

TEACHERS' PERCEPTIONS OF DIGITAL PEDAGOGICAL PRACTICESFROM: EXAMINING ENGLISH TEACHERS' DIGITAL PEDAGOGICAL COMPETENCE IN SENIOR HIGH SCHOOLS

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Abstract

Integrating digital technology into student-centered English language instruction enhances the learning process and student engagement. This study aims to analyze the perceptions and competencies of secondary school English teachers regarding the implementation of digital pedagogy, as well as the impact on instructional practices in Aceh Province. The study utilizes qualitative data obtained through interviews with five English teachers who have experience using digital tools in classroom instruction; these informants participated voluntarily. Data analysis was conducted using the Miles and Huberman method. The results indicate that while teachers view digital pedagogy as beneficial for learning, their basic digital skills remain limited. Teacher perceptions and competencies significantly influence digital pedagogy practices, with competence exerting a greater impact. Qualitative findings reveal issues such as anxiety, skill gaps, and infrastructure barriers—specifically limited access to electricity, the internet, and devices. Consequently, there is a need for professional development and adequate infrastructure support.

Keywords: English teacher, teacher competencies, teacher perceptions, technology integration

1. INTRODUCTION

Education systems have undergone a rapid technological transformation, particularly regarding classroom instruction. There has been a shift away from the traditional methods frequently employed by teachers toward student-centered approaches. This shift is driven by the fact that student-centered approaches foster inquiry, critical thinking, and active learning (Mat & Jamaludin, 2024). This global trend is fueled by the demand for 21st-century competencies, leading to the adoption of technology-supported strategies—such as digital simulations, online collaboration, and interactive learning platforms—in school-based education (Martín-Alguacil & Avedillo, 2024).

Technological support in this context reshapes school-based learning—including teaching and assessment methods driving broader educational reform toward digital learning and the development of 21st-century skills among students. In modern educational reform, digital technology has become a crucial element of learning interactions. Digital pedagogical practices offer opportunities to make learning more accessible, inclusive, and personalized, thereby meeting the diverse needs of learners (Suprihatiningrum & Syaripudin, 2026). However, digital education entails more than just the use of technology; it involves the development of digital literacy, collaboration, and adaptive thinking. By integrating student-centered learning strategies and digital pedagogy with a focus on the learning process, digital education yields profound benefits for learners ranging from increased engagement and motivation to the development of higher-order thinking skills (Álvarez Ariza & Hernández, 2026; Arifani et al., 2026).

In English language learning, digital tools have redefined how complex ideas are taught and understood. Interactive simulations and data analysis software enable students to experiment with and observe phenomena that might otherwise be inaccessible. These active learning experiences help students think and act like scientists. Furthermore, AI-driven

platforms personalize instruction and support problem-solving skills, extending opportunities to resource-constrained contexts. In this way, digital pedagogy transforms students from passive recipients of information into active participants in the learning process. However, the availability of advanced technology in schools does not automatically translate into effective classroom integration. Successful implementation depends not only on digital infrastructure but also on how educators intentionally use digital tools to enhance learning. Teachers remain central to this process as they interpret policies, design instruction, and guide student experiences.

A more substantial impact emerges when teachers are actively involved in the implementation process, have opportunities to develop self-efficacy, and receive support that enables them to translate instructional designs or initiatives into classroom practice (Compen et al., 2021; Li et al., 2026). In a randomized controlled trial involving 45 teachers and 30 secondary schools, Compen et al. (2021) demonstrated that teacher participation in webinar-based professional development contributed to increased self-efficacy and improved student learning outcomes. Therefore, English teachers' perceptions regarding digital pedagogy are crucial.

Their beliefs regarding the utility of technology, confidence in using it, and sense of self-efficacy significantly influence classroom practices. Beyond adaptation and implementation, sustained integration requires robust digital competence. This competence extends beyond basic technical knowledge to include an understanding of how digital tools can support pedagogical goals and subject-specific content. The Technological Pedagogical Content Knowledge (TPACK) framework remains a key guide for balancing these dimensions to create meaningful digital learning experiences. Perceptions and competence are closely intertwined; as teachers build their digital understanding and confidence, their attitudes toward technology tend to improve. Similarly, a strong belief in the educational value of digital tools can motivate them to develop more advanced skills and pedagogical approaches.

However, while many developed nations are developing sophisticated digital learning systems, developing countries continue to face serious challenges. Limited internet connectivity, unreliable electricity, and power supply shortages act as obstacles. Technological limitations—such as high device costs, designs ill-suited to user needs, suboptimal performance, or a reliance on inadequate supporting infrastructure pose significant barriers to technology integration (Matter et al., 2017; Orellano-Colón et al., 2022). Recognizing these challenges has formulated ambitious national policies to harness the transformative potential of digital education, including strategies.

The role of technology in enhancing the quality, equity, and relevance of education. English education is a key component of this framework, reflecting the field's importance to national innovation and sustainable development. These policy initiatives also provide guidance on infrastructure expansion, digital training for teachers, and resource allocation; however, the success of these plans hinges on their implementation at the school level. Despite such policy commitments, a gap remains between national aspirations and classroom realities. Many secondary schools, particularly in rural areas, continue to face issues such as unstable electricity supplies, limited internet access, and a shortage of digital devices. These infrastructure and access barriers constrain the consistent application of digital pedagogy.

Furthermore, although policy documents encourage professional development, evidence indicates that many science teachers still lack digital skills and confidence particularly regarding the integration of technology with pedagogy and subject matter mastery. A gap also exists between current instructional practices and ideal standards for digital teaching; this includes uncertainty surrounding teachers' perceptions and adoption of digital pedagogies, as well as a lack of evidence regarding their ability to effectively utilize digital tools to enhance learning outcomes.

Previous studies have largely focused on ICT infrastructure and access, with limited exploration of teachers' perceptions and competencies regarding digital pedagogy. Few studies have examined how these dimensions interact to influence actual teaching practices. To address this gap, this study investigates the perceptions, competencies, and digital pedagogical practices of secondary school science teachers in Pidie Regency. The study aims to provide empirical insights that can inform policies, teacher professional development programs, and strategies for fostering effective technology integration in English language instruction..

2. METHOD

The aim of this study is to conduct a comprehensive empirical investigation into the perceptions and competencies of secondary school science teachers regarding digital pedagogical practices. To achieve this, the study is grounded in a pragmatic paradigm, which prioritizes research problems and values the use of diverse methods to generate practical, actionable knowledge.

This philosophy is particularly well-suited for exploring the complex, real-world intersection of teachers' beliefs, skills, and classroom practices. The study was conducted in Pidie Regency, Aceh. English language teachers were the primary focus, as they serve as frontline implementers of digital pedagogy within the discipline of interest. A secondary qualitative group comprised five English teachers, selected due to their strategic oversight of the educational environments in which these teachers operate.\

A purposive sampling procedure was employed to select five information-rich English teachers—chosen based on their teaching and administrative experience, leadership roles in English education, and involvement in digital initiatives—to ensure they could provide deep, contextual insights into digital pedagogical practices. A pilot study was conducted with five non-participating English teachers to assess the clarity, relevance, and potential ambiguity of the items; feedback from this pilot phase was used to refine the instrument. Qualitative interview data were analyzed thematically using a hybrid approach: deductive categories based on the research framework and inductive themes emerging from participants' responses. Findings from both methods were integrated during the interpretation stage to provide a more profound understanding. All ethical protocols, including informed consent and data confidentiality, were strictly adhered to.

3. RESULTS AND DISCUSSION

This study involved five school English teachers as qualitative informants. Quantitative data were used to describe the teachers' perceptions, competencies, and digital pedagogy practices, while qualitative data were analyzed thematically to provide a deeper explanation of the quantitative findings. Overall, the study indicates that science teachers hold positive perceptions of digital pedagogy, yet their levels of efficacy, technological competence, and actual application in teaching practices remain limited.

Teachers' Perceptions of Digital Pedagogical Practices

Research findings indicate that science teachers hold positive attitudes and perceptions regarding digital pedagogy and view digital technology as beneficial to the learning process. However, this positive outlook is not fully matched by high levels of self-efficacy or digital pedagogical practice. Analysis reveals that while perceptions exert a positive and significant influence on practice, this influence is moderate. This suggests that a belief in the benefits of technology does not automatically translate into the confidence and ability to implement it in instruction.

These findings demonstrate that positive perceptions alone are insufficient to drive the effective implementation of digital pedagogy. Teachers also require practical experience and skills to transform their beliefs about technology's benefits into concrete actions. Interviews

reveal that teachers often hesitate to use digital methods due to a fear of making mistakes or encountering technical issues in front of students. Research shows that while teachers frequently hold positive beliefs regarding the benefits of technology, these beliefs do not always translate into actual technology use in instructional practice (Akram et al., 2022; Alghasab, 2026; Ertmer & Ottenbreit-Leftwich, 2012). Consequently, a "belief-practice gap" exists—a disparity between teachers' beliefs about the benefits of technology and the extent to which technology is actually integrated into the learning process. This gap can arise when teachers lack practical experience, techno-pedagogical skills, opportunities for experimentation, and the institutional support necessary for meaningful technology integration (Abedi et al., 2023; Pathiranage & Karunaratne, 2023). Therefore, awareness of technology's benefits is a necessary but insufficient condition; effective technology integration requires teachers to translate those beliefs into pedagogical decisions, instructional designs, and concrete classroom practices. Thus, sustained practical training is essential to alleviate anxiety and boost teacher confidence.

These findings indicate that perceptions regarding the usefulness and ease of use of technology can drive technology acceptance. The teachers' positive perceptions in this study align with previous research showing that teachers value the benefits of digital devices. However, low self-efficacy suggests that accepting technology does not necessarily mean teachers possess the adequate skills to use it..

Teacher Competence in Digital Pedagogy

Interview results further clarify these findings. School leaders noted that while teachers may be highly enthusiastic about virtual laboratories, they are not necessarily capable of setting up the necessary tools or aligning them with the curriculum. Consequently, limited competence can serve as a direct barrier to the implementation of technology in instruction.

In addition to teacher competence, infrastructure plays a crucial role. Limitations regarding electricity and internet connectivity, as well as malfunctioning computer equipment, can hinder technology implementation even when teachers are motivated to use it.

These findings indicate that enhancing teacher competence must go hand-in-hand with improving the quality of the supporting environment. Training should not merely impart knowledge about technology; it must provide practical experience in using the technology, integrating it into the curriculum, and applying it within actual instructional activities. The study's results are supported by Mekheimer (2025), who posits that hands-on experience is a key component of effective technology integration training—not merely an optional add-on. Furthermore, training that focuses solely on isolated technical skills tends to be insufficient for transforming instructional practices (Lubuva, Ndibalema, & Mbwambo, 2024).

Teacher Perceptions and Competence

Research findings indicate that continuous training not only helps alleviate teacher anxiety but also enhances self-efficacy and competence. When teachers gain hands-on experience using technology and successfully resolve emerging issues, this experience improves their skills while simultaneously boosting their confidence. This aligns with research by Joshi & Woodward (2026), Olurinola & Olugbade (2024), and Siyam et al. (2025), which found that opportunities for hands-on practice with technology in real-world instructional contexts tend to lead to improvements in technological competence, self-efficacy, and confidence regarding technology integration. A crucial mechanism in this process is "mastery experiences"—successful experiences in performing tasks, retrying technology-based strategies, and reflecting on instructional practices. Such experiences reinforce teachers' belief in their ability to use technology effectively in instruction (Barton & Dexter, 2020; Gomez et al., 2022; Joshi & Woodward, 2026). These findings demonstrate that developing teachers'

digital competence requires more than just conceptual understanding or theory-based training; it must be supported by authentic practice, successful experiences, reflection, and ongoing professional support.

The reciprocal relationship among perception, competence, and practice aligns with Bandura's Social Cognitive Theory, specifically the concept of reciprocal determinism. This theory posits that personal factors, behavior, and the environment mutually influence one another. In the context of this study, positive perceptions can encourage teachers to enhance their digital skills. Subsequently, improved skills and practical experience can strengthen self-efficacy and foster increasingly positive perceptions of technology.

Thus, the relationship between perception and competence is not unidirectional. Teachers with positive perceptions tend to be motivated to develop their digital capabilities, while increased competence can reinforce self-confidence and positive views regarding technology. Ultimately, this cycle can drive improvements in digital pedagogical practices.

The Role of School Culture, Leadership, and Infrastructure

Research findings indicate that the implementation of digital pedagogy depends not only on individual teacher characteristics but is also influenced by the school environment. Interview results show that school culture and leadership support are crucial factors in encouraging teachers to utilize technology. Support from leadership can foster a sense of security, allowing teachers to experiment with new instructional methods and navigate potential errors associated with technology use. Several studies demonstrate that a principal's transformational leadership plays a significant role in supporting technology integration by enhancing school digital infrastructure and fostering teachers' positive beliefs regarding technology, as well as their technical skills and pedagogical competence in using technology for instruction (Schmitz et al., 2023). A study involving 2,247 secondary education teachers revealed that transformational leadership by principals positively influences various factors supporting technology integration, particularly teachers' confidence and skills in the pedagogical application of technology. This leadership also operates through indirect mechanisms by cultivating a school climate conducive to technology integration; although the leadership influence may be distal, it remains significant through the fostering of trust, support structures, and teacher self-efficacy (Kaya Kaşıkçı et al., 2023). Conversely, when administrative support is weak, teachers tend to adhere to familiar instructional practices and lack the motivation to adopt technology in more innovative ways (Peled & Perzon, 2022).

These findings broaden the understanding that barriers to digital pedagogy are multidimensional. Teachers' positive attitudes and competencies require support through adequate infrastructure, leadership backing, a positive school culture, and professional development opportunities tailored to their needs. This explains why teachers may hold positive perceptions while their actual digital pedagogical practices remain limited.

Overall, the research results indicate that positive perceptions serve as a starting point for the acceptance of digital pedagogy, whereas competence is the more decisive factor in its actual implementation. Teachers may acknowledge the benefits of digital technology, but without adequate knowledge, skills, and self-efficacy, such perceptions do not necessarily translate into effective digital teaching practices.

The gap between perception and practice is also influenced by external factors, particularly infrastructure limitations, access to devices and the internet, leadership support, and school culture. Adequate digital infrastructure is a fundamental prerequisite for integrating technology into instruction. The availability of devices, stable internet connectivity, digital resources, and technical support plays a crucial role in enabling teachers to effectively integrate technology into their teaching practices (Akram et al., 2022; Timotheou et al., 2023; Kebede et al., 2025).

However, the mere availability of infrastructure does not automatically result in optimal technology utilization. A study in Luxembourg demonstrated that even when schools possess a relatively high level of technological resources, ICT usage in classroom practice remains limited if infrastructure investment is not accompanied by a pedagogical vision, teacher competence, and school leadership that support technology integration (Lomos et al., 2023). Consequently, limitations regarding hardware, software, and digital resources can hinder teachers' opportunities to integrate technology into the curriculum; meanwhile, effective access must be understood not merely as the presence of devices, but also in terms of availability, sufficient quantity, suitability, accessibility, and support for technology use among teachers and students (Timotheou et al., 2023). Therefore, enhancing the implementation of digital pedagogy requires a systematic approach that extends beyond a focus on the teacher as an individual..

The primary implication of this study is the need for practical and sustainable professional development programs. Training must assist teachers in developing both technical skills and the pedagogical ability to integrate technology into the curriculum. Simultaneously, schools need to foster a supportive environment through positive leadership, technical support, and well-functioning infrastructure and equipment. Such an approach can help narrow the gap between teachers' positive perceptions and actual digital pedagogical practices in the classroom.

4. CONCLUSIONS AND RECOMMENDATIONS

Research findings indicate that secondary school English teachers generally hold positive perceptions of digital pedagogy, yet its implementation in instruction faces various challenges. Limited self-efficacy, alongside gaps in technological and pedagogical competence, are factors preventing these positive perceptions from fully translating into classroom practice. Perceptions and competence are closely linked; positive perceptions can drive skill development, while increased competence can boost teachers' confidence in using digital technology. The implementation of digital pedagogy is influenced not only by teachers' internal factors but also by the school environment. Limited electricity supply, internet access, device availability, and institutional support serve as significant barriers to adopting digital technology. Furthermore, teacher anxiety regarding technology use and a lack of sustained, practical training exacerbate the gap between perception and practice.

Based on these findings, the government and policymakers need to strengthen digital education infrastructure, specifically regarding the availability of electricity, internet access, and adequate devices. Schools and school leaders must also foster a culture that supports digital innovation through mentoring, technical support, and an environment that encourages teachers to integrate technology into their instruction. Teacher professional development programs should be practical, sustained, and tailored to the specific needs and conditions of the schools. Training should focus not merely on introducing technology but also on its application within the curriculum and science instruction. Approaches such as mentoring, coaching, and Professional Learning Communities can be employed to enhance both teacher competence and self-efficacy.

Future research should utilize a longitudinal design to observe changes in teachers' perceptions, competence, and practices over time. Comparative studies across different regions are also necessary to improve the generalizability of the findings. Additionally, future research could further examine the effectiveness of professional development programs and the relationship between teachers' digital pedagogy competence and student learning outcomes in technology-based science instruction.

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