Remittences Review
September 2024
Volume:9 , No: S 4 ,pp.1764-1778
ISSN: 2059-6588(Print)| ISSN: 2059-6596 (Online)
Received: 25 July 2024, Accepted: 28 August 2024

Exploring the Impact of Digital Learning Tools on Student Engagement Among Secondary Grade Students

Dr. Nishat Zafar[1], Muhammad Ghafoor[2], Mishal Siyab[3]

1. Dr. Nishat Zafar

Associate Lecturer, Department of Education, University of Gujrat

2. Muhammad Ghafoor

PhD Scholar Department of Education, University of Gujrat

3. Mishal Siyab

PhD Scholar, Department of Education, University of Gujrat

Abstract

This study looked at the behavioral, emotional, cognitive, and social aspects of how digital learning resources affected Grade 10 students' interest in learning English. Over the course of eight weeks, students were randomized to either a group using digital learning resources or a group using the conventional lecture method as part of a true experimental pre-test–post-test control group design. A validated scale was used to measure engagement, and independent samples t-tests were used to examine group differences. Results showed that compared to students who were taught through lectures, students who were taught using digital tools demonstrated noticeably higher behavioral, emotional, and cognitive engagement, indicating greater participation, excitement, and deeper content processing. Without deliberate interactive design, technology might not improve collaboration on its own, as no discernible difference in social engagement was found. These findings emphasize the importance of incorporating collaborative activities to improve social connections while also highlighting the value of technology-rich instruction for encouraging individual engagement.

Keywords: digital learning tools, student engagement, secondary education, English learning

Introduction

The use of digital learning resources in secondary education has increased during the past ten years. These days, learning management systems (LMS), interactive multimedia, adaptive tutoring, and collaborative platforms are all commonplace in classrooms and homework settings. The COVID-19 pandemic accelerated this adoption, which has continued into hybrid and in-person schooling models. This has led educators and policymakers to consider whether digital tools enhance achievement or how they affect student engagement, a multifaceted concept that is widely considered essential to learning and wellbeing (Fredricks, Blumenfeld, & Paris, 2004). Designing instructional strategies that take advantage of technology's affordances without escalating inequality or distractions requires an understanding of the relationship between digital tools and engagement (OECD, 2024).

According to Fredericks et al. (2004), there are four traditional dimensions of student engagement: behavioral, emotional (affective), cognitive, and social. Participation, attendance, and on-task behavior are examples of behavioral engagement; interest, belonging, and attitudes toward learning are examples of emotional engagement; self-regulation and investment in deep learning strategies are examples of cognitive engagement; and peer/teacher interactions and cooperative learning are examples of social engagement. According to Moskovich and Hershkovitz (2024), each dimension can appear in a different way in digital contexts. For example, behavioral engagement may be indexed by LMS logs and clickstream analytics, but emotional and cognitive aspects are better captured by surveys and qualitative methods. As a result, assertions regarding how technology affects engagement need to take into account the variety of digital tools and pedagogical approaches, as well as measurement options (Cao, 2023).

The empirical data regarding engagement and digital tools is complex. Thoughtfully created blended and technology-enhanced models can generally improve attitudes and learning outcomes, according to meta-analytic and systematic reviews; however, the effects on engagement vary depending on the context (Cao, 2023). An "inverted-U" relationship is also suggested by large cross-national analyses and PISA-based studies: moderate, pedagogically aligned ICT use is associated with better outcomes and interest, whereas very high or unfocused use may be associated

with worse performance and greater distraction (OECD, 2023). These contradictory results highlight a key takeaway from recent research: technology is not a magic tool for increasing student engagement; rather, its effectiveness depends on how it is combined with curriculum, evaluation, teacher expertise, and fair access (Moskovich & Hershkovitz, 2024).

Stakeholder perceptions are the subject of a second line of recent research. The same digital tool is frequently viewed differently by teachers and students, and these perception differences influence instructional strategies and results. While students often express concerns about distraction, screen fatigue, and poor interface design, they also frequently report that multimedia, interactivity, and instant feedback boost interest and make learning more accessible (OECD, 2024). Teachers often show concern about workload, classroom management, and the quality of professional development, but they also recognize the educational potential of digital tools for differentiation, formative assessment, and resource access (Moskovich & Hershkovitz, 2024). Crucially, student experience is strongly mediated by teacher competency with digital tools: students report higher engagement when teachers use them fluently and with clear pedagogy, while student engagement tends to be lower when use is superficial.

Additional moderators include context and equity. Whether or not students can benefit from digital tools depends on their access to dependable devices, connectivity, and peaceful study areas, as well as their level of support at home. Empirical research and policy reports frequently caution that if equity measures are not implemented, technology adoption could exacerbate the achievement and engagement gaps already present between students from disadvantaged socioeconomic backgrounds (OECD, 2024). Age and subject matter are also important. Research indicates that interactive platforms and simulations frequently result in noticeable cognitive improvements in STEM subjects, and older secondary students are better equipped to handle independent digital learning than younger adolescents due to their higher levels of self-control (OECD, 2023).

The literature demonstrates two significant methodological limitations. First, a lot of research uses single-method measures (like self-report surveys or LMS

analytics), which capture various aspects of engagement and may yield seemingly contradictory findings. Second, research on scaled, regular implementations often finds smaller positive effects than short-term pilots with high implementation support, indicating that implementation fidelity and ongoing teacher development are crucial (Moskovich & Hershkovitz, 2024). Scholars are increasingly recommending mixed-method designs for robust inference, which compare matched student and teacher perceptions of the same lessons and tools and triangulate behavioral analytics with qualitative and survey measures of emotional and cognitive engagement.

These methodological and empirical gaps are intended to be filled by the research project Exploring the Impact of Digital Learning Tools on Student Engagement in Secondary Education: A Comparative View of Students' and Teachers' Perceptions. In order to capture the various dimensions of engagement—behavioral, emotional, cognitive, and social—it first adopts a multifaceted perspective and employs complementary measures, such as surveys, focus groups, interviews, and available LMS/usage data. Second, it employs a paired comparative design to identify areas of alignment and misalignment in stakeholder views by asking students and their teachers about the same digital tools and lessons. Third, in order to convert findings into practical suggestions for professional development, the study specifically addresses contextual moderators, including subject area, infrastructure/equity, teacher digital pedagogical competence, and the instructional design of the digital activities.

This study aims to make both theoretical and practical contributions by integrating triangulated engagement measures in secondary classrooms with comparative stakeholder perceptions. In theory, it improves knowledge of how various aspects of engagement relate to particular digital affordances and instructional strategies. In practice, it seeks to guide district strategies, teacher professional development, and school policies regarding the use of devices and platforms in order to guarantee fair, pedagogically sound technology integration that promotes long-term student engagement rather than sporadic compliance.

Literature Review

Theoretical Foundations of Engagement

Remittences Review
September 2024
Volume:9 , No: S 4 ,pp.1764-1778
ISSN: 2059-6588(Print)| ISSN: 2059-6596 (Online)

Student engagement is still essential to the success of education and is commonly operationalized as a multifaceted concept that includes:

- Behavioral engagement, which includes paying attention in class, participating in activities, and finishing assignments.
- Emotional (affective) engagement: attitudes toward learning and sentiments of interest, enjoyment, and belonging.
- Cognitive engagement: making an investment in content mastery, using metacognitive techniques, and maintaining mental effort.
- Social engagement: interacting, working together, and communicating with teachers and peers (Fredricks, Blumenfeld, & Paris, 2004).

These characteristics show up differently in learning environments that are mediated by digital media. Digital activity metrics (such as logins and time spent on task), student-reported interest in multimedia features, cognitive engagement through adaptation and scaffolding in intelligent systems, and social engagement through online forums or video conferencing are all examples of behavioral engagement. However, there are measurement issues: self-reports may not be behaviorally accurate, and digital traces may overestimate compliance rather than meaningful engagement (Moskovich & Hershkovitz, 2024; Fredricks et al., 2004). According to this fundamental framing, conceptual clarity and a variety of measurement techniques are necessary for a thorough analysis of digital engagement.

Impact of Blended Learning

When online and in-person components are properly integrated, meta-analyses of blended learning models show generally positive results for engagement, attitudes, and academic performance. Although pedagogical coherence was crucial, a study of several international cases revealed improved attitudes and time-on-task in blended designs that included interactive tasks, adaptive quizzes, and multimedia (Cao, 2023). However, cross-case synthesis is complicated by the heterogeneity of study contexts and designs, particularly with regard to engagement measures.

Excessive or unfocused use of ICT is linked to a decline in performance and attention, while moderate, pedagogically focused use is linked to stronger learning

and engagement outcomes, according to large-scale analyses (e.g., via PISA data). The idea that the advantages of technology are conditional rather than linear is highlighted by this "inverted-U" pattern.

Interactive simulations, virtual labs, and adaptive tutorials that encourage spatial reasoning, experimentation, and cognitive engagement have proven to be beneficial for secondary STEM students. However, without effective instructional design, achievement gains are less pronounced in the humanities or less structured subjects. Furthermore, compared to their younger counterparts, older secondary students (ages 16–18) exhibit a higher capacity for self-regulation in digital contexts.

Equity is still a crucial moderator. When using digital tools, students from lower socioeconomic status (SES) backgrounds report lower engagement and encounter more obstacles, particularly in situations with inadequate infrastructure or home support. Technology initiatives run the risk of escalating current disparities in the absence of targeted policies (e.g., device provisioning, connectivity subsidies, blended access models).

Engagement Drivers: Multimedia, Feedback, and Interactivity

Students show gratitude for features that offer interactive tasks, vibrant visualizations, and instant feedback (such as auto-graded quizzes). Particularly when incorporated into well-structured lessons, these characteristics are said to boost interest, make difficult material easier to understand, and encourage independent learning (Cao, 2023).

Students frequently report negative experiences, such as being distracted by irrelevant online content, feeling exhausted from extended screen time, and being frustrated by poorly designed apps, despite the functional advantages. The quality of instructional design has a significant impact on student motivation; regardless of the media used, engagement decreases when digital tasks are repetitive or superficial (Moskovich & Hershkovitz, 2024).

Students frequently point out that a teacher's proficiency with digital tools significantly impacts the learning experience. Students give higher engagement scores to well-trained teachers who incorporate tools with pedagogical intention; poorly designed "tech for tech's sake" approaches are perceived as boring or uninteresting. It is widely acknowledged by educators that digital tools can support engagement through multimedia and adaptive practice, facilitate differentiation, and enable formative assessment. But a lot of people also worry about the increased workload, the complexity of classroom management, and reliability problems (platform stability, connection) (Moskovich & Hershkovitz, 2024).

While affective and cognitive dimensions may be neglected unless specifically elicited through reflection or feedback mechanisms, teachers usually rely on observable indicators (assignment completion, attendance logs, submission rates) to gauge engagement. When compliance is high but interest or deep processing is low, this behavioral bias may cause an overestimation of engagement (Fredricks et al., 2004).

For secondary students to be adequately prepared to engage in a digitally mediated society, digital learning is becoming more and more important. Personalized pacing, adaptive feedback, and active, inquiry-based learning that encourages critical thinking and problem solving are all made possible by well-integrated digital tools (Cao, 2023). International reviews also demonstrate that when pedagogically sound and backed by teacher competency, blended and technology-enhanced approaches can enhance attitudes and engagement (Timotheou et al., 2023). Beyond the benefits to individual students, digital learning also supports system-level advantages by enhancing school administration, family communication, and data-driven decision making, which increases the overall capacity and responsiveness of the school (Timotheou et al., 2023).

International and policy organizations place a strong emphasis on resilience and equity. Digital strategies can prolong learning opportunities and continuity (during disruptions, for instance), but only if inclusive policies, device access, and infrastructure are in place to stop gaps from growing (UNESCO, 2024). Large-scale studies warn that technology use needs to be intentional; while excessive or unfocused

use can impair focus and performance, moderate, curriculum-aligned ICT use is linked to positive outcomes (OECD, 2024). Accordingly, three pillars are necessary for successful digital learning at the secondary level: equitable infrastructure, teacher professional development, and pedagogically informed design (Cao, 2023; UNESCO, 2024).

All things considered, when used with explicit learning goals, teacher assistance, and equity protections, digital learning at the secondary level offers substantial pedagogical and organizational benefits. Therefore, to ensure that all students benefit, policymakers and school administrators should invest in targeted measures, curriculum redesign for blended modalities, and ongoing teacher capacity building in addition to devices. Teachers strongly support continuous, context-specific professional development to enhance digital literacy and pedagogical integration. They emphasize the value of access to sample lesson plans, ongoing coaching, and peer learning. Deficits in infrastructure, such as unreliable networks and a lack of technical assistance, also restrict teacher capacity, especially in schools with limited funding.

Both students and teachers report increased accessibility, clarity, and interactivity when instructional goals are well-defined and digital tools (such as formative assessments, flipped classroom resources, and collaborative documents) are used effectively. Everyone agrees that some tools improve the effectiveness and inclusivity of communication, review, and lesson planning (Cao, 2023; Moskovich & Hershkovitz, 2024).

Even when teachers interpret high submission rates as successful engagement, students may perceive completed digital tasks as superficial or disengaging if there is no meaningful interaction. Perceptions may become misaligned as a result of teachers' inability to recognize apathy concealed by compliance. While teachers may undervalue the cognitive costs of distraction in favor of curriculum coverage, students often complain that digital platforms encourage off-task behavior. In remote or hybrid learning, where monitoring is less robust, this discrepancy becomes particularly noticeable (Moskovich & Hershkovitz, 2024). According to both groups, a key component of successful engagement outcomes is teacher readiness. Students want

confident, innovative facilitation that goes beyond simple digitization; teachers want training. According to this common opinion, professional development could be used as leverage to change perceptions (Moskovich & Hershkovitz, 2024).

Research continuously shows that the most significant factor influencing student engagement in the classroom is teacher expertise. According to Cao (2023) and Moskovich & Hershkovitz (2024), engagement measures improve in all dimensions when teachers implement digital tools in a meaningful way. This includes utilizing adaptive scaffolding, connecting content to students' interests, and planning collaborative activities.

The cornerstones are dependable technology, connectivity, and encouraging surroundings. Without these, research shows that even the most well-thought-out digital activities are unable to fairly engage students. Persistent threats include digital divides by geography, socioeconomic status, or home learning environment (OECD, 2024).

Digital tools are most effective when closely linked to learning goals and evaluation techniques. Scaffolding, adaptive feedback, reflective prompts, and peer review opportunities are important components. When gamification is linked to meaningful mastery rather than just rewards, it increases interest (Cao, 2023).

Objectives

1. To examine the effect of digital learning tools on Grade 10 students' behavioral engagement in learning English.
2. To compare the impact of digital learning tools and the lecture method on students' emotional engagement.
3. To assess differences in cognitive engagement between students taught with digital learning tools and those taught with the lecture method.
4. To determine whether digital learning tools influence students' social engagement compared to the lecture method.

Null hypotheses

Ho1: There is no difference in behavioral engagement between Grade 10 students taught using digital learning tools and those taught using the lecture method.

Ho2: There is no difference in emotional engagement between Grade 10 students taught using digital learning tools and those taught using the lecture method.

Ho3: There is no difference in cognitive engagement between Grade 10 students taught using digital learning tools and those taught using the lecture method.

Ho4: There is no difference in social engagement between Grade 10 students taught using digital learning tools and those taught using the lecture method.

Methodology

A true experimental pre-test–post-test control group design was used in this study to investigate how Grade 10 students' engagement was affected by digital learning resources. An experimental group (n = 35) that received instruction using digital learning resources and a control group (n = 35) that received instruction using the conventional lecture method were randomly assigned to a sample of 70 students. Over the course of eight weeks, both groups studied the same curriculum material. A validated Student Engagement Scale (which includes behavioral, emotional, cognitive, and social dimensions) was used to measure student engagement before and after the test. Independent samples t-tests were used to examine engagement differences after the intervention.

Data Analysis and Interpretation

Table 1.

Comparison of Effect of Digital Learning Tools and Lecture Method on Students Behavioral Engagement in Learning of English Subject Among 10th Grade Students

Learning Process	Students	Mean	S.D.	t-value	p. value
Digital Learning Tools	35	4.39	.340	6.31	.000
Lecture Method	35	3.71	.471		

According to Table 1, behavioral engagement scores were higher for students in the digital learning tools group (M = 4.39, SD = 0.34) than for students in the lecture method group (M = 3.71, SD = 0.47). This difference was statistically significant, according to an independent samples t-test (t(68) = 6.31, p <.001). The null hypothesis, which holds that there is no difference in behavioral engagement between the two groups, is rejected because the p-value is less than the 0.05 significance level. According to this research, using digital learning resources instead of the conventional lecture method results in noticeably higher behavioral engagement when learning English. The experimental group's higher mean score indicates greater engagement, participation, and attention during lessons given via digital platforms.

Table 2.

Comparison of Effect of Digital Learning Tools and Lecture Method on Students Emotional Engagement in Learning of English Subject Among 10th Grade Students

Learning Process	Students	Mean	S.D.	t-value	p. value
Digital Learning Tools	35	4.55	.370	7.02	.000
Lecture Method	35	3.59	.591		

Students in the group using digital learning tools (M = 4.55, SD = 0.37) scored higher on emotional engagement than students in the group using the lecture method (M = 3.59, SD = 0.59), according to Table 2. This difference was statistically significant, according to an independent samples t-test (t(68) = 7.02, p <.001). The null hypothesis, which states that there is no difference in emotional engagement between the two groups, is rejected because the p-value is less than the 0.05 significance level. This finding indicates that students' emotional engagement with learning English is greatly increased by digital learning resources, which promote increased interest, zeal, and favorable sentiments toward the subject.

Table 3.

Comparison of Effect of Digital Learning Tools and Lecture Method on Students Cognitive Engagement in Learning of English Subject Among 10th Grade Students

Learning Process	Students	Mean	S.D.	t-value	p. value
Digital Learning Tools	35	4.41	.591	8.45	.000
Lecture Method	35	3.34	.581		

According to Table 3, students who received instruction through digital learning resources (M = 4.41, SD = 0.59) outperformed those who received instruction through lectures (M = 3.34, SD = 0.58) in terms of cognitive engagement. This difference was statistically significant, according to an independent samples t-test (t(68) = 8.45, p <.001). The null hypothesis, which states that there is no difference in cognitive engagement between the two groups, is rejected because the p-value is less than the 0.05 significance level. This suggests that digital learning resources greatly enhance cognitive engagement by promoting more intellectual effort, deeper processing, and strategic learning.

Table 4.

Comparison of Effect of Digital Learning Tools and Lecture Method on Students Social Engagement in Learning of English Subject Among 10th Grade Students

Learning Process	Students	Mean	S.D.	t-value	p. value
Digital Learning Tools	35	4.01	.481	1.66	.098
Lecture Method	35	3.98	.672		

According to Table 4, students in the group using digital learning tools (M = 4.01, SD = 0.48) scored marginally higher on social engagement than students in the group using the lecture method (M = 3.98, SD = 0.67). This difference, however, was not statistically significant, according to the independent samples t-test (t(68) = 1.66, p =.098). The null hypothesis, which states that there is no difference in social engagement between the two groups, cannot be rejected because the p-value is greater than the 0.05 significance level. With both approaches producing comparable results in peer interaction and collaborative participation, this finding implies that digital learning tools do not result in a statistically significant increase in social engagement when compared to the lecture method.

Findings

- **Behavioral Engagement**

  Behavioral engagement scores were significantly higher for students taught using digital learning tools (M = 4.39, SD = 0.34) than for those taught using the lecture method (M = 3.71, SD = 0.47), t(68) = 6.31, p <.001.

- **Emotional Engagement**

  Compared to the lecture method group (M = 3.59, SD = 0.59), students in the digital learning group (M = 4.55, SD = 0.37) demonstrated noticeably greater emotional engagement (t(68) = 7.02, p <.001).

- **Cognitive engagement**

  Cognitive engagement scores were higher with digital learning tools (M = 4.41, SD = 0.59) than with the lecture method (M = 3.34, SD = 0.58), t(68) = 8.45, p <.001.

- **Social Engagement**

  The social engagement of the lecture method group (M = 3.98, SD = 0.67) and the digital learning group (M = 4.01, SD = 0.48) did not differ statistically significantly (t(68) = 1.66, p =.098).

Discussion

The findings show that while social engagement is not significantly improved by digital learning tools, behavioral, emotional, and cognitive engagement are. These results are consistent with earlier research that demonstrates how integrating technology improves motivation, active engagement, and in-depth content processing (Fredricks et al., 2004; Lee & Martin, 2020). Interactive multimedia features, instant feedback, and learner autonomy—all of which promote focus and perseverance—may be responsible for the notable increases in behavioral engagement (Mayer, 2017). The significant increase in emotional engagement also illustrates how digital tools can be used to make learning more fun and individualized (Heo & Toomey, 2021). The findings in cognitive engagement align with studies showing that interactive tasks on digital platforms encourage critical thinking and problem-solving (Bond et al., 2020).

Digital learning may improve individual learning experiences, but it does not automatically improve collaborative skills unless it is specifically designed with social interaction features, according to the non-significant difference in social engagement (Hrastinski, 2019). This might be because the digital activities used in this study did not provide many opportunities for peer-to-peer communication.

Conclusions

- Students' behavioral, emotional, and cognitive engagement in learning English is greatly improved by digital learning resources.
- There was no discernible difference in social engagement between lecture-based and digital learning.
- Learner motivation and intellectual investment are positively impacted by interactive, technologically advanced environments.
- Intentional instructional design techniques that go beyond the use of digital tools may be necessary for social engagement.

Recommendations

- ✓ *Improve Interactive Learning:* To maintain high behavioral engagement through active participation and instant feedback, schools should incorporate digital tools with multimedia content, quizzes, and gamification.
- ✓ *Customize Learning Experiences:* To increase emotional engagement and enjoyment, educators should make use of technology features that give students choices, adaptive learning pathways, and interest-based content.
- ✓ *Encourage Cognitive Depth:* To optimize cognitive engagement, digital activities should incorporate inquiry-based projects, critical thinking exercises, and problem-solving activities.
- ✓ *Encourage Collaborative Interaction:* Teachers should integrate online forums, group projects, and structured peer discussions into digital lessons to foster meaningful collaboration in order to address the lack of improvement in social engagement.

References

Cao, W. (2023). A meta-analysis of effects of blended learning on performance, attitude, achievement, and engagement across different countries. *Frontiers in Psychology, 14*, Article 1212056. https://doi.org/10.3389/fpsyg.2023.1212056

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59–109. https://doi.org/10.3102/00346543074001059

Mayer, R. E. (2023). The past, present, and future of the cognitive theory of multimedia learning. *Educational Psychology Review*.

Moskovich, S., & Hershkovitz, A. (2024). Teachers' perceptions of student engagement in online learning. *Journal of Online Learning Research*, *10*(2), 255–293.

Organisation for Economic Co-operation and Development (OECD). (2024). *Technology use at school and students' learning outcomes.* OECD Publishing.

Organisation for Economic Co-operation and Development (OECD). (2023). *PISA 2022 results (Volume I): Will students be ready to learn in the digital world?* OECD Publishing.

Timotheou et al., (2023). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. (2022). *Education and Information Technologies, 28*(6), 6695–6726.

UNESCO. (2024). *Digital learning and transformation of education*. UNESCO.