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Technology Integration for Student Engagement And Mastery: A Qualitative Study in Malaysian Secondary Economics Education

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Abstract

This study investigates the integration of digital tools in secondary school economics education, focusing on their impact on student engagement and conceptual mastery. Guided by the need to move beyond traditional teacher-centered approaches, the research examines how Malaysian economics teachers employ technology, the challenges they encounter, and the support mechanisms required for effective implementation. A qualitative methodology was employed, involving semi-structured interviews, document analysis, and classroom observations with six experienced economics teachers across four government schools. Thematic analysis revealed five major themes: technology as a catalyst for engagement and mastery, barriers to implementation, professional development and pedagogical confidence, leadership and institutional support, and parental involvement. Findings indicate that interactive videos, gamified platforms, and online quizzes significantly enhanced motivation, participation, and self-directed learning, while infrastructural limitations, uneven digital literacy, and inconsistent institutional and parental support hindered integration. The study underscores the importance of continuous professional development, reliable infrastructure, clear policies, and strengthened home–school partnerships. Practical implications highlight the need for a coordinated approach involving teachers, school leaders, policymakers, and parents to ensure sustainable and equitable and sustainable digital integration. By foregrounding subject-specific digital pedagogy, this research contributes to the discourse on educational technology in non-STEM subjects and provides actionable insights for advancing the goals of Malaysia's educational transformation agenda.

Keywords: Economics Education, Technology Integration, Student Engagement, Digital Learning, Qualitative Research

Introduction

Economics education at the secondary school level serves as a vital foundation for developing students' capacity to make informed financial and societal decisions in both academic and real-world contexts ((Kuok et al., 2016; Ministry of Education, 2024). As an elective subject, it introduces essential economic concepts such as opportunity cost, resource allocation, and market equilibrium which are the key principles that underpin financial literacy and responsible citizenship. However, despite the subject's importance, student engagement and conceptual mastery in economics remain persistent challenges in many secondary classrooms.

A significant factor contributing to this issue is the continued dominance of teacher-centered instructional approaches that emphasize rote memorization and passive learning. Such approaches often hinder students' ability to think critically and apply economic theories to authentic situations (Adu & Zondo, 2024; Jackson, 2009; Yin, 2008). In response, educational researchers advocate a shift toward student-centered pedagogies that encourage active participation, problem-solving, and higher-order thinking (Fredricks, 2023; Muhammad Raflee & Halim, 2021). Within economics education, meaningful engagement requires not only cognitive activation but also innovative teaching strategies that connect abstract theories with students' lived experiences (Hasniati et al., 2024). Nevertheless, many teachers continue to rely on conventional methods, resulting in low motivation, disengagement, and shallow understanding of economic principles (Jüttler, 2020; Zondo & Adu, 2023).

In recent years, technology integration has emerged as a transformative avenue for improving teaching and learning experiences. Digital tools such as videos, gamified platforms, simulations, and online assessments have been found to enhance student motivation, conceptual understanding, and autonomy (Baiden et al., 2022; Wardoyo et al., 2021). Furthermore, technology supports differentiated instruction and aligns with the demands of 21st-century learning (Madhakomala, 2024; Romli et al., 2023). Despite these benefits, barriers such as inadequate infrastructure, varying levels of digital literacy, and inconsistent institutional or parental support continue to limit effective implementation.

Against this backdrop, the present study investigates the perspectives and practices of experienced Malaysian secondary school economics teachers who actively integrate technology into their teaching. Unlike prior studies that explore technology integration in general education contexts, this research focuses specifically on the subject of economics, an area where digital pedagogical research remains limited. By examining teachers' lived experiences, this study provides novel insights into how technology can be harnessed to promote engagement and conceptual mastery in economics education. The findings contribute to the social science field by offering evidence-based implications for educational policy, teacher professional development, and the design of technology-enhanced pedagogies in subject-specific contexts.

This study is guided by the following research questions:

1. How do secondary school economics teachers integrate digital tools into their teaching practices to support student engagement and conceptual mastery?
2. What challenges do teachers encounter in implementing technology-enhanced teaching strategies in economics classrooms?

3. What forms of institutional, professional, and parental support are necessary to ensure the effective integration of technology in economics education?

Literature Review

Student Engagement and Mastery in Economics Education

Student engagement is widely recognized as a crucial factor in academic success, particularly in subjects like economics that require both abstract reasoning and real world application (Fredricks, 2023). Engagement is often conceptualized through three interrelated dimensions: behavioral, emotional, and cognitive. Together, these influence how students respond to learning tasks and develop higher-order thinking skills (Jetter, 2020; Tikusan, 2024). In Malaysia, economics is offered as an elective subject at the upper secondary level, yet participation and active involvement remain low. This challenge is frequently linked to the continued dominance of teacher-centered instruction, which prioritizes rote memorization and passive knowledge transmission (Yin, 2008). Such practices restrict students' ability to analyze, evaluate, and apply concepts such as opportunity cost, elasticity, and resource allocation to real-world contexts (Retnam & Abdul Razak, 2024). To achieve mastery in economics, students must go beyond surface learning and be cognitively engaged in problem-solving, decision-making, and critical application of theories. Research indicates that meaningful engagement in economics requires not only cognitive activation but also pedagogical strategies that emphasize relevance, interactivity, and connection to real-life scenarios (Hasniati et al., 2024; Mizzi, 2021).

Integrating Technology in Economics Instruction

The integration of digital tools into education has been widely associated with improvements in motivation, participation, and learning outcomes across disciplines (Ejimonye et al., 2020; Singh, 2020). In economics classrooms, tools such as interactive videos, gamified platforms, online quizzes, and simulations help students visualize abstract theories and engage more actively with challenging content (Baiden et al., 2022; Wardoyo et al., 2021). For example, Yin et al. (2019) found that music videos and visual media help students connect economic theories with familiar real-world situations, while flipped classroom approaches have been shown to increase readiness and foster deeper classroom discussions (Ibrahim et al., 2021). Beyond enhancing motivation, technology also supports differentiated instruction and self-paced learning, which align with the principles of 21st-century education (Foo, 2021; Romli et al., 2023; Hisham et al., 2023). Students are able to revisit materials independently, promoting autonomy and reinforcing long-term retention.

However, much of the research in this area has been conducted in general education or STEM-related fields, with economics education often overlooked. This lack of subject-specific focus limits understanding of how digital tools can be tailored to address the cognitive and pedagogical challenges of economics, where abstract reasoning must be contextualized through real-world applications. This highlights the need for strategies that are not only technologically effective but also pedagogically aligned with economic reasoning and problem-solving.

Barriers to Effective Technology Integration

Despite its potential, the integration of technology in secondary schools is often hindered by systemic and practical barriers. Infrastructure issues such as poor internet connectivity, insufficient devices, and outdated equipment remain common obstacles (Adu & Zondo, 2024; UNESCO, 2023). Teacher-related challenges—such as limited confidence, resistance to change, and inadequate digital skills—also reduce the consistency and quality of implementation (Foo, 2021; Francom, 2020). Zondo and Adu (2023) emphasized that the success of digital teaching strategies is largely dependent on educators' preparedness and technological competence, highlighting the importance of investing in teacher capacity-building initiatives.

Student-level digital literacy further complicates adoption. While some students adapt quickly to new platforms, others require extensive guidance to perform basic tasks, resulting in uneven participation and achievement (Nursaid et al., 2024; Sukardi et al., 2023) These disparities reinforce digital inequalities and place additional pressure on teachers, who must spend more instructional time addressing technical or skill-related issues. Without systemic solutions, such inequalities may undermine the very purpose of technology-enhanced learning.

Teacher Training Leadership and Parental Support

Effective technology integration requires more than tools—it depends on robust ecosystems of support involving teachers, school leadership, and parents. Continuous professional development (CPD) has been shown to strengthen teachers' confidence and competence in using digital tools effectively. Sustained, context-specific, and practice-oriented training is particularly important, as one-off workshops often fail to bring about lasting changes in pedagogy (Ogbonna et al., 2022; Hennessy et al., 2021; Wright et al., 2024).

Leadership support is equally critical. School administrators play a decisive role in providing infrastructure, technical support, and encouragement for innovation (Liu et al., 2022; Pelgrum, 2001). In schools lacking clear digital policies, technology use tends to be fragmented and inconsistent, leaving teachers to manage integration independently (Zhao et al., 2020; Rosen et al., 2023).

Parental involvement further shapes the success of digital learning. Studies have shown that students with parents who actively monitor, encourage, and support digital activities tend to demonstrate stronger engagement and achievement (Epstein et al., 2020; Wang et al., 2023). Conversely, a lack of parental awareness or limited access to technology at home can exacerbate the digital divide, especially in lower-resource communities (Bingimlas, 2021; Smith & Razzak, 2024). Strengthening home–school partnerships and enhancing parents' digital literacy are therefore crucial steps toward equitable and sustainable digital integration.

Summary of Gaps

In summary, while existing research demonstrates the potential of technology to improve engagement and mastery, most studies either generalize findings across disciplines or focus predominantly on STEM education. Economics education, by contrast, poses distinct challenges, as its abstract concepts require visualization and contextual grounding within limited curriculum time. In Malaysia, where economics is taught as an elective subject, these

challenges are compounded by infrastructural inequalities, uneven digital literacy, and inconsistent support from schools and families.

This study seeks to address these gaps by examining the perspectives of experienced secondary school economics teachers in Malaysia who actively integrate technology. By focusing on subject-specific digital pedagogy, the study provides insights that may inform policy, teacher professional development, and classroom practice in economics education.

Methodology

This study employed a qualitative research methodology to explore how technology integration in economics instruction influences student engagement and mastery in Malaysian secondary schools. The qualitative approach was chosen to gain rich, contextual insights into teachers' lived experiences, pedagogical strategies, and challenges when using digital tools. As emphasized by Creswell and Creswell (2018), qualitative inquiry enables the researcher to examine complex social phenomena in natural settings, making it appropriate for educational studies where subjective interpretation and human interaction are central. In addition, Merriam and Tisdell (2016) argue that qualitative design is particularly suitable when the aim is to understand meaning-making processes within authentic teaching contexts.

Research Design

A basic qualitative design was adopted, consistent with the philosophical underpinnings of interpretivism, which seeks to understand phenomena though the meanings participants assign to them (Creswell & Creswell, 2018). This design allowed for a nuanced exploration of economics teachers' pedagogies practices, enabling the researcher to identify how and why specific technology enhanced strategies were employed. The study was guided by three key inquiries: (1) how teachers integrate technology to support student learning, (2) what challenges they face in doing so, and (3) what support mechanisms are essential for success.

Data collection involved semi-structured interviews, lesson plan reviews, and classroom observation notes to ensure triangulation and enhance credibility (Patton, 2015). The interviews were flexible yet focused, allowing for probing based on participants' responses. Document analysis provided additional context to the strategies described by teachers, while observations validated classroom practices.

Participants and Sampling

The study was conducted in four government schools located in Selangor and Negeri Sembilan, two highly urbanized states in Peninsular Malaysia with moderate access to digital infrastructure. These schools were selected due to their active participation in digital pilot programs supported by the Ministry of Education, which enabled access to teachers with prior experience in educational technology integration. Participants consisted of six secondary school economics teachers selected though purposive sampling. Inclusion criteria required that participants (i) have at least five years of experience teaching economics at the secondary school level, (ii) were currently integrating technology into their lessons, and (iii) were employed in government secondary schools. This sampling strategy ensured that participants were experienced educators with relevant insights into classroom realities (Merriam & Tisdell, 2016). Although the sample size was small, data saturation was achieved, meaning that no

new themes emerged after repeated interviews. This strengthens the credibility of the findings.

Data Collection Procedures

Semi-structured interviews were conducted to gather data, using open-ended questions about student participation, technology use, encountered difficulties, and required support systems. Depending on participant convenience, interviews were conducted both face-to-face and online, each lasting 45–60 minutes. With consent, all sessions were audio-recorded and later transcribed verbatim.

The interviews were supplemented by document analysis of lesson plans and anonymized samples of student assignments and assessments that incorporated digital tools. These documents provided concrete evidence of classroom practices and supported validation of interview findings. Classroom observation notes were also used to confirm reported practices.

Prior to data collection, ethical approval was obtained from the Faculty Research Ethics Committee at The National University of Malaysia. Informed consent was obtained from all participants, who were assured of confidentiality and anonymity. Identifying details were removed from transcripts, lesson plans, and student work. The use of multiple data sources enhanced the validity of the findings (Creswell & Creswell, 2018).

Data Analysis

Thematic analysis was applied to identify patterns and themes within the data (Braun & Clarke, 2006). The process followed six steps: (1) familiarizing oneself with the data by repeatedly reading transcripts; (2) generating initial codes using open coding, (3) grouping related codes to search for themes, (4) reviewing and refining themes, (5) defining and naming the themes, and (6) producing the final report, supported with verbatim excerpts. NVivo 15 software was used to manage data and support systematic coding. This software enhanced organization, ensured consistency, and promoted transparency in the analytic process (Saldana, 2021).

Findings and Discussion

The analysis revealed five major themes regarding technology integration in secondary school economics classrooms: (1) Technology as a catalyst for engagement and mastery, (2) Barriers to effective implementation, (3) Professional development and pedagogical confidence, (4) Leadership and institutional support, and (5) Parental involvement and the home environment. These themes are presented below, supported by direct teacher quotes and interpreted in light of existing literature.

Technology as a Catalyst for Student Engagement and Conceptual Mastery

Teachers reported that digital tools transformed classroom dynamics by making abstract economic concepts more accessible and engaging. Interactive videos, gamified platforms, and online quizzes were particularly effective in enhancing motivation, participation, and independent learning.

> *"When I use videos and economic simulations, my students can visualize the concepts better. They are more interested and actively involved in the lesson" (Informant 1)*

This excerpt illustrates the transformative role of digital media in shifting students from passive listeners to active participants. Visual and interactive features help demystify abstract concepts such as elasticity, opportunity cost, and marginal analysis topics often difficult to grasp through traditional lectures alone. These observations are supported by prior research. Vaughan et al. (2020) found that educational videos enhance conceptual understanding by providing vivid representations of economic models. Buchanan et al. (2021) demonstrated that simulations allow learners to experiment with supply and demand scenarios, thereby promoting experiential learning. Similarly, Lee et al. (2024) reported that interactive platforms foster both emotional and behavioral engagement, which are essential for deeper learning. Rahman et al. (2023) and Gomez et al. (2024) further affirmed that the flexibility of digital content supports self-paced learning and encourages students to revisit lessons outside classroom hours, reinforcing retention and comprehension. Several teachers in this study echoed these insights, noting that on-demand access to digital resources facilitated greater autonomy in student learning.

> *"The students enjoy using online quizzes and games. They take part more actively and are willing to explore the content on their own." (Informant 3)*

This reflects a central principle of digital learning: student agency, or the ability to take control of one's own learning path (Greenhow et al., 2022; Johnson et al., 2023). Game-based learning environments such as Wayground (formally Quizizz) and Kahoot were praised for sustaining student interest while providing formative assessment opportunities that teachers could use to adjust instruction. Prior studies by Deterding et al. (2022), Alvarez et al. (2021), and Zhu et al. (2024) further highlight the motivational benefits of gamification. Importantly, these tools do not merely entertain; they also foster self-directed learning strategies, enabling students to explore content at their own pace while remaining actively engaged.

Challenges in Implementing Technology Integration

Despite the benefits, teachers identified several barriers to effective implementation. Infrastructure limitations—particularly unreliable internet access and insufficient devices which disrupted lesson flow and reduced teachers' motivation to plan technology-based lessons.

> *"The internet connection is not stable, and sometimes the devices are not working properly. This makes it difficult to plan lessons that rely on technology." (Informant 2)*

Such challenges are consistent with Sukardi et al. (2023) and Bates (2022), who reported that device shortages and low bandwidth reduce both the frequency and quality of digital learning experiences, particularly in under-resourced schools. These constraints are not merely logistical but exacerbate digital inequality, limiting students' equal access to engaging opportunities.

Another challenge was student-level digital literacy. While some students navigated platforms with ease, others struggled with basic tasks such as accessing portals or submitting assignments.

> *"Some students are not familiar with the platforms we use, so they need extra guidance. It takes time to ensure everyone can take part equally." (Informant 5)*

This reflects a divide not only in access but also in capability. Ally (2019) and Li and Chen argue that students with lower digital literacy are more likely to disengage, which undermines both performance and self-regulated learning. Chai et al. (2020) further note that unequal digital skills amplify existing educational inequities, while Keller et al. (2024) emphasize the need for systemic digital literacy programs within school curricula to address these imbalances proactively. For teachers, this disparity meant additional instructional time, creating stress and slowing lesson progress. Zondo and Adu (2023) also stressed that the success of digital strategies depends heavily on educators' preparedness and competence, which becomes even more critical when student capabilities vary widely.

Teacher Professional Development and Digital Pedagogical Confidence

A recurring theme was the need for continuous professional development (CPD) to build teacher confidence and competence in integrating technology effectively. Participants admitted uncertainty about whether they were using tools appropriately to support learning.

> *"I need more training on how to use these digital tools properly. Sometimes, I feel unsure whether I'm using them effectively to support learning" (Informant 4)*
> *"Although I've used some digital tolls before, I often feel unsure about their effectiveness. More hands-on training would help me use them better." (Informant 6)*

This professional learning gap echoes Avidov Ungar (2020) and Bingimlas (2023), who identified insufficient training as a key barrier that often leads to superficial or sporadic technology use. Teachers also emphasized that CPD should focus not only on technical skills but also on pedagogical design and how to align digital tools with instructional goals. Hennessy et al. (2021) and Wright et al. (2024) argue that effective CPD must integrate pedagogy and practice rather than remain at the level of technical tutorials.

Long-term, collaborative training is essential. Becta (2004) and Liu and Spector (2019) stressed the need for ongoing, school-supported CPD not one-off workshops is more likely to nurture confidence and embed a culture of innovation. Sustained professional learning can therefore build teacher competence and encourage experimentation with technology-enhanced strategies in economics classrooms.

Leadership and Institutional Support in Enabling Technology Use

School leadership and institutional policies were found to significantly shape teachers' ability and motivation to integrate technology. Teachers expressed that access to resources, encouragement from administrators, and structured policies boosted their confidence.

> *"When the school provides the tools and encourages us to use technology, it motivates me to integrate it more confidently into my teaching." (Informant 1)*

This aligns with Hughes et al. (2020) and Liu et al. (2022), who observed that administrative support including infrastructure, professional training, and pedagogical autonomy empowers teachers to adopt innovative practices. Strong leadership ensures that technology use is not just optional but embedded in teaching culture.

Conversely, several teachers noted the absence of formal policies and consistent support, leaving them to manage independently.

> *"There's no clear policy or structured support for technology use in teaching. We must manage on our own most of the time." (Informant 5)*

This reflects Zhao et al. (2020) and Wang et al. (2025), who found that schools lacking coherent digital policies experience fragmented and inconsistent practices. Rosen et al. (2023) further emphasize that institutional support must extend beyond leadership to create a shared vision across the school community.

The findings suggest that successful integration in economics education requires not only teacher competence and resources but also alignment between school digital education policies and subject-specific curriculum needs. When teachers are granted pedagogical autonomy alongside clear guidance, they are better positioned to design contextualized digital activities that promote higher-order thinking and deeper conceptual mastery.

Parental Involvement and the Home Learning Environment
Teachers highlighted that parental support and home environments played a critical role in shaping students' participation and achievement in digital economics learning.

> *"When parents cooperate, students are more likely to complete their online tasks and participate actively." (Informant 3)*

This finding resonates with Epstein et al. (2020) and Liu et al. (2021), who found that active parental monitoring and encouragement reinforce motivation, accountability, and engagement in online learning.

In contrast, the absence of parental guidance—combined with limited access to devices at home—was seen as a major barrier.

> *"Some parents do not understand the importance of using these tools. They don't check their children's online learning activities." (Informant 4)*

This points to a home-based digital divide, shaped by parental awareness and resources. Bingimlas (2021), Smith and Razzak (2024), and Gonzalez et al. (2024) similarly note that parental competence strongly influences student autonomy and motivation. Henderson and Mapp (2022) further argue for strengthening home–school partnerships through parental digital literacy programs, especially in under-resourced communities.

This study extends prior work by showing that parents are not passive background factors but active facilitators or barriers to digital learning. Strengthening parental engagement through targeted initiatives could therefore serve as a strategic lever for inclusive and equitable technology integration in economics education.

Conclusion and Recommendations

This study examined how technology integration in the teaching of secondary-level economics influences student engagement and mastery. The findings revealed that interactive digital tools such as videos, gamified platforms, and online quizzes significantly enhanced students' motivation and comprehension of complex economic concepts. Teachers also emphasized that technology facilitated differentiated instruction and promoted self-directed learning. However, several systemic challenges including limited infrastructure, uneven digital literacy among students, and inconsistent institutional and parental support were found to hinder effective implementation.

In light of these findings, several recommendations are proposed to strengthen technology integration in economics education. First, there is a need for continuous, contextualized professional development to equip teachers with both technical skills and pedagogical strategies. Second, schools must invest in reliable infrastructure, ensuring equitable internet connectivity and updated devices. Third, targeted interventions to close digital literacy gaps should be implemented, with scaffolded programs to develop students' digital competencies. Fourth, school leadership should adopt clear policies and provide structured support systems that encourage sustainable use of digital tools. Lastly, parental engagement programs should be introduced to build digital awareness at home and foster supportive learning environments.

These insights reaffirm that successful digital integration is not dependent on technology alone but on coordinated efforts across infrastructure, pedagogy, policy, and stakeholder collaboration. At the policy level, the findings suggest the need for a national framework that systematically supports subject-specific digital pedagogies in economics, including contextualized training and infrastructure tailored to the cognitive demands of the subject. Such initiatives are critical to aligning digital transformation with the goals of the Malaysian Education Blueprint and to cultivating economically literate citizens equipped with 21st-century skills.

Future research should investigate the long-term impact of digital integration strategies on student outcomes and explore scalable professional development models that address context-specific teaching challenges. This study contributes to the growing body of evidence on how technology can be wisely adapted in the teaching of economics, particularly in addressing the digital divide and reinforcing 21st-century learning.

Practical Implications

The findings of this study provide several practical implications for the implementation of technology in economics education. For teachers, the results underscore the need to integrate gamified platforms, videos, and online assessments strategically to enhance student engagement and conceptual understanding. Schools and policymakers can use these insights to design professional development programs that combine technical training with

pedagogical applications tailored to economics teaching. At the institutional level, investment in reliable infrastructure and clear digital policies is essential to ensure sustainability. Finally, parental involvement should be strengthened through awareness campaigns and digital literacy initiatives that extend learning support beyond the classroom. Collectively, these measures highlight a feasible pathway for translating research insights into practical action at classroom, school, and policy levels.

Limitations

This study has several limitations. First, the small sample size on six economics teachers from selected secondary schools, limits the generalizability of the findings. As a qualitative inquiry, the results reflect context-specific experiences and interpretations that may not fully represent broader educational settings. Second, the reliance on self-reported data through interviews raises the possibility of social desirability bias. Future studies could broaden participation across more diverse geographical and institutional contexts and adopt mixed-methods designs to strengthen robustness and transferability. Longitudinal research would also be valuable in examining the sustained impact of technology integration on student achievement, critical thinking, and higher-order economic reasoning. Such approaches can provide a more comprehensive and valid understanding of the effectiveness of digital pedagogy in economics education. Despite these limitations, this study offers valuable insights into the realities of technology integration in non-STEM subjects, contributing to the development of nuanced, contextually grounded strategies that can be scaled across diverse school settings.

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