



EdTech as a Tool for Promoting Student Autonomy

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ABSTRACT

This study explored the role of educational technology (EdTech) in promoting student autonomy in Acehese schools. As digital tools become increasingly embedded in education, the shift from teacher-centered to student-centered learning has gained urgency. Yet, EdTech is often used merely as a content delivery tool, with limited emphasis on fostering independent learning. This study investigates how students perceive EdTech in supporting their autonomous learning and identifies the specific features and practices that contribute to this process. Data were collected from two senior high schools in Nagan Raya, involving 30 students and 4 English teachers. Through semi-structured interviews, focus group discussions, and classroom observations, the study found that EdTech promotes autonomy through on-demand access to materials, immediate feedback, self-paced learning, and task flexibility. Students viewed EdTech as a learning companion, enabling them to review content, monitor progress, and take initiative in both classroom and out-of-class settings. Teacher practices such as digital goal-setting and reflective activities further enhanced learner independence. The findings align with previous research but add depth by emphasizing the synergistic role of teacher guidance and student voice in leveraging EdTech for autonomy. The study's novelty lies in framing EdTech not just as a platform, but as a partner in developing lifelong, self-regulated learning habits. While the study was contextually limited to two schools, its implications highlight the importance of purposeful EdTech integration in curriculum design. Future research should explore broader and more diverse settings, combining qualitative and quantitative methods to deepen understanding. This study encourages schools to adopt autonomy-supportive technologies and pedagogies to prepare students for an evolving educational landscape.

Keywords: *autonomous learning, educational technology, independent learning, secondary education, student perception*

1. INTRODUCTION

In recent years, educational technology (EdTech) has reshaped the way learning occurs in both formal and informal settings. With the rapid development of digital tools, online learning platforms, and mobile applications, students are no longer entirely dependent on the teacher-centered model of education. Instead, they are gradually shifting toward more autonomous and self-directed learning modes, especially in contexts where access to technology is prevalent (Tyagi et al., 2023). Student autonomy, defined as the capacity to take charge of one's own learning process, is increasingly recognized as a crucial skill for success in the 21st century (Ismail & Yoestara, 2022). However, fostering such autonomy remains a challenge in many educational systems, especially those rooted in traditional pedagogical approaches. This research explores how EdTech functions not just as a delivery mechanism for content, but as a transformational tool that can actively promote student autonomy (Riyanto et al., 2024).

Despite its potential, EdTech is often underutilized or misaligned with pedagogical goals (Syahputri et al., n.d.). Many implementations focus on content delivery rather than empowering students to become independent learners. In contexts where learner-centered pedagogy is not yet fully established, the use of technology tends to replicate passive learning models in digital formats, rather than transforming students into active agents of their own learning (Arumugam, 2025). While some research has highlighted how certain technologies can facilitate self-paced learning, time management, and learner reflection, there remains limited evidence on how EdTech specifically supports the broader and deeper aspects of student autonomy, such as goal-setting, strategy selection, self-monitoring, and self-evaluation (Direktorat Sekolah Menengah Kejuruan Direktorat Jenderal Pendidikan Vokasi Vokasi, 2020).

The problem lies in the gap between the availability of EdTech and its pedagogical use for promoting autonomy. In many classrooms, students use digital platforms and tools daily—whether for submitting assignments, attending online lectures, or accessing learning materials, but these tools are not always intentionally



designed or implemented to enhance independent learning skills. Furthermore, in contexts where students are traditionally more dependent on teacher direction, autonomy is not easily cultivated, and the role of EdTech in this transformation is still underexplored.

This study is motivated by the need to investigate how EdTech can be aligned with pedagogical strategies to foster student autonomy meaningfully. It seeks to understand the specific features, uses, and experiences that contribute to students' autonomous learning behaviors. This is particularly relevant in light of the COVID-19 pandemic, which accelerated the adoption of EdTech worldwide and forced educators and learners alike to engage in new modes of learning (Abdul-Majied et al., 2023). Now, as educational institutions continue to integrate technology into their practices, it is essential to explore how these tools can serve more than just logistical purposes and instead foster meaningful, lasting shifts in learner behavior and mindset (Yulita et al., 2023).

The aim of this study is to explore the role of educational technology in promoting student autonomy in secondary education settings. It focuses on how students interact with EdTech tools, how they perceive their ability to learn independently, and what features or conditions support or hinder the development of autonomy. By doing so, the research intends to offer insights into how technology can be leveraged to move beyond passive consumption toward active, self-regulated learning.

The research gap addressed in this study lies in the limited exploration of student autonomy as an outcome of EdTech integration, especially in non-Western, developing, or high-school learning contexts. Much of the existing literature focuses on higher education or online learning environments in developed countries. Several studies have explored the connection between EdTech and student autonomy. Synekop et al. (2023) found that while students had access to technology, only those with high metacognitive skills used it for independent learning. O'Reilly & Milner (2020) showed that task-based digital tools helped students develop goal-setting and reflective thinking. Barak and Dori (2009) emphasized the role of feedback and self-assessment in promoting autonomy. Mobile apps improved self-directed learning among EFL students (Chau et al., 2021). Similarly, Pellas (2014) revealed that self-regulation and computer self-efficacy were key to student engagement in online learning environments. Unfortunately, there is a lack of qualitative understanding of how high school students, particularly in more traditional or teacher-centered education systems, experience autonomy when using EdTech. Furthermore, many studies examine learning outcomes and technological effectiveness without closely examining the student's internal process of becoming autonomous through the use of such tools.

The novelty of this research lies in its specific focus on autonomy as a transformational outcome of EdTech use rather than merely treating technology as a tool for academic achievement or engagement. It also draws on student voice, exploring how learners themselves perceive their journey toward autonomy when interacting with technology. The study incorporates a case-based, qualitative approach, allowing for a more nuanced understanding of students' lived experiences, strategies, and attitudes toward self-directed learning with digital tools. By framing EdTech as a partner in autonomy rather than just a platform, this research introduces a conceptual shift in how technology's role in education is understood and evaluated.

This research is guided by the following two questions:

1. How do students perceive the role of EdTech in supporting their independent learning processes?
2. What features or practices of EdTech contribute to the development of student autonomy in classroom and out-of-class learning contexts?

By answering these questions, the study seeks to contribute to both theory and practice: providing empirical evidence for educators and developers looking to design and implement EdTech that empowers learners, while also offering theoretical insights into the pedagogical mechanisms by which autonomy can be cultivated in digital environments. In doing so, it supports the broader vision of education as a means of preparing students not just to pass exams, but to become life-long, self-regulated learners in an ever-changing world.



2. METHODS

This study employed a qualitative case study design to explore how educational technology (EdTech) supports the development of student autonomy in secondary education. A qualitative approach was chosen to allow an in-depth understanding of students' and teachers' experiences, perceptions, and practices regarding the use of EdTech in promoting independent learning behaviors.

2.1. Research Setting and Participants

The research was conducted in two senior high schools in Nagan Raya, Indonesia (SMAN 1 Seunagan and SMAN 1 Kuala) which had integrated digital learning platforms and tools into their regular instruction. The schools were selected purposively based on their active use of EdTech (such as Google Classroom, learning apps, or LMS platforms) and willingness to participate in the study. A total of 30 students and 4 English teachers were involved. The student participants were in Grade 11, aged between 16 and 17, and had been exposed to technology-assisted learning for at least one academic year. All participants provided informed consent prior to data collection.

2.2. Research Instruments

Three primary instruments were used:

1. Semi-structured interviews with teachers to explore their strategies, perceptions, and challenges in using EdTech to support student autonomy.
2. Focus Group Discussions (FGDs) with students to gather their insights into how EdTech influenced their learning habits, goal-setting, and decision-making.
3. Classroom observations, both in physical and online settings, to document real-time interactions with EdTech and how autonomy was encouraged or hindered in practice.

Interview and FGD guides were developed based on themes from existing literature on learner autonomy, including goal-setting, self-monitoring, self-evaluation, and independent task management.

2.3. Data Collection Technique

Data collection was conducted over a four-week period. Each teacher was interviewed for approximately 45–60 minutes, while each student FGD lasted about 60–75 minutes and involved 5–6 students per group. All sessions were audio-recorded with permission and later transcribed for analysis. Classroom observations were conducted during both synchronous (live) and asynchronous learning activities, focusing on student interaction with technology, decision-making behavior, and teacher facilitation methods.

2.4. Data Analysis

Data were analyzed using thematic analysis following Braun and Clarke's (2006) six-step procedure. Initial coding was conducted manually by reading the transcripts multiple times, identifying patterns and categorizing them into themes related to student autonomy (e.g., independent task initiation, self-reflection, digital resource management). Triangulation was applied by comparing data from interviews, FGDs, and observations to enhance credibility and trustworthiness. Member checking was also conducted by returning preliminary interpretations to participants for validation. This methodological approach aimed to generate rich, contextualized insights into how EdTech contributes to the development of student autonomy, while also acknowledging the social and pedagogical dynamics that influence technology use in classroom environments.



3. RESULTS & DISCUSSION

3.1. Results

3.1.1 *Students' Perceptions of Edtech in Supporting Their Independent Learning*

Analysis of interview transcripts, focus group discussions (FGDs), and classroom observations revealed three major themes regarding students' perceptions of EdTech in supporting their independent learning: access to flexible learning resources, encouragement of self-paced learning, and support for self-monitoring and motivation.

First, students consistently described EdTech as a gateway to a wide range of learning materials that they could access anytime and anywhere. During FGDs, participants emphasized the usefulness of digital platforms such as Google Classroom, YouTube, and educational apps for reviewing lessons at their own pace. One student noted, *"When I don't understand something in class, I can watch videos again at home or search Google. It helps me catch up by myself."* This sentiment was echoed in classroom observations, where students were often seen revisiting digital materials on their phones or laptops after tasks were assigned. Teachers also confirmed that the use of EdTech allowed students to engage in follow-up learning beyond classroom time, thereby supporting their autonomy.

Another common theme was the perception that EdTech allowed for learning at one's own pace. Several students appreciated not being rushed by others' progress or limited by classroom schedules. In one FGD, a student shared, *"Sometimes I need more time to understand grammar, but in class the teacher must move fast. With apps, I can learn slowly and repeat things."* Interview data with teachers supported this finding, highlighting that many students showed increased confidence when allowed to revisit digital tasks independently. Observations further revealed that in asynchronous learning sessions, students actively managed their own study time, sometimes pausing or replaying video lessons to suit their needs. This behavior reflects early signs of self-regulation and initiative.

The third fact that emerged was the role of EdTech in helping students monitor their own progress and stay motivated. Several students mentioned that quizzes and progress trackers in apps such as Duolingo or Quizizz provided immediate feedback, which helped them identify their weaknesses and improve independently. One participant explained, *"I like that the app gives me scores. If I fail, I try again until I pass. It's like a game."* This gamified experience seemed to encourage persistence and responsibility for one's learning. Teachers observed that students who engaged with such apps tended to ask more targeted questions in class, suggesting greater self-awareness in their learning process.

Moreover, classroom observations showed students referring to their digital notes, checking assignment progress, or setting reminders using their devices—behaviors associated with autonomy. In interviews, teachers reported that while not all students were equally proactive, those who used EdTech effectively tended to be more independent in completing assignments and preparing for assessments.

3.1.2 *Features and Practices of EdTech That Foster Student Autonomy in Classroom and Out-of-Class Learning*

The data from interviews, focus group discussions (FGDs), and classroom observations revealed that specific features and practices within EdTech environments played a significant role in fostering student autonomy both in classroom and out-of-class learning contexts. One of the most prominent features identified by students was on-demand access to learning content, including recorded lessons, digital reading materials, and instructional videos. This feature allowed students to review materials multiple times according to their individual pace and needs, which encouraged self-initiated learning and minimized dependence on teacher explanations. Students described this as empowering, especially when they felt shy to ask questions in class. Teachers also observed that students who regularly revisited digital content demonstrated greater confidence and performed better on independent tasks.

Another key feature noted by students was the presence of immediate feedback mechanisms, such as auto-graded quizzes, progress bars, or personalized notifications embedded in learning applications like Google



Forms, Quizizz, or Duolingo . These features enabled students to monitor their understanding, identify areas of improvement, and take corrective actions independently. In FGDs, students often referred to these digital interactions as “reminders” or “personal guides,” showing that they viewed the system not just as a tool but as a learning partner. This was reinforced by classroom observations, where students frequently checked their scores immediately after tasks and made revisions without being prompted by the teacher.

Moreover, the flexibility of EdTech platforms—in terms of time, location, and device accessibility—was frequently highlighted by both students and teachers as crucial in promoting out-of-class autonomy. Students could study while commuting, late at night, or during free periods at school. They were no longer confined to the boundaries of scheduled class hours or physical textbooks. This flexibility encouraged them to take responsibility for their own study routines, especially when preparing for exams or catching up after absences. Teachers supported this by designing learning tasks that required online submissions or reflections, creating a culture of self-accountability.

In addition to features, certain practices encouraged by teachers also played a critical role. Teachers who gave students the option to choose their topics for projects, or who used EdTech tools to set personalized goals, helped foster a sense of ownership over the learning process. One teacher shared in an interview that she intentionally used Padlet and Google Docs not only for collaboration but also for students to track their weekly learning goals and progress. Students confirmed that such practices helped them become more aware of their learning direction and gave them a sense of control. These structured, tech-supported practices bridged the gap between teacher guidance and learner independence.

In summary, the combination of accessible content, real-time feedback, flexible learning environments, and teacher-driven practices of goal-setting and student choice formed a powerful ecosystem that supported the development of student autonomy. Rather than acting in isolation, these EdTech features and pedagogical strategies interacted synergistically to encourage learners to take initiative, reflect on their progress, and manage their own learning journey both inside and outside the classroom.

3.3 Discussion

The findings of this study align with previous research emphasizing the role of EdTech in supporting independent learning. Like Silva et al. (2023), this study confirms that students use technology to revisit materials and manage their learning pace, a key aspect of autonomy. The use of real-time feedback tools, as observed by Al, was also evident here, with students relying on auto-graded quizzes and progress trackers to guide their self-improvement (Febrianti et al., 2025). Compared to Mercado (2024), emphasized on task-based learning, this study highlights the additional impact of teacher practices—such as goal-setting and digital reflection—in enhancing autonomy. In the present context, where hybrid and digital learning are becoming the norm, EdTech’s role is increasingly vital in promoting lifelong learning habits. Moving forward, educational institutions must integrate autonomy-supportive tools and teacher training to ensure technology use genuinely empowers learners, not just delivers content. This shift is essential for building self-driven, future-ready students.

4. CONCLUSION

This study concludes that EdTech plays a significant role in promoting student autonomy through accessible content, immediate feedback, flexible learning, and supportive teacher practices. Students perceived digital tools as enablers of independent learning, both inside and outside the classroom. However, the study was limited to a small number of participants in two schools, which may not reflect broader contexts. Future research should explore diverse settings and integrate quantitative data. It is recommended that educators design tech-integrated tasks that promote self-regulation and goal-setting, while schools provide continuous support and training to maximize the autonomy-enhancing potential of educational technology.



Declaration on AI use

Artificial intelligence (AI), specifically Perplexity AI, was partly used for the purposes of brainstorming ideas and refining word choice during the preparation of this manuscript. The writing, analysis, interpretation, and organization of all content were conducted entirely by the authors. The authors retain full responsibility for the originality, accuracy, and scholarly integrity of the work.

REFERENCES

- Abdul-Majied, S., Kinkead-Clark, Z., & Burns, S. C. (2023). Understanding Caribbean Early Childhood Teachers' Professional Experiences During the COVID-19 School Disruption. *Early Childhood Education Journal*, 51(3), 431–441. <https://doi.org/10.1007/s10643-022-01320-7>
- Arumugam, S. (2025). Deep Learning-Based Smart Invigilation System for Enhanced Exam Integrity. *Proceedings of Engineering and Technology Innovation*, 29, 99–115. <https://doi.org/10.46604/peti.2024.14105>
- Chau, K. Y., Law, K. M. Y., & Tang, Y. M. (2021). Impact of Self-Directed Learning and Educational Technology Readiness on Synchronous E-Learning. *Journal of Organizational and End User Computing*, 33(6), 1–20. <https://doi.org/10.4018/JOEUC.20211101.0a26>
- Direktorat Sekolah Menengah Kejuruan Direktorat Jenderal Pendidikan Vokasi Vokasi. (2020). *Pengaplikasian Pola Multi Entry-Multi Exit (MEME) Guna Mendukung Konsep Merdeka Belajar di SMK*. Direktorat Sekolah Menengah Kejuruan Direktorat Jenderal Pendidikan Vokasi Vokasi.
- Febrianti, C., Tari, K. J., Ariska, Y., & Lestari, R. (2025). The Use of Artificial Intelligence in Personalizing Learning Experiences at Schools. *International Journal of Education*, 4(1), 1–16.
- Ismail, N., & Yoestara, M. (2022). *Learning Environment in Speaking Classes*. USK Press.
- Mercado, J. (2024). Self-Directed Learning in STEM Teaching and Learning: A Systematic Review of Empirical Evidence. *Sciencetechno: Journal of Science and Technology*, 3(1), 53–84. <https://doi.org/10.55849/sciencetechno.v3i1.739>
- O'Reilly, S., & Milner, J. (2020). Impact of technology-based reflective practice tools on student skill development. *International Journal of Technology and Human Interaction*, 16(1), 77–93. <https://doi.org/10.4018/IJTHI.2020010106>
- Pellas, N. (2014). The influence of computer self-efficacy, metacognitive self-regulation and self-esteem on student engagement in online learning programs: Evidence from the virtual world of Second Life. *Computers in Human Behavior*, 35(March 2014), 157–170. <https://doi.org/10.1016/j.chb.2014.02.048>
- Riyanto, R., Ferdhianzah, H. J., & Trilaksono, H. (2024). Culture-Based Education Innovation for Children's Character Building in the Context of Educational Tourism Destinations. *AL-ISHLAH: Jurnal Pendidikan*, 16(2), 2134–2147. <https://doi.org/10.35445/alishlah.v16i2.4861>
- Silva, G., Godwin, G., & Jayanagara, O. (2023). The impact of AI on personalized learning. *Journal of Learning Sciences. International Transactions on Education Technology (ITEE)*, 3(1), 36–46.
- Syahputri, V., Ismail, N., Kismullah, K., & Darsan, H. (n.d.). *Mobile Learning for English Language Learners at Senior High Schools*. Pusat Pengembangan Pendidikan Dan Penelitian Indonesia (P4I).
- Synekop, O., Lavrysh, Y., Lukianenko, V., Ogienko, O., Lytovchenko, I., Stavvytska, I., Halatsyn, K., & Vadaska, S. (2023). Development of Students' Metacognitive Skills by Means of Educational Technologies in ESP Instruction at University. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 14(2), 128–142. <https://doi.org/10.18662/brain/14.2/448>
- Tyagi, P., Singh, A. K., Tyagi, P., Chanchal, H., Gautam, P., & Nibhoria, S. (2023). Human-Centred Artificial Intelligence in Education, Present and Future Opportunities. *2023 3rd International Conference on Advance*



Computing and Innovative Technologies in Engineering, ICACITE 2023, July, 2742–2746.
<https://doi.org/10.1109/ICACITE57410.2023.10182545>

Yulita, I. N., Hariz, F. A., Suryana, I., & Prabuwno, A. S. (2023). Educational Innovation Faced with COVID-19: Deep Learning for Online Exam Cheating Detection. *Education Sciences, 13*(2), 1–15.
<https://doi.org/10.3390/educsci1302019>