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Impact of Technology Integration on Student Engagement in Secondary Schools in Mozambique

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Abstract

Purpose: The purpose of this article was to analyze impact of technology integration on student engagement in secondary schools.

Methodology: This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low cost advantage as compared to a field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

Findings: Technology integration in secondary schools is linked to increased student engagement, including higher motivation and participation. Studies show that interactive tools like digital platforms improve academic outcomes and foster greater classroom involvement. However, the impact varies based on factors like teacher training and technology access.

Unique Contribution to Theory, Practice and Policy: Constructivist learning theory, the technology acceptance model (TAM) may be used to anchor future studies on the impact of technology integration on student engagement in secondary schools. In practice, it is essential that secondary school educators receive comprehensive and continuous professional development in integrating technology into their teaching. From a policy perspective, governments should prioritize investment in digital infrastructure to ensure equitable access to technology for all students, regardless of their socio-economic background.

Keywords: *Technology Integration, Student Engagement, Secondary Schools*

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INTRODUCTION

Student engagement, often measured through participation, attention, and motivation in class, refers to the behavioral, emotional, and cognitive investment a student demonstrates during educational activities. It includes active contributions to class discussions, sustained attention to instructional content, and intrinsic motivation to learn and succeed. Studies in developed economies like the United States (USA) show wide-scale measurement efforts for example, the National Survey of Student Engagement assesses participation in academic challenges, peer collaboration, and interactions with faculty at more than 1,600 institutions, capturing trends in collegiate engagement across key indicators such as participation in deep learning activities. Research suggests that higher engagement correlates with better academic outcomes and motivation, with institutions using engagement data to guide improvements in teaching practices and learning environments (National Survey of Student Engagement, n.d.). Similarly, in the United Kingdom (UK) and Japan, peer-reviewed research highlights attention and motivation as central to engagement; for example, studies published in journals like the British Journal of Educational Psychology emphasize motivation's role in shaping participation and sustained attention in learning tasks, often linked to improved cognitive engagement and achievement outcomes (British Journal of Educational Psychology, n.d.).

In developing economies, student engagement measurements often reveal challenges tied to resource constraints and instructional practices. Peer-reviewed research from blended Massive Open Online Courses (MOOCs) in a developing country context shows validated engagement scales can capture participation and cognitive involvement, but external factors like internet connectivity and infrastructure can significantly influence attention and motivation (Edumadze, 2024). Another study examining participation in Mozambican classrooms found that students' perceptions of teaching practices strongly shape their willingness to engage, indicating that classroom environment and teacher interaction quality are key determinants of participation levels in developing settings (De Carvalho, 2024). While formal trend statistics are less abundant than in developed contexts, these studies indicate that engagement especially sustained attention and motivation remains highly sensitive to learning conditions, teaching methods, and access to educational resources across developing countries (Edumadze, 2024).

In Sub-Saharan African economies, research highlights both structural barriers and pedagogical influences on student engagement. For instance, studies in junior high schools suggest that socioeconomic factors such as perceived family economic hardship are negatively associated with student behavioral engagement, indicating that motivation and attention are constrained by broader economic insecurity (Ansong, 2018). Additionally, reviews of learner-centered pedagogy in Sub-Saharan contexts emphasize the importance of active learning approaches to foster participation and deeper engagement, but note challenges like large class sizes and limited teacher preparation that can hinder students' classroom involvement (International Education Research and Policy Consortium, n.d.). Overall, evidence from this region points to lower averages of participation and intrinsic motivation compared to developed economies, although efforts to implement interactive approaches show promise in strengthening engagement where constraints permit (International Education Research and Policy Consortium, n.d.).

Technology integration in education involves the use of digital tools and e-learning platforms to enhance the teaching and learning experience. It has gained prominence as a means to foster greater

student engagement by promoting active participation, sustained attention, and intrinsic motivation in classrooms. One example is the use of Learning Management Systems (LMS), such as Moodle or Canvas, which enable students to access materials, participate in discussions, and track their progress, leading to higher levels of participation and motivation. Another example is the integration of Interactive Whiteboards (IWBs), which provide dynamic, multimedia-rich environments that encourage students to actively engage in lessons, maintain focus, and collaborate with peers. Gamification in education, through tools like Kahoot or Quizlet, motivates students by incorporating game-like elements, enhancing both participation and attention through competition and rewards. Research suggests that these tools promote greater engagement by making learning more interactive, enjoyable, and relevant to students' interests (Zhao, 2022; Singh & Pritchard, 2021).

In addition, e-learning platforms like Coursera or edX allow students to take courses at their own pace, which enhances self-regulated learning, leading to increased motivation. The flexibility of these platforms also encourages learners to engage actively with content, resulting in higher participation levels. Similarly, virtual reality (VR) in education offers immersive experiences that capture students' attention, enabling them to interact with the content in ways that traditional methods cannot. These technologies foster deeper cognitive engagement by providing rich, context-driven learning environments. When integrated effectively, these digital tools not only enhance classroom participation and attention but also contribute to long-term motivation and academic success by aligning learning experiences with modern technological expectations (Smith, 2021; Richardson & King, 2020).

Problem Statement

Despite the rapid adoption of digital tools and e-learning platforms in secondary school classrooms worldwide, their actual impact on student engagement including participation, attention, and motivation remains uneven and poorly understood. While some recent studies report positive correlations between technology use and increased engagement levels in secondary settings, others suggest that the quality of integration, teacher readiness, and access disparities significantly influence outcomes (Alabi, 2025; McCall, 2025). Moreover, even when technology access is high, inconsistent instructional practices and limited professional development can result in minimal or no improvement in meaningful student participation (Alabi, 2025). There is also evidence that technological tools may inadvertently distract learners or widen engagement gaps among students with varying digital literacy levels, undermining the potential benefits of technology integration (McCall, 2025). Thus, the central problem is that schools are investing in technology without sufficient empirical clarity on how, under what conditions, and to what extent these tools genuinely enhance student engagement in secondary education (Alabi, 2025; McCall, 2025).

Theoretical Review

Constructivist Learning Theory

Emphasized that knowledge is actively constructed by learners through interaction with their environment. This theory, originally proposed by Jean Piaget and later expanded by Lev Vygotsky, underscores the importance of social interaction and hands-on learning experiences. In the context of secondary schools, technology integration facilitates constructivist learning by providing interactive tools that enable students to engage in collaborative, problem-solving tasks. For

example, tools like interactive whiteboards and e-learning platforms allow students to build on their prior knowledge in a dynamic environment, encouraging active participation. By enhancing learning with technology, students are more likely to stay engaged, thus fostering deeper understanding and retention of content (Vygotsky, 2020).

The Technology Acceptance Model (TAM)

Developed by Davis (1989), posits that users' acceptance of technology is primarily influenced by two factors: the perceived ease of use and the perceived usefulness of the technology. In secondary education, this model is highly relevant because students' attitudes toward digital tools like learning management systems (LMS) or educational apps directly affect their engagement. If students perceive technology as easy to use and valuable for learning, they are more likely to actively participate and stay motivated. The model helps explain why some students might embrace technology while others may show resistance, influencing the degree of their engagement with digital learning tools (Lee, 2021).

Empirical Review

Heilporn and Majdoub (2025) aimed to investigate how the use of technology in secondary education impacts student engagement and learning from the students' perspective. The study was qualitative, using a descriptive approach with interviews conducted across four schools in the United States. It included 40 secondary students, and the data collected focused on students' perceptions of how digital tools, such as interactive whiteboards and e-learning platforms, influenced their classroom participation. The findings revealed that students felt more engaged in lessons when technology was incorporated into the learning process, with interactive tools making learning more dynamic and motivating. Students reported that technology provided them with more opportunities for collaboration and helped them better understand complex concepts. The study also found that students were more likely to participate in discussions and pay attention during lessons when technology was used, as it catered to different learning styles and allowed for more personalized learning. Recommendations from the study included the need for schools to ensure teachers are properly trained in the effective use of technology and that digital tools should be seamlessly integrated into the curriculum to maximize engagement. The study also emphasized that without sufficient teacher guidance and structured use of technology, the benefits of engagement may be limited. Ultimately, the research supported the notion that technology, when integrated thoughtfully, can significantly enhance student engagement and learning outcomes. Heilporn and Majdoub (2025) also recommended that school leaders invest in professional development and ensure technology access for all students. Their findings provided a framework for further studies to examine the long-term impacts of technology integration in various school contexts. The study's limitations included the small sample size and its focus on one geographical area, suggesting the need for broader research across different regions. This study also acknowledged the potential for distractions when technology was not used effectively in the classroom. The researchers proposed future studies to explore the relationship between technology integration and long-term academic performance. Lastly, they suggested that policymakers should support the development of robust digital infrastructures in schools.

Sahu (2025) explored the impact of technology integration on student engagement and academic performance in secondary schools. The study employed a mixed-methods design, combining

qualitative and quantitative approaches, and involved 300 students and 30 teachers across three high schools in India. The quantitative component of the research involved pre- and post-tests to measure the students' engagement levels before and after the introduction of technology tools such as online learning platforms and interactive digital assessments. The qualitative component included interviews with students and teachers to gather insights into their experiences with technology use in the classroom. Findings indicated that technology integration led to a significant improvement in student engagement, as measured by increased participation in class activities and higher academic performance in subjects like mathematics and science. Students reported higher motivation levels due to the interactive and personalized learning experiences provided by digital tools. Teachers observed that students were more attentive, and their problem-solving abilities improved with the use of digital tools. The study also identified that the integration of technology helped bridge gaps in learning by providing resources for students who were struggling. Sahu (2025) recommended that schools invest in technology infrastructure, including reliable internet access and devices, and emphasized the need for ongoing teacher training to maximize the effectiveness of technology integration. He also noted that while technology facilitated engagement, its effectiveness was dependent on the teacher's ability to incorporate it into the curriculum meaningfully. The study suggested that future research should focus on the role of student-teacher interactions in a technology-enhanced learning environment. Furthermore, it recommended that educators be trained to use technology tools in ways that align with best teaching practices. One limitation of the study was the variation in technology access among students, which might have affected the engagement outcomes. Sahu (2025) concluded by advocating for policy reforms that encourage the integration of technology in secondary education to enhance learning outcomes.

Zafeer (2025) examined the relationship between technology use and student engagement in science classrooms in secondary schools. The study involved 309 secondary science teachers from various schools in Pakistan and explored factors such as access to digital learning tools, frequency of use, and teacher competency in utilizing technology. Data was collected through structured questionnaires, and statistical analysis was performed to identify trends in student engagement associated with technology use. The study found that increased access to digital tools, such as interactive simulations and multimedia content, positively correlated with higher student participation and improved academic outcomes. Teachers who were more confident in using technology reported higher levels of student engagement and motivation. Zafeer et al. (2025) concluded that technology could significantly enhance student engagement in science education, but this impact was strongly mediated by the teacher's ability to integrate technology effectively into the lesson plans. Recommendations from the study included the need for regular teacher training on the use of digital tools, ensuring equitable access to technology for all students, and the development of curricula that incorporate technology in meaningful ways. The study also highlighted that despite the availability of technology, its potential was often not fully realized due to limited teacher preparation and inadequate digital infrastructure in some schools. Zafeer et al. (2025) recommended further studies to explore the specific types of digital tools that have the most impact on student engagement in secondary schools. Limitations of the study included its reliance on self-reported data, which may have been subject to biases. The researchers called for more controlled studies to examine the direct effects of different types of digital technology on student engagement and academic performance.

Ubabuike and Chisom (2025) employed a correlational research design and surveyed 750 students across 10 public schools to assess the impact of digital tools like e-books, interactive whiteboards, and online resources on engagement. The results showed a strong positive relationship between the use of digital tools and student participation, particularly in subjects like English and mathematics. Students who had access to these technologies were more likely to be attentive in class, ask questions, and engage in peer discussions. Additionally, the study found that students felt more motivated to complete assignments and were more confident in their abilities to succeed academically. The researchers recommended that schools prioritize the acquisition of digital tools and ensure that teachers are well-trained in integrating these tools into their teaching practices. They also emphasized the importance of government policies that support the widespread use of technology in education. Ubabuike and Chisom (2025) suggested further research to investigate the long-term effects of digital tools on student performance and engagement, especially in rural areas with limited access to technology. A limitation of the study was the focus on urban schools, which may not fully represent the challenges faced by schools in more rural areas.

Majdoub, Heilporn, and Diab (2025) explored how digital technology use in classrooms influences students' emotional engagement, motivation, and attention. The study used a qualitative inductive approach, conducting in-depth interviews with students and teachers from several high schools. The findings revealed that students who had access to technology, including tablets and online learning platforms, reported higher levels of engagement and were more likely to stay focused during lessons. The study highlighted that technology not only captured students' attention but also helped them feel more involved in the learning process by providing immediate feedback and opportunities for collaboration. The researchers recommended that schools incorporate more interactive digital tools into the curriculum and ensure that teachers are adequately trained in their use. They also suggested that schools create a more inclusive digital environment by providing technology to all students, especially those from lower-income backgrounds. Limitations included the small sample size and the focus on only a few schools. Majdoub et al. (2025) encouraged future research to explore the emotional impacts of digital learning tools on different student demographics.

Sahu (2025) investigated the role of technology integration on student engagement in secondary schools within the context of online learning. The study employed a pre-test and post-test design, using a sample of 150 students from three schools in India. The study showed that students who participated in online lessons and had access to digital tools like video lectures and interactive quizzes were significantly more engaged than those who received traditional instruction. The results also indicated an improvement in students' academic performance, particularly in subjects where digital tools were regularly used. Sahu (2025) recommended that schools invest in e-learning platforms and ensure that teachers are equipped with the necessary skills to use technology effectively. He also noted that the integration of technology could be enhanced by involving students in the selection of digital tools, as this could increase their motivation to participate. However, the study also highlighted challenges related to the digital divide, with students from disadvantaged backgrounds struggling to access the necessary technology. The researcher recommended that policymakers address these challenges by providing equitable access to digital tools across different socioeconomic groups.

Msafiri (2023) analyzed 51 empirical studies from diverse regions, focusing on the factors influencing student engagement with digital learning tools. Findings from the review indicated that technology integration consistently led to higher levels of student participation, especially in environments where teachers were well-prepared to use digital tools effectively. The study concluded that when technology was integrated into classrooms with proper support structures, students were more likely to be motivated and attentive, thus enhancing their academic performance. Msafiri (2023) recommended that schools focus on creating a balanced approach to technology use, where both traditional and digital tools are used complementarily. The review also emphasized the need for ongoing professional development for teachers to ensure they can adapt to technological advancements.

METHODOLOGY

This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low-cost advantage as compared to field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

FINDINGS

The results were analyzed into various research gap categories that is conceptual, contextual and methodological gaps

Conceptual Research Gaps

Heilporn and Majdoub (2025) and Sahu (2025) both suggest that technology integration enhances student engagement, but they primarily focus on general engagement without fully exploring the emotional and cognitive dimensions separately. Future research could explore how specific types of engagement such as emotional engagement and cognitive engagement are influenced differently by technology integration. Additionally, Zafeer (2025) highlight teacher competency as a crucial mediator, but how this mediating role interacts with students' intrinsic motivation has not been thoroughly investigated. There is also a need for more granular research into the specific types of digital tools (e.g., online platforms, interactive simulations) that most effectively influence engagement and learning.

Contextual Research Gaps

Ubabuike and Chisom (2025) and Zafeer (2025) acknowledge the influence of teacher preparation and curricular integration, but the specific strategies for integrating technology within the curriculum are still not well-defined. Research could explore best practices for integrating digital tools into diverse curriculum areas (e.g., math, science, humanities) to better understand how subject matter affects the degree of student engagement. Furthermore, the digital divide highlighted by Sahu (2025) calls for research that looks at how different socio-economic factors (e.g., rural vs. urban schools) affect technology integration’s success.

Geographical Research Gaps

Heilporn and Majdoub (2025) conducted their study in the United States, while Sahu (2025) focused on India, and Ubabuike and Chisom (2025) focused on Nigeria. These studies underscore the need for broader geographical diversity in examining the impact of technology integration on student engagement. There is a lack of cross-country comparisons to understand how geographical and cultural differences affect the adoption and impact of technology on engagement. Furthermore, as Zafeer (2025) highlight, research in low-resource settings (e.g., rural schools in developing countries) is still limited, and there is a clear need to investigate how technology integration is implemented and its effects in less-developed educational systems.

CONCLUSION AND RECOMMENDATIONS

Conclusions

In conclusion, the impact of technology integration on student engagement in secondary schools is undeniably significant, with evidence pointing to improvements in participation, attention, and motivation when digital tools are used effectively. Studies such as those by Heilporn and Majdoub (2025), Sahu (2025), and Zafeer (2025) demonstrate that technology can foster a more dynamic, personalized, and collaborative learning environment, which caters to diverse student learning styles. However, the successful integration of technology is not without its challenges. Factors such as teacher preparedness, adequate infrastructure, and equitable access to digital tools must be addressed to maximize the benefits of technology. While research shows positive outcomes, it is clear that the impact of technology on engagement can vary significantly depending on contextual factors like curriculum design, the teacher's ability to integrate technology, and the socio-economic backgrounds of students. To fully realize the potential of technology in enhancing student engagement, future studies should focus on longitudinal research that examines the long-term effects of technology integration, especially in diverse geographical contexts. Policymakers and educational leaders must prioritize professional development for educators, invest in infrastructure, and ensure equal access to technology, ensuring that all students can benefit from the engagement-enhancing potential of digital tools.

Recommendations

Theory

Future research should expand existing models like the technology acceptance model (TAM) and Self-Determination Theory (SDT) to explore how various types of technology influence different aspects of engagement, particularly emotional and cognitive engagement. This expansion will allow for a deeper understanding of how sustained technology use affects long-term student participation, attention, and motivation. Additionally, theoretical frameworks should be developed to account for the long-term impacts of technology integration on academic performance and engagement, ensuring that the evolving nature of digital tools is adequately captured in educational theory.

Practice

In practice, it is essential that secondary school educators receive comprehensive and continuous professional development in integrating technology into their teaching. This training should go beyond the basic technical skills, focusing on pedagogical strategies that actively engage students through digital tools. Teachers should be trained to seamlessly incorporate technology into the

curriculum, creating interactive, student-centered learning environments. Additionally, schools should focus on fostering personalized learning through adaptive technology tools that cater to individual learning styles and speeds, ultimately enhancing student engagement and participation in class.

Policy

From a policy perspective, governments should prioritize investment in digital infrastructure to ensure equitable access to technology for all students, regardless of their socio-economic background. This includes providing adequate internet connectivity, devices, and digital platforms that support interactive learning and engagement. Policymakers must also address the digital divide by implementing strategies that ensure students in rural and underserved areas have access to the same technological resources as their peers in urban settings. Furthermore, policies should encourage teacher training programs that focus on technology integration, offering ongoing professional development opportunities to ensure that educators are well-prepared to use technology in ways that enhance student engagement. These policy interventions will support a more inclusive and effective integration of technology into the secondary education system.

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