engagement in higher education, particularly when digital tools supported discussion, simulation, and project-based learning.

Research affirms that technology's role in social sciences education must extend beyond content delivery to facilitate higher-order cognitive processes such as argumentation, interpretation, and contextual analysis (Ayanwalea et al., 2025). For example, learning management systems and virtual collaboration platforms can scaffold group discussions, peer

review, and asynchronous debate — all vital components of social inquiry. These digitally mediated experiences allow students to engage with complex societal issues in ways that traditional face-to-face formats may not easily support.

Yet, a substantial literature gap remains regarding how these pedagogical innovations operate in low-resource settings. Much of the existing evidence is drawn from well-resourced universities in high-income countries, limiting generalisation to contexts such as Nigerian higher education. This gap points to the need for empirical studies investigating curricular and instructional practices in social sciences programmes where infrastructure, teacher competencies, and institutional support mechanisms differ significantly.

2.4 Technology Integration and Faculty Competence

A recurring theme in the literature is the critical role of faculty competence and readiness in successful technology integration. Fitrah (2025) explored teachers' readiness for adopting deep learning pedagogy and found that digital competence is a significant predictor of effective instructional innovation. Faculty who lack confidence or training in digital tools tend to underutilise technologies or resort to superficial uses that do not transform teaching and learning. This finding is echoed by Ajani (2025), who reported that economics educators often encounter challenges related to digital literacy, institutional support, and pedagogical alignment when attempting to integrate technology.

The relationship between teacher competency and technology use is not linear; it involves institutional culture, available professional development, and incentives for innovation. Zhang et al.'s (2025) systematic review on digital competence emphasizes the need for sustained professional learning opportunities that are context-responsive, discipline-specific, and grounded in pedagogical goals. Without such supports, faculty may view technology as an additional task rather than as an enabler of instructional quality.

The literature reviewed also identifies inconsistency in conceptualising teacher readiness across studies. Some research treats digital competence as technical skills, while others consider pedagogical and reflective capacities. This inconsistency creates a fragmented understanding of faculty preparedness and undermines efforts to develop coherent training frameworks. Consequently, this study foregrounds teacher competence as a central factor in curriculum innovation and seeks to examine how social sciences faculty at Unilorin engage with pedagogical technologies.

2.5 Institutional Barriers and Enablers

Institutional context plays a pivotal role in shaping technology-enabled curriculum innovation. According to Theodorio, Waghid, and Wambua (2024), post-pandemic educational reform has accelerated technology adoption in many universities, but issues of access, equity, and institutional readiness persist. These include inadequate digital infrastructure, inconsistent internet connectivity, limited funding for educational technologies, and absence of strategic policies guiding curriculum transformation.

Scholarship from alternative education contexts suggests that institutional policies that prioritise technology integration, provide fiscal and technical support, and incentivise pedagogical experimentation are more likely to foster sustainable innovation (Iropiteraye-Adjekpovu&Nwabuaku, 2024).

Without supportive institutional frameworks, curriculum reform initiatives may remain fragmented or fail to scale beyond pilot programmes. Thus, institutional enablers, such as digital policy frameworks and collaborative leadership, are critical components of effective technology-driven innovation.

Another institutional factor is assessment culture. Traditional assessment practices often prioritise memorisation and standardised examinations, which can conflict with technology-enhanced learning experiences that emphasise creativity, collaboration, and higher-order thinking. The literature suggests that aligning assessment practices with pedagogical innovations is essential for reinforcing desired learning outcomes (Bhuttah et al., 2024). Such alignment requires institutional commitment to rethinking not only what is taught but how learning is measured.

2.6 Theoretical and Framework Foundations

While empirical studies document phenomena related to technology integration, theoretical frameworks are essential for explaining how and why certain innovations succeed. Two prominent frameworks relevant to this study are the Technological Pedagogical Content Knowledge (TPACK) model and SAMR (Substitution, Augmentation, Modification, Redefinition). TPACK asserts that effective instructional design emerges from the intersection of content knowledge, pedagogy, and technology (Mishra, 2019). This model underscores that technology integration is not an isolated skill but part of a holistic pedagogical repertoire that must align with disciplinary content and learner needs.

The SAMR model offers a continuum for evaluating technology use, from substitution (mere replacement of traditional tools) to redefinition (new tasks made possible exclusively through technology). Both frameworks emphasise that technology's value lies not in its presence but in how it transforms learning experiences. Nevertheless, the literature reveals limited application of these frameworks in empirical studies within Nigerian universities, particularly in social sciences contexts. This represents a significant gap: theory-driven research that uses TPACK or SAMR to explain curriculum innovation processes within Nigerian social sciences programmes is minimal.

2.7 Synthesis and Research Gaps

The literature in educational technology and curriculum innovation affirms that pedagogy-driven, technology-enabled reforms can transform teaching and learning by enhancing engagement, supporting personalised learning, and promoting deeper cognitive processes. Globally, technologies are shown to support critical thinking, collaboration, and adaptability, essential competencies for social sciences graduates. However, evidence from Nigerian higher education remains limited, particularly regarding discipline-specific applications and the interplay of institutional contexts with pedagogical innovation.

A key research gap is the scarcity of empirical studies examining how social sciences educators in Nigerian universities integrate technology in a way that is driven by pedagogy rather than by technology availability. Existing studies tend to be descriptive or limited to case reports, lacking robust primary data analysis. Moreover, the literature rarely explores faculty competence and readiness comprehensively, nor does it consistently examine institutional policy frameworks that support innovation.

Finally, theoretical application of models like TPACK and SAMR in curriculum reform research within Nigerian universities is underrepresented. This gap limits the explanatory power of existing studies and weakens the link between theory and practice. Addressing these gaps can enrich understanding of curriculum innovation processes, inform policy, and support capacity building for educators.

3. Methodology

This study employs a mixed-methods research design combining quantitative and qualitative approaches to investigate pedagogy-driven, technology-enabled curriculum innovation for social sciences students at the University of Ilorin (Unilorin), Nigeria. The study aims to examine the extent to which technology-enhanced pedagogical strategies influence teaching, learning, and assessment outcomes, and to identify key enablers and barriers of technology adoption. The population comprises social sciences students across political science, economics, sociology, and public administration. To ensure representative sampling, a stratified random sampling technique was applied. The strata were based on department and year of study. Within each stratum, participants were randomly selected. The target sample size was determined using Cochran's formula for large populations:

$$n_0 = \frac{Z^2 \cdot p \cdot q}{e^2}$$

where n_0 is the sample size, $Z$is the z-score at 95% confidence level (1.96), $p$is the estimated proportion of students using technology (assumed 0.5 for maximum variability), $q = 1 - p$, and $e$is the margin of error (0.05). Substituting values, the minimum sample size was calculated as:

$$n_0 = \frac{1.96^2 \cdot 0.5 \cdot 0.5}{0.05^2} \approx 384$$

resulting in a target of 400 students to allow for non-responses and attrition.

Data were collected using a structured questionnaire and semi-structured interviews. The questionnaire comprised five domains: demographics, technology usage, pedagogical practices, student engagement and learning outcomes, and perceived barriers and enablers. Responses were measured on a 5-point Likert scale to enable quantitative analysis. Semi-structured interviews were conducted with a subset of students to gather qualitative insights on pedagogical strategies, technology integration, and institutional support mechanisms. Interview responses were audio-recorded, transcribed verbatim, and anonymized to ensure confidentiality.

Quantitative data were analyzed using SPSS version 28. Descriptive statistics were computed, including means ($\bar{x}$) and standard deviations (s):

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}, s = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

where $x_i$represents individual responses and $n$the sample size. Correlation analysis (r) was used to examine relationships between technology usage, pedagogical innovation, and learning outcomes:

$$r = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n} (x_i - \bar{x})^2 \sum_{i=1}^{n} (y_i - \bar{y})^2}}$$

Multiple regression analysis was conducted to determine predictors of student engagement and performance:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \epsilon$$

where $Y$is the dependent variable (learning outcomes), $X_1, X_2, \ldots, X_k$are independent variables (technology use, pedagogical practices, faculty competence, institutional support), $\beta_0$is the intercept, $\beta_k$are regression coefficients, and $\epsilon$is the error term. Reliability of questionnaire constructs was assessed using Cronbach's alpha (α):

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k} \sigma_i^2}{\sigma_t^2}\right)$$

where $k$is the number of items, $\sigma_i^2$the variance of each item, and $\sigma_t^2$the total variance. Values above 0.7 were considered acceptable.

Qualitative data from interviews were analyzed using thematic analysis. NVivo software facilitated systematic coding, enabling the identification of recurring themes related to curriculum innovation, barriers, and enablers. The integration of quantitative and qualitative data ensured triangulation, enhancing validity and robustness of findings.

Ethical considerations were rigorously applied. Participation was voluntary, with informed consent obtained from all respondents. Confidentiality and anonymity were maintained, and data were securely stored. Ethical approval was granted by the University of Ilorin Ethics Review Board.

In summary, the methodology employs robust sampling, validated instruments, mathematical rigor in data analysis, and qualitative insights to examine pedagogy-driven, technology-enabled curriculum innovation. The design ensures alignment with the study's objectives and provides a foundation for evidence-based recommendations in social sciences education at Unilorin.

4. Discussion of Results

The analysis of primary data collected from 400 social sciences students at Unilorin reveals significant patterns in technology integration, pedagogical innovation, and learning outcomes. Table 1 presents the descriptive statistics of key variables, showing that digital tools such as learning management systems, virtual collaboration platforms, and AI-enabled assessment tools are moderately to highly used, with mean scores ranging from 3.620 to 4.120 on a 5-point Likert scale. These results confirm global trends emphasizing the centrality of technology in enhancing teaching and learning (Ayanwalea et al., 2025; Vorobyeva et al., 2025). Economically, technology integration reduces transaction costs in knowledge acquisition, allowing for flexible scheduling, immediate feedback, and access to diverse learning resources, which can improve student productivity and educational efficiency.

Table 1: Descriptive Statistics of Key Variables (3 Decimal Places)

Variable	Mean	Std. Dev	Min	Max
Technology Use	4.120	0.682	2	5
Pedagogical Innovation	3.980	0.718	2	5
Student Engagement	4.050	0.698	2	5
Learning Outcomes	3.950	0.742	2	5
Institutional Support	3.620	0.798	1	5

Correlation analysis reveals a strong positive relationship between technology use and student engagement ((r = 0.721, p < 0.01)) but a weaker and non-significant relationship between pedagogical innovation and learning outcomes ((r = 0.198, p = 0.072)) and between institutional support and learning outcomes ((r = 0.134, p = 0.114)). These findings suggest that while technology use directly benefits student engagement, other factors such as pedagogical innovation and institutional support may not significantly influence learning outcomes in the current context. From an economic reasoning perspective, this aligns with the notion that returns on technology investment are sensitive to contextual adoption and student responsiveness (Bhuttah et al., 2024). Policy-wise, the results indicate prioritizing technology adoption and digital literacy programs for students.

Regression analysis confirms that technology use ((\beta = 0.409, p < 0.01)) remains a significant predictor of learning outcomes, while pedagogical innovation ((\beta = 0.092, p = 0.215)) and institutional support ((\beta = 0.085, p = 0.176)) are non-significant. This highlights that technology integration alone is a primary driver of student performance, whereas pedagogical approaches and support mechanisms may require further contextual adaptation to achieve measurable effects (Fitrah, 2025; Khoza & van der Walt, 2025). Economically, these findings suggest that direct access to digital tools increases productive learning time, while indirect supports may have delayed or negligible short-term returns.

Table 2: Regression Results for Learning Outcomes

Predictor	Beta	Std. Error	t	p-value
Technology Use	0.409	0.073	5.603	0.001
Pedagogical Innovation	0.092	0.081	1.135	0.215
Institutional Support	0.085	0.090	0.944	0.176
Constant	1.213	0.504	2.407	0.017

The study highlights the importance of student engagement frameworks in technology-enhanced learning. Students reported that collaborative assignments, real-time quizzes, and AI-driven feedback improved their participation and motivation, consistent with Majini Bella (2025). Economically, higher engagement reduces dropout rates and improves time-to-graduation efficiency, representing a cost-effective educational outcome. Policy-wise, universities should continue focusing on technological access and training for students to maximize engagement, rather than relying solely on institutional support or pedagogical changes.

Analysis of discipline-specific outcomes indicates that economics and political science students reported higher benefits from technology integration compared to sociology and public administration. This may reflect variations in course content, teaching methods, and students' digital readiness (Ajani, 2025; Pan & Filippova, 2024). These findings suggest that targeted interventions for disciplines with lower digital adoption could improve the effectiveness of curriculum innovations.

The integration of AI and adaptive learning technologies has a transformative effect on

student learning. Students reported that AI-enabled analytics facilitate personalised learning pathways, identifying knowledge gaps and providing targeted exercises (Vorobyeva et al., 2025; Khoza & van der Walt, 2025). Economically, this increases learning efficiency by optimising student effort. Policymakers should prioritize investment in adaptive learning tools while ensuring students have sufficient digital literacy to utilize them effectively.

Equity in technology access remains a critical factor influencing outcomes. Students from lower socioeconomic backgrounds faced challenges accessing high-speed internet and devices, constraining engagement despite technology availability (Hasim & Abu Bakar, 2025). This emphasizes the economic principle of resource allocation — unequal access can exacerbate educational inequalities. Policies such as subsidized devices, campus internet expansions, and inclusive technology programs remain essential.

The study confirms that TPACK and SAMR frameworks explain observed student outcomes. Students who experienced effective integration of technology with content reported higher engagement and learning outcomes (Mishra, 2019; Adi Badiozaman& Segar, 2026). However, the non-significant results for pedagogical innovation suggest that not all curricular adaptations are equally effective without student digital readiness. Policies should therefore focus on both technology adoption and student capacity building.

Table 3: Mean Scores of Technology and Pedagogical Adoption by Department

Department	Technology Use	Pedagogical Innovation	Engagement
Economics	4.210	3.980	4.130
Political Science	4.140	3.950	4.090
Sociology	3.920	3.870	3.910
Public Administration	3.870	3.820	3.880

Table 4: Regression Diagnostics

Statistic	Min	Max	Mean	Std. Dev
Residual	-1.872	2.104	0.000	0.721
Studentized Residual	-2.103	2.114	0.000	0.731
Predicted Values	2.107	4.983	3.956	0.742

5. Conclusion

This study examined the role of pedagogy-driven, technology-enabled curriculum innovation in transforming teaching, learning, and assessment for social sciences students at Unilorin. The findings indicate that technology use is the primary driver of improved learning outcomes and student engagement, while other factors such as pedagogical innovation and institutional support did not have a statistically significant impact in this context. Students who actively engaged with digital learning tools demonstrated higher participation, motivation, and overall academic performance. These results highlight the critical importance of providing accessible, functional, and user-friendly

technological resources that directly enhance student learning experiences.

The analysis also revealed that technology adoption has varying impacts across disciplines, with economics and political science students benefiting more than students in sociology and public administration. This suggests that the effectiveness of digital tools is influenced by course content, learning activities, and student familiarity with technology. Therefore, technology integration should not follow a one-size-fits-all approach but rather consider the specific needs and digital readiness of each discipline to maximize learning outcomes.

Equity in access to technology emerged as a crucial factor influencing student engagement and performance. Students from lower socioeconomic backgrounds faced limitations in accessing devices and reliable internet, which reduced the potential benefits of curriculum innovations. Addressing these inequities is essential to ensure that all students can fully participate in technology-enabled learning, thereby fostering inclusive education and minimizing disparities in academic achievement.

The study demonstrates that while technology is a powerful enabler of student learning, complementary factors such as pedagogical strategies and institutional support may require further alignment to yield measurable outcomes. Students' engagement and learning improvements are maximized when technological tools are integrated meaningfully within the curriculum, allowing for interactive, personalized, and adaptive learning experiences. This underscores the need for universities to prioritize student-centered digital learning infrastructure.

From a broader perspective, the findings suggest that investment in technology can yield immediate benefits in teaching and learning efficiency, especially in resource-constrained environments. By focusing on tools that enhance direct student interaction, provide timely feedback, and support collaborative learning, universities can improve academic performance and optimize educational resources. This approach also encourages self-directed learning and fosters skills necessary for digital literacy, critical thinking, and problem-solving.

In conclusion, technology-driven curriculum innovations have the potential to transform higher education when implemented effectively and equitably. For social sciences students, meaningful engagement with digital tools directly contributes to improved learning outcomes, while non-significant factors such as pedagogical adjustments or institutional support may need further development or contextual adaptation. Policymakers and university administrators should focus on enhancing student access to technology, promoting digital competency, and designing curriculum activities that leverage technology's full potential.

Overall, the study highlights that the success of curriculum transformation initiatives depends largely on student interaction with technology. By prioritizing accessible digital resources, addressing equity challenges, and tailoring technological interventions to specific disciplines, universities can foster a more effective, inclusive, and engaging learning environment that prepares students for the demands of the digital age. This study provides evidence that technology adoption, when aligned with student needs, is a critical driver of curriculum innovation and academic success.

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