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DIGITAL PEDAGOGICAL INNOVATION IN TEACHING ASSISTANCE: A COMPARATIVE STUDY IN INDONESIA AND MALAYSIA

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Abstrak
Penelitian ini mengeksplorasi inovasi pedagogis digital dalam program asistensi mengajar di Indonesia dan Malaysia menggunakan pendekatan kualitatif berbasis kelas dengan desain multiple case study. Tujuan penelitian adalah menganalisis praktik penggunaan media digital dalam pembelajaran, respons dan keterlibatan siswa, serta dinamika pembelajaran yang terjadi. Penelitian dilakukan di dua sekolah menengah pertama swasta di Jawa Timur, Indonesia dan Pahang, Malaysia. Data dikumpulkan melalui wawancara semi-terstruktur, catatan lapangan, dan refleksi pengajaran, kemudian dianalisis menggunakan analisis tematik Braun dan Clarke. Temuan penelitian mengidentifikasi tiga isu utama dalam implementasi inovasi pedagogis digital di kedua konteks, meskipun terdapat variasi dalam partisipasi siswa. Tantangan yang dihadapi meliputi keterbatasan teknis seperti koneksi internet, perbedaan literasi digital siswa, dan keterbatasan waktu. Penelitian ini menyimpulkan bahwa efektivitas inovasi pedagogis digital memerlukan perencanaan pedagogis yang matang, dukungan dukungan sosial dan scaffolding dari asisten pengajaran sebagai mediator pembelajaran, serta pertimbangan terhadap keterbatasan teknis dan kesiapan siswa.

Kata Kunci: Inovasi Pedagogi digital; Program Asistensi Mengajar; Studi Komparatif; TPACK; Keterlibatan Siswa

Abstract
This study aims to analyse the use of digital media in classroom learning, students' responses and engagement, as well as the learning dynamics in both contexts. This research explores digital pedagogical innovations in teaching assistant programs in Indonesia and Malaysia using a classroom-based qualitative multiple case study design. The research was conducted in two private junior high schools in East Java, Indonesia, and Pahang, Malaysia. Data were collected through semi-structured interviews, field notes, and teaching reflections, and were analysed using Braun and Clarke's thematic analysis. The findings indicate that digital media enhance student engagement and motivation in both contexts, although variations in student participation were identified. The findings reveal three emerging issues related to pedagogical integration, student engagement distribution, and implementation barriers. The challenges include technical limitations such as internet connectivity, differences in students' digital literacy, and time constraints. This study concludes that the effectiveness of digital pedagogical innovations requires thorough pedagogical planning, social support, and the mediating and scaffolding roles of teaching assistants, as well as consideration of technical limitations and student readiness.

Keywords*: Digital Pedagogical Innovation; Teaching Assistance Programs; Comparative Study; TPACK; Student Engagement*

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INTRODUCTION

Education plays a fundamental role in shaping individuals with strong character and competence (Nurdin et al., 2024). In the digital age, the rapid development of technology has significantly played a crucial role in learning activities. The development of digital technology is advancing at a rapid pace, becoming not merely an additional option but a fundamental necessity for educational institutions worldwide (Danuri, 2019). Educators are required to master digital technology skills and create appropriate learning media for students. The reshaping of learning that involves the use of digital technology in teaching has become an international phenomenon (Rosyidah et al., 2025).

The transformation of education in the digital age has given rise to new approaches in learning. The use of simulation applications and educational games creates interactive learning experiences that are not only effective but also enjoyable. Learning, which was previously passive and sequential, has now become more active, enabling students to engage more deeply in understanding complex concepts. Furthermore, the digital era has brought fundamental changes to the teacher-student relationship (Yusuf et al., 2023). Through online learning platforms, communication and collaboration have become more open. Students can participate in global discussions, contribute ideas, and collaborate on cross-border projects, supporting the development of social skills and creating opportunities for more comprehensive learning (Maswain et al., 2025).

The integration of digital tools, such as simulation applications and educational games, has contributed to more engaging and interactive learning environments. These tools support communication, collaboration, and access to broader learning resources, allowing students to participate in more meaningful learning experiences. Teachers must not only master subject matter but also use technology to make learning more creative and engaging. Nevertheless, teachers' technological skills remain relatively low. Research by the Data and Information Center of the Ministry of Education and Culture revealed that out of 28,000 teachers tested, only 46% reached Level 1, while only 14% reached Level 2. Therefore, prospective teachers must prepare themselves by developing digitally-based teaching skills and the ability to design and utilize digital media in the learning process.

Digital-focused pedagogical competence is essential in developing creative teachers. Digital pedagogy is not merely the ability to use technology, but also the capacity to leverage it to strengthen students' critical thinking and foster positive attitudes toward technology. Research by Syahid et al. (2023) on digital competency training needs for teachers in the Merdeka Curriculum indicates that most teachers already understand information and data literacy, yet still face limitations in designing and developing digital learning materials effectively as well as achieving adequate levels of technological proficiency. Therefore, teachers need to master various pedagogical aspects, including learning innovation, digital learning design, and the application of principles for developing students' character and moral values (Akbar, 2021).

One concrete way to enhance the capabilities of prospective educators is through a teaching assistance program. Through this program, prospective teachers participate directly in the learning process, enabling them to better understand the challenges faced by educators and to hone effective teaching skills (Sassabila & Rahmawati, 2025). Teaching assistance students can serve as mentors who support pupils throughout the learning process, particularly in building empathic communication and positive interpersonal relationships. Their presence allows for more informal interactions, making pupils feel more comfortable expressing themselves and engaging in meaningful learning. In order to implement such collaboration, effective learning management is required, as teachers cannot manage alone the complexity of learning in the digital era. University

students can support teachers in creating digital learning media, providing creative activities, and strengthening a culture of literacy and numeracy (Maharani et al., 2025).

Education in today's digital age demands teaching approaches that emphasize not only the mastery of technology but also the teacher's ability to integrate it in an educationally meaningful way (Putri, 2023). The use of digital learning media can create an interactive and participatory learning environment. However, when digital media is used without an appropriate teaching strategy, it can diminish students' interest and lead to boredom (Rahmi et al., 2024). This demonstrates that the effectiveness of digital media depends on the pedagogical approach employed, aligning with the principles of constructivism and student engagement theory, which emphasize the student's active role in the learning process (Fitria & Muthi, 2024).

Teaching assistance activities provide a genuine opportunity for prospective educators to apply digital teaching innovations directly in the classroom. However, in practice, there are varying student responses and classroom dynamics influenced by teachers' readiness, student characteristics, and prevailing learning cultures. In the context of Indonesia and Malaysia, although both countries strive to integrate technology into education, differences in educational systems and teaching methods give rise to diverse digital teaching experiences (Wahyuni & Riyanto, 2022). This supports Bandura's Social Learning Theory, which suggests that learning occurs through observation, interaction, and social collaboration, where the presence of teachers, teaching students, and the use of digital media play important roles in shaping learning behavior and student engagement (Rahimi et al., 2025).

Based on this situation, the purpose of this study is to analyze digital teaching innovations in teaching assistance activities in Indonesia and Malaysia using a qualitative, classroom-based approach. The focus is on the practice of using digital media for learning, student responses and engagement, and the learning dynamics that emerge. Limited research has explored digital pedagogical innovations as experienced by students in teaching assistance programs, particularly in cross-national classroom contexts. Theoretically, this study is grounded in the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the integration of technology, pedagogy, and content. It is therefore hoped that this research will contribute both conceptually and practically to the development of digital pedagogy across diverse educational contexts (Hermansah et al., 2024).

METHOD

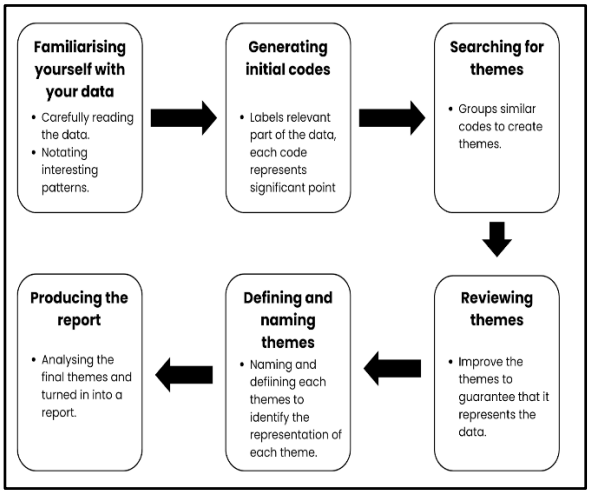


Figure 1. Six Phases of Thematic Analysis Adapted from Braun and Clarke (2006)

This is a qualitative descriptive classroom-based multiple case study design research that aims to explore and compare digital pedagogical innovations implemented in teaching assistance programs

both in Indonesia and Malaysia. It focuses on the classroom practices, student responses, and reflections towards the program. Thus, each national context was treated as a separate case, forming a multiple-case classroom-based study. The Braun and Clarke's (2006) thematic analysis framework, which enabled the identification of recurring patterns and themes across the two cases that were employed in order to describe both Indonesian and Malaysian students' experiences in the classroom when the researcher integrated digital learning media in the classroom activities. The six phases of thematic analysis were applied after the researcher gathered the data to explore students' perception, specifically in understanding their experiences, difficulties in using digital learning media for study in the classroom. Moreover, results of the thematic analysis by Braun and Clarke (2006) assist the researcher assess whether the performance of digital pedagogical innovation was functional in cross-country context as the subject was compared between Indonesian and Malaysian junior high school students. The six phases are shown on Figure 1.

This study was conducted in two private junior high schools located in different national contexts: one in East Java, Indonesia, and the other in Pahang, Malaysia. The schools were selected to symbolize comparable educational settings in terms of students' level and instructional materials. This research was placed within teaching assistance programs implemented in both schools, where digital learning media was integrated into classroom activities. A total of 60 students participated in this study, consisting of 30 students from Indonesia and 30 students from Malaysia. The participants of this research were selected using purposive sampling, as they met specific criteria relevant to the objectives of this study. Thus, the criteria were students who participated in classroom activities facilitated by the teaching assistants program and students who were exposed to digital learning media during the learning process. The participants voluntarily agreed to take part in this study in accordance with ethical research guidelines. Their identities were kept anonymous and all data were treated confidentially to ensure privacy. They were selected because they directly experienced the implementation of digital pedagogical innovation in their classrooms.

Moreover, the research was conducted over a period of approximately one month, during which digital learning media were consistently integrated into regular classroom instruction as part of the teaching assistance program. It was conducted through three main stages: preparation, implementation, and data collection. Each stage is systematically organized to ensure the logic of the research procedures. In the preparation stage, the researcher began with identifying the research issues on innovation in digital learning media within a cross-country teaching assistance program. Hence, the research settings were selected in two different national contexts, which were Indonesia and Malaysia to ensure the comparison of both countries. In order to support the conceptual framework, the researcher also discussed digital pedagogy, class-based qualitative study, and teaching assistance-related literature. A semi-structured interview guide was developed based on the research objectives and the theoretical framework, so it related to the implementation of digital learning media during the teaching assistance program to encourage the classroom activities. Thus, all the materials were designed in accordance with the learning objectives and the students' level.

The implementation stage was conducted during the program both in Indonesian and Malaysian schools. Thus, the researcher acted as a teacher and integrated various learning media classroom activities, such as interactive presentations, online quizzes, and some digital learning platforms. These digital media were used in order to encourage students' engagement, support interactive learning process, and prevent students' boredom, so it allowed students to actively participate in the classroom, express their ideas, and collaborate with their peers using digital tools. In this stage, the researcher also observed their participation and responses towards digital innovation in the learning process.

After the implementation stage, data were collected through semi-structured interviews with selected students who had experienced the use of digital media in learning activities. Moreover, the primary data, which were students' interviews, were obtained to explore their experiences, perceptions, and difficulties encountered during the learning process using digital media. Meanwhile, the secondary data were acquired from field notes as supporting data and triangulation to document classroom situations, students' interactions, and learning processes as well as the teaching reflection to record the researchers' on practices and students' engagement. To be more specific, lesson plans, learning materials, and photos of classroom activities as a documentation were collected to support and triangulate the data.

In addition, a semi-structured interview guide was employed as the main research instrument to obtain in-depth data. The researcher developed an interview guide blueprint based on the research objectives and the TPACK framework. It focused on three main aspects, which were students' learning experiences, students' responses toward digital learning media, and difficulties encountered during classroom learning activities.

Table 1. Interview Guide Blueprint

Focus Area	Indicators
Students' learning experiences	Learning process Students' engagement Students' perceptions
Students' responses toward digital learning media	Students' interest in learning Students' motivation Students' participation
Difficulties encountered during learning activities	Technical problem Cognitive barriers Students' interaction

To support and strengthen the interviews data, several instruments were used, such as field notes to record the students' interaction and classroom observation during learning activities, teacher's reflection notes as consideration towards the problems and process of collecting the qualitative data, also classroom documentation, including learning materials, media, and lesson plan as well. Thus, all the interviews recordings were transcribed verbatim prior and cross-checked to the analysis to ensure the data accuracy and minimize transcription errors. The Braun and Clarke's (2006) thematic analysis was employed to systematically compare and explore students' learning experiences, difficulties, and perceptions during the implementation of digital pedagogical innovation in the teaching programs both in Indonesia and Malaysia.

According to Braun and Clarke (2006), the data were analyzed by involving six phases: familiarising the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. The analysis focused on identifying patterns related to students' engagement, responses, and difficulties in using digital learning media across Indonesian and Malaysian classroom contexts.

RESULT

Based on the classroom observations and interviews, digital learning media were routinely integrated into classroom instruction in Indonesia. Various platforms, such as PowerPoint or Canva presentations, educational videos, and digital practice exercises were used to support learning activities. Digital presentation media serves to convey information in a structured and visual manner, while instructional videos function as both an introduction and reinforcement of that information. Teaching assistants also guide students in using digital media, both technically and in understanding the content.

The findings indicate that students were more actively engaged when digital media were used in learning. This was reflected in their participation in following instructions and answering questions. The classroom atmosphere becomes more dynamic and interactive, particularly during video-based explanations and digital exercises. However, student engagement remains uneven, as some students tend to be less active in class discussions. From the interview results, students expressed positive toward the use of digital media in the learning process. They feel that PowerPoint or Canva is very helpful in understanding the material more effectively, as it is more engaging, not monotonous and provides greater variety compared to conventional lecture methods.

The use of digital media increased students' motivation during classroom activities. Digital-based exercises encouraged students' active participation, while support from teachers and teaching assistants contributed to students' confidence in learning. However, the level of engagement varied among students, as some still required additional guidance to participate more actively. Although the responses obtained are predominantly positive, several challenges were identified during the implementation process in Indonesia. Technical issues include the limited availability of devices, unstable internet connectivity, and disruptions to the digital media used during learning. From a cognitive perspective, differences in students' abilities and levels of digital literacy required extra assistance from teachers and companions. Furthermore, student participation in class discussions remained uneven, with not all students actively engaged. Additionally, time constraints limited the intensity of interaction during the learning process.

In the Malaysian context, digital learning media were consistently integrated into classroom instruction to support the learning process. Various platforms, such as Canva, Quizziz, Kahoot, and presentation slides were used alongside short instructional videos to introduce topics and support digital-based learning tasks. Throughout the lesson, teaching assistants played a supportive role in guiding students in using digital platforms and understanding instructional content. Classroom activities were conducted through interactive digital exercises, question-and-answer sessions, and structured explanations, while immediate feedback was provided by both teachers and teaching assistants to support students' understanding.

In terms of students' engagement, the findings indicate that students generally showed positive engagement during the learning process supported by digital media. They paid attention to visually presented materials and actively responded to interactive digital tasks, as reflected on their willingness to follow instructions, complete assignments, and respond to teachers' questions. However, students' engagement varied among individuals, as some students required additional guidance to remain involved during classroom discussions. Interview results also revealed that most students perceived the use of digital learning media positively, as it was considered more interesting than conventional methods. Visual presentations, videos, and interactive games helped students understand the material more easily while creating a less monotonous and more engaging learning environment. Thus, students showed curiosity towards learning materials delivered through digital platforms that involved videos and interactive tasks.

Furthermore, immediate feedback and support increased students' motivation, particularly when they encountered difficulties. Students also demonstrated active participation by answering questions, completing digital tasks, and following instructions during classroom activities. Nevertheless, several challenges were identified during the implementation of digital learning in the Malaysian context. Technical challenges included unstable internet connections and limited familiarity with certain digital platforms, which occasionally disrupted the learning process. From a cognitive perspective, differences in students' digital literacy affected their ability to complete tasks

and understand instructions, often requires repeated explanations. In addition, classroom interaction was limited due to limitation of time and heterogeneous levels of student participation.

Table 2. Comparison of Digital Pedagogical Practices in Teaching Assistance Programs

Aspect	Indonesia	Malaysia
Learning process	Digital learning media were used to emphasize interactive explanations and student participation.	Digital learning media including Canva, Quizizz, Kahoot, slides and videos were integrated to support lesson activities.
Students' Engagement	Students paying attention to visual and video-based materials and actively participating in exercises.	Students' demonstrated steady engagement, though some required additional guidance to remain involved.
Students' Perceptions	Students perceived digital learning as interesting and helpful for understanding materials compared to lecture-based learning.	Presentations and videos were effective in clarifying materials as well as reducing boredom.
Students' Interest in Learning	Digital media increased students' enthusiasm, curiosity, and reduced boredom during learning activities.	Digital media attracted students' interest in learning, particularly through interactive multimedia content.
Students' Motivation	Digital exercises and support from teachers enhanced students' motivation and confidence.	When students encountered difficulties, digital tasks and immediate feedback increased students' motivation.
Students' Participation	Students participated actively by answering questions and completing digital tasks, though some still required encouragement.	Students with various levels of confidence showed noticeable participation in individual and group digital tasks.
Technical Problems	Limited devices and unstable internet connectivity occasionally disrupted learning.	Unstable internet connections and limited familiarity with platforms disrupted the learning flow.
Cognitive Barriers	Differences in digital literacy required additional support during learning activities.	Variations in digital literacy led to difficulties in understanding instructions.
Students' Interaction	Digital media fostered a more dynamic and interactive classroom atmosphere, though time limitations reduced discussion opportunities.	Digital tools supported interaction between students and teachers, but interaction was sometimes limited by time.

DISCUSSION

Based on the findings from both Indonesian and Malaysian contexts, there are three key issues emerged from the implementation of digital pedagogical innovation within teaching assistance programs. The first issue discussed the pedagogical integration of digital media into classroom instruction. In both contexts, digital tools enhanced student engagement, supported lesson delivery, and facilitated classroom interaction. This finding aligns with previous studies that indicate the integration of web-based virtual into classroom environments between teachers and students, promote independent learning, and create more engaging digital learning experiences (Amri et al., 2022). However, differences were identified in pedagogical significance, because Indonesian context tended to implement digital media in a more interactive way, while the Malaysian context emphasized structured instruction and guided task completion. These findings support the argument that online teaching methods are situational and affected by pedagogical environment and classroom practices (Rosyidah et al., 2025; Wahyuni & Riyanto, 2022).This difference may indicate that

Indonesian educational contexts are better equipped for the student-centered learning approaches, where digital media were used to facilitate classroom interaction, discussion and participation.

On the other hand, the Malaysian context appears to reflect a more teacher-guided instructional approach, where digital tools function to support clarity, organization, and task completion. This perspective aligns with principles of constructivism that emphasize the active role of students in scaffolding knowledge through classroom interaction. Thus, the more interactive use of digital media in the Indonesian context suggests a closer sequence with constructivist learning environments, where students are encouraged to explore, respond, and collaborate during the learning process. process. In line with the TPACK framework, impactful digital education demonstrates the combination of tech skills, educational theories, and situational knowledge (Hermansah et al., 2024). Thus, teaching assistance programs played a significant role in aligning technological tools with pedagogical strategies to promote meaningful learning rather than using technology as a stand-alone tool (Fitria & Muthi, 2024). This suggests that the presence of teaching assistants program contributed to a more balanced implementation of TPACK in classroom practice, particularly by bridging the gap between technological tools and pedagogical implementation. Rather than solely introducing digital media, teaching assistants facilitated how these tools were used to support interaction, scaffold learning activities, and adapt to students' needs in different classroom contexts. Therefore, the effectiveness of digital pedagogy in this study is not only determined by the availability of technology, but also by how it is pedagogically enacted within specific classroom environments.

The second issue related to the unequal distribution of students' engagement and participation besides the overall positive response towards digital learning media. Although digital tools increased students' motivation in both contexts, not all students actively participated in classroom discussions and learning activities. This findings aligns with the theory of student engagement, which involves cognitive, behavioral, and emotional components that influence how students participate in learning activities (Farida et al., 2024). This heterogeneous response suggests that digital media alone cannot guarantee equal engagement among students in the classroom, which aligns with previous findings that meaningful engagement depends on instructional facilitation rather than technological on its own (Rahmi et al., 2024). From this perspective, digital pedagogy should not be perceived only as a technology intervention, but as a process that requires active facilitation to support diverse learners. According to Bandura's Social Learning Theory, learning occurs through observation, interaction, and social collaboration (Rahimi et al., 2025). Thus, students who actively interacted with teachers and peers would get more benefits from the use of digital learning activities compared to those who required additional scaffolding. This indicates that social interaction between the teaching assistance and students is essential in implementing the effectiveness of digital learning environments as well as important in addressing the gaps. Teaching assistance's role is not only as technical facilitators, but also as pedagogical mediators who support students' interaction, participation, and provide scaffolding as well. Their role helped ensure that digital learning environments become more inclusive and responsive towards the students' heterogeneous levels of engagement.

The last issue related to the technical and cognitive barriers as it affected the effectiveness of innovation in digital as teaching tools. The ultimate problems such as unstable internet connections, limited access to devices, and unfamiliarity with digital platforms disrupted classroom activities in both Indonesian and Malaysian contexts. Moreover, differences in students' digital literacy and learning abilities affected their capacity to follow instructions and complete digital tasks thoroughly. These challenges indicate that technological integration does not guarantee the effective learning outcomes when it stands alone. Some students experienced cognitive overload when multiple digital tools were introduced simultaneously (Maswain et al., 2025). From a pedagogical perspective, these

findings suggest that the importance of digital innovation depends not only on technological availability but also on students' readiness. This supports previous research that indicates the effectiveness of learning depends not only on technological availability, but also on students' readiness as well as teachers' ability to manage classroom dynamics (Syahid et al., 2023).

All in all, this study provides a meaningful contribution by examining digital pedagogical innovation within the teaching assistance programs in a cross-country classroom context. Unlike previous studies that primarily focus on teachers' use of digital media or product-based development approaches (Wahyuni & Riyanto, 2022; Hermansah et al., 2024), this research addresses a gap by focusing on classroom-based experiences and students' perspectives within real learning environments. It highlights the pedagogical role of teaching assistants as mediators who bridge technology, pedagogy, and students' learning readiness in Indonesian and Malaysian classrooms. The findings indicate that teaching assistants contributed not only to technical support but also to instructional scaffolding, classroom interaction, and the management of students' engagement during digital learning activities. It also reinforces the effective digital pedagogy that is not merely determined by technological tools only, but by how these tools are integrated through human interaction and pedagogical support. From a TPACK viewpoint, the presence of teaching assistants enhanced the integration of technological and pedagogical knowledge in the classroom. Furthermore, this study extends the application of TPACK by emphasizing the integration procedure of technology and the role of teachers in facilitating the process within the real classroom settings. Therefore, this cross-country qualitative evidence extends current discussions on digital pedagogy by positioning teaching assistance programs as a contextual and relational component in ensuring meaningful and inclusive digital learning implementation in Southeast Asia (Wilczewski & Alon, 2023; Cheung et al., 2023).

CONCLUSION

This study demonstrates that digital pedagogical innovation within teaching assistant programs in Indonesia and Malaysia has a positive impact on students' engagement, motivation, and learning participation. In line with that, the integration of digital media in classroom practices has been shown to effectively support instructional delivery and enhance learning experiences across both contexts. The presence of digital tools allows for more interactive, flexible, and student-centered learning environments, which contribute to increased interest and involvement in classroom activities. However, the findings also indicate that positive responses toward digital learning are not automatically accompanied by students' engagement and participation. This suggests that digital media alone is insufficient to create inclusive engagement without the application of appropriate pedagogical approaches. Teaching assistant programs play a significant role in providing learning support, facilitating interaction, and helping students overcome difficulties. Teaching assistants act as an important mediator in ensuring that digital learning is implemented more effectively in classroom settings. Nevertheless, technical limitations and variations in digital literacy further influence the effectiveness of digital pedagogical innovation. Thus, the success of digital learning implementation depends on the availability of technology, pedagogical planning, classroom management, and students' readiness. Therefore, the success of digital learning implementation is highly dependent on the integration of multiple components, including the availability and reliability of technology, well-structured pedagogical planning, effective classroom management, and students' readiness to engage with digital learning environments. Without the alignment of these elements, the potential benefits of digital innovation may not be fully realized. Based on these findings, future researchers are recommended to explore digital pedagogical innovation using longitudinal designs or mixed methods approaches, as well as involving broader educational contexts such as public schools or different levels of education. Comparative studies across countries

are also encouraged. On a practical level, schools and educators should strengthen and provide ongoing support related to digital pedagogy, particularly for teaching assistants. Therefore, enhancing teaching assistants' competencies in selecting and managing digital learning tools is essential, as are clear instructional strategies to minimize technical and cognitive barriers in learning activities.

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