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Bridging Digital Skill Gaps in Vocational Education: A Study on English Teachers' Digital Pedagogical Competencies

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Abstract

This study examines the digital pedagogical competencies of English teachers at Liaocheng Vocational and Technical College, particularly emphasizing their digital literacy, technology integration in teaching, and effective use of digital resources. In response to the increasing demand for digital skills in education, the research aims to identify the current levels of digital proficiency among these educators, analyzing factors such as age, gender, educational background, and teaching experience that may influence their abilities. Adopting a descriptive quantitative methodology, the study uses descriptive statistics to assess teachers' expertise with digital tools, highlighting their capability to incorporate technology into pedagogical practices. The findings reveal a high level of digital proficiency among the teachers surveyed. Specifically, they demonstrate strong digital literacy skills, an effective pedagogical integration of technology, and an adeptness in managing and utilizing digital resources in their teaching processes. These results align with prior studies suggesting that digital skills enhance teaching effectiveness and foster student engagement in modern educational settings. Despite these strengths, the study also identifies potential areas for growth, including the development of personal online presences and the integration of social media platforms for educational purposes. The study's conclusions underscore the importance of continued professional development in digital pedagogy for vocational educators, recommending targeted training programs to support these teachers in refining their digital skills. This improvement would enable them to effectively support student learning outcomes, contributing to more dynamic and engaging educational experiences.

Keywords: *College English Teachers, Digital literacy, Digital pedagogical skills, Pedagogical integration of technology, Use of digital resources*

A. Introduction

With the popularization of "Internet Plus" in China, teachers' ability to provide information-based instruction will be crucial in measuring the country's educational development. In vocational colleges, English teachers will incorporate information technology into their teaching methods. The level of information-based instruction will become an indispensable component in assessing the quality of college-level English teaching. Therefore, there will be a need further to enhance the information technology teaching proficiency of college educators.

The Chinese Ministry of Education (2018) formulated the "Education Informatization 2.0 Action Plan," emphasizing that education informatization can support and lead to modernization, which is significant for building an education and human resources powerhouse. The promulgation of the plan has greatly encouraged more researchers to explore the cultivation of teachers' informational teaching ability (Mao et al., 2021). China's education informatization has shown a new trend of innovation and integration in response to the transformation of the "big

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intelligence moving cloud" era. In 2019, the State Council issued the "Implementation Plan for the Reform of National Vocational Education," clarifying the role of vocational education. This was followed by supporting documents, including the "double high" construction indicators, which set specific requirements for vocational teachers' informatization teaching abilities. In June 2020, the Ministry of Education released the "Digital Campus Standards for Vocational Colleges". It pointed out the need to comprehensively enhance teachers' informational teaching abilities. In September 2020, the Ministry of Education and nine other departments jointly released the "Action Plan for Boosting the Quality and Excellence of Vocational Education (2020-2023)," suggesting that vocational education information 2.0 should be carried out. Vocational schools should be encouraged to provide information technology training for all staff and boost the information technology capabilities of teachers and management personnel (Zhou & Cui, 2022). In November 2020, Minister of Education Chen Baosheng proposed establishing a modern education system for an information society. Wu Yan, Director General of the Department of Higher Education, also emphasized the need to enhance college teachers' teaching abilities widely. In March 2021, the Ministry of Education issued a notice emphasizing the need to strengthen education management information. It highlighted that education must adapt to informatization to support its development and cultivate high-quality, innovative individuals who meet contemporary requirements and positively influence social development (Jin, 2023).

The Chinese Ministry of Education's 2022 work plan proposed actively developing "Internet + education," guiding pilot demonstrations of new educational informatization models, and deepening the integration of information technology and teaching. Recent Ministry documents indicate that the direction of educational reform is to incorporate IT into teaching, promote educational informatization, and enhance teachers' informational teaching abilities. In this context, the success of vocational colleges in reforming teaching and improving talent cultivation largely depends on teachers' proficiency in informational teaching. With the advancement of national education informatization, college English teaching will increasingly rely on information technology. Vocational college English teachers must improve their information-based teaching skills, integrate educational IT with teaching, and adopt personalized, information-based, innovative teaching models. This is essential in the information age, as it enhances teaching effectiveness and positively influences teachers' career development. Therefore, exploring the current state of vocational English teachers' informational teaching abilities, identifying factors influencing these abilities, and finding ways to improve them are crucial for enhancing overall teaching quality (Zhao, 2020).

College English teachers are pivotal in equipping students with the language skills necessary for academic success and future career opportunities. At institutions like Liaocheng Vocational and Technical College (LVTC), these educators face the dual challenge of integrating digital tools into their teaching methodologies while ensuring effective learning outcomes in a rapidly evolving technological landscape.

In response to these challenges, a comprehensive survey employing a descriptive method has been initiated to assess and enhance digital pedagogical skills among LVTC's English faculty. This research initiative aims to delve deeply into the current state of digital literacy among teachers, examining their proficiency in utilizing educational software, digital resources, and online communication platforms (Chen et al., 2023). The study seeks to identify areas where additional support and training may be needed by evaluating these competencies through a detailed questionnaire. Moreover, the survey will explore how teachers integrate technology into their lesson plans to enrich educational experiences and engage students more effectively. This includes evaluating multimedia resources, interactive tools, and digital content creation methods that foster active learning environments (Liu et al., 2022).

The insights gained from this survey will inform targeted professional development programs and guide strategic initiatives to enhance teaching practices at LVTC. By aligning digital skills with educational objectives, the college aims to empower its English faculty to deliver high-quality instruction that meets the needs of today's digitally savvy students. Ultimately, the focus on enhancing digital pedagogical skills reflects LVTC's commitment to providing a progressive learning environment where both teachers and students thrive in the digital age. Through continuous assessment and adaptation, the college endeavors to maintain educational excellence and prepare graduates for success in a globally interconnected world.

The Chinese Ministry of Education emphasizes integrating information technology into education, which is crucial for modernizing teaching methods and improving educational quality. This shift towards educational informatization has led vocational colleges, especially in English teaching, to prioritize the development of teachers' informational teaching abilities. Initiatives like the "Education Informatization 2.0 Action Plan" and the "Implementation Plan for the Reform of National Vocational Education" highlight the need to enhance vocational college educators' proficiency in using information technology for teaching. Educational authorities' release of standards and action plans further underscores the importance of incorporating information technology into vocational education. The rapid advancement of technology has fundamentally reshaped educational paradigms, compelling the integration of digital tools and resources into pedagogical approaches. This evolution is particularly critical in vocational education, where proficiency in practical skills and contemporary knowledge is indispensable for students' future career success. Thus, investigating the digital pedagogical competencies among English teachers at Liaocheng Vocational and Technical College (LVTC) is essential.

LVTC, akin to many vocational institutions, assumes a pivotal role in equipping students with specialized skills tailored to various professions. Proficiency in English is pivotal, facilitating global communication and bolstering employability across vocational sectors. Consequently, the efficacy of English instruction at LVTC directly influences students' career trajectories and professional achievements. Digital literacy entails utilizing digital tools effectively, extending beyond mere operational knowledge to leveraging these tools for enhanced teaching and learning outcomes. For LVTC's English educators, digital literacy encompasses utilizing digital platforms for curriculum development, integrating multimedia resources to enrich educational experiences, and harnessing online communication tools to foster interactive learning environments (Zhang et al., 2023). Furthermore, integrating technology into pedagogy necessitates innovative approaches that reimagine teaching methodologies. This integration spans diverse applications, such as incorporating educational software, implementing flipped classroom models, and integrating virtual simulations to promote immersive learning experiences (Wang et al., 2022). Such innovative practices enhance instructional effectiveness and cultivate a dynamic learning environment conducive to student engagement and academic achievement.

Central to effective digital pedagogy is the judicious use of digital resources, encompassing an array of online databases, educational applications, and multimedia resources. These resources offer invaluable support for curriculum enrichment, providing access to authentic materials and interactive learning tools that cater to diverse learning styles and academic needs (Li et al., 2021). In conclusion, studying digital pedagogical skills among English teachers at LVTC is imperative for ensuring the institution remains at the forefront of educational innovation and meets the evolving demands of today's digital-native students. By emphasizing digital literacy, innovative pedagogical integration of technology, and the strategic use of digital resources, this research aims to enhance teaching practices and enrich learning experiences, ultimately preparing students for success in an increasingly digitalized global landscape (Zhao et al., 2020).

The significance of this study lies in the need for vocational college English teachers in Liaocheng and beyond to adapt to the demands of the digital age. As educational systems increasingly rely on technology, teachers must possess the skills to utilize information technology for personalized and competent teaching methods effectively. This enhances teaching effectiveness and aligns with broader educational modernization and talent cultivation goals. Additionally, improving teachers' informational teaching abilities is integral to their career development and the overall enhancement of educational quality. A descriptive survey method will be employed to understand and enhance these competencies comprehensively. This research approach is designed to provide a detailed picture of digital pedagogical skills among English teachers at Liaocheng Vocational and Technical College (LVTC). The survey will utilize a meticulously crafted questionnaire distributed to the English teaching staff to gather comprehensive data on their digital competencies.

Digital literacy entails utilizing digital tools effectively, extending beyond mere operational knowledge to leveraging these tools for enhanced teaching and learning outcomes. For LVTC's English educators, digital literacy encompasses utilizing digital platforms for curriculum development, integrating multimedia resources to enrich educational experiences, and harnessing online communication tools to foster interactive learning environments (Zhang et al., 2023). The survey encompasses several key areas. It evaluated the current digital skills of the teachers, assessing their proficiency in using various digital tools and technologies. It specifically describes the digital pedagogical skills among vocational college English teachers in Liaocheng Vocational and Technical College, particularly in digital literacy, pedagogical integration of technology, and the use of digital resources.

B. Methods

1. Research Design

This study employs a descriptive quantitative design to systematically assess digital pedagogical skills and informatization levels among English teachers at Liaocheng Vocational and Technical College, Shandong, China. Descriptive quantitative research is well-suited to assessing specific competencies, such as digital literacy and technology integration in pedagogy, as it enables a structured numerical overview of proficiency levels (Creswell, 2014; Fraenkel et al., 2019). A descriptive design focuses on capturing the current state of teachers' digital skills, offering insights into their strengths and identifying potential areas for improvement. Using measurable variables, the study builds a detailed picture of digital pedagogy within the vocational education context, aligning with the objectives of digital competency assessment (Koehler & Mishra, 2009). Applying descriptive statistics enhances the study’s reliability by providing objective data that can be analyzed across demographic factors, such as age, gender, educational background, and teaching experience. This quantitative approach enables general findings regarding skill levels and specific insights into how individual characteristics impact digital teaching efficacy (Johnson & Christensen, 2017). Consequently, the research design effectively supports the study's objectives by offering a comprehensive framework to interpret the role of digital skills in vocational English instruction.

2. Research Procedure

The research was conducted with the total population of English department faculty members at Liaocheng Vocational and Technical College, comprising 178 individuals. These participants, aged 21 to 65, include full-time and part-time faculty members, representing a diverse mix of male and female educators. Utilizing a total enumeration sampling technique ensures inclusivity and accuracy by involving all teachers in the sample without exclusion (Etikan et al., 2016). This approach allows for an exhaustive assessment of digital pedagogical

skills across the department, capturing the full scope of digital proficiency within this academic community. Prior to administering the questionnaire, informed consent was obtained from all participants. Clear instructions on the purpose and confidentiality of the study were provided to encourage open and honest responses, a critical aspect in educational research (Robson, 2011). The entire procedure was conducted within the English department, enabling efficient data collection and high response rates. This procedural approach minimizes logistical issues and comprehensively represents the department's digital pedagogical practices (Patten & Newhart, 2017).

3. Data Collection Technique

The primary data collection tool was a structured questionnaire to assess digital pedagogical skills among vocational college English teachers. This questionnaire included items covering key areas, such as digital literacy, pedagogical integration of technology, and the effective use of digital resources. Structured questionnaires are commonly used in quantitative research to gather consistent data across large samples, enhancing findings' reliability and validity (Dörnyei & Taguchi, 2009). The questionnaire was administered in English to align with the language proficiency of the respondents, facilitating precise and accurate responses. Each questionnaire section was crafted to align with the research objectives, with items measuring specific digital skill aspects. For example, questions about digital literacy focused on using digital tools, while those on pedagogical integration assessed teachers' practices in incorporating technology into instruction (Tondeur et al., 2017). By examining digital resource usage, the questionnaire also aimed to provide insights into the range of technologies applied in teaching. This comprehensive approach ensured that the questionnaire captured a holistic view of digital competencies among vocational English teachers, contributing to a nuanced understanding of their instructional practices.

4. Data Analysis Technique

The data from the questionnaires were analyzed using descriptive statistics, focusing on measures of central tendency (mean, median) and variability (standard deviation). This statistical approach is essential for summarizing quantitative data, allowing a clearer understanding of the sample's demographic and digital proficiency characteristics (Pallant, 2020). Demographic variables such as age, gender, educational background, and teaching experience were also analyzed to identify potential correlations with digital skills. Descriptive statistics provide foundational insights, revealing trends in digital competency levels across different respondent categories (Field, 2018). Additionally, frequency and distribution patterns were examined to assess digital literacy, pedagogical integration, and resource usage, offering teachers a comprehensive view of digital proficiency (Tabachnick & Fidell, 2013). This approach enabled the researchers to identify areas of strength and opportunities for development in digital pedagogy. By applying these statistical methods, the study offers data-driven conclusions that contribute to a broader understanding of how digital tools are utilized and highlight potential avenues for further professional development (Lund & Lund, 2013).

C. Findings and Discussion

There is a diverse age distribution among the participants, highlighting the prominence of middle-aged individuals within the study. The presence of younger participants suggests that younger adults are also engaged in the study context, possibly reflecting their early career entry or further education pursuits, consistent with observations by Chen (2021) about the increasing participation of younger adults in professional training and development. In the gender distribution, there is a clear predominance of female participants. This higher representation of

females could reflect broader trends in various fields where women increasingly participate in educational, social, and professional contexts.

Most participants hold a Master's degree, making this the most common educational background in the sample. This high representation of individuals with advanced education may suggest that the participants are involved in specialized fields or professional sectors that require higher qualifications, consistent with research by Zhang (2021), which indicates that individuals with a Master's degree often pursue roles in academia, management, or specialized industries. While on their teaching experience the most significant proportion of participants have 11-20 years of teaching experience, indicating a dominance of mid-career professionals in the sample. This suggests that most participants are in a phase of their careers where they have gained substantial experience and expertise, which may align with their ability to take on greater responsibilities in their roles. According to Guo (2020), educators with this experience level are typically more adaptable and proficient in balancing teaching methodologies and administrative duties, often serving as key contributors to curriculum development and institutional policies.

Table 1. Digital Pedagogical Skills of Vocational College English Teachers in Liaocheng

Indicator	Mean	Std Dev	Verbal Interpretation
1. Digital Literacy	3.48	0.16	High Level
2. Pedagogical Integration of Technology	3.48	0.22	High Level
3. Digital Resources	3.49	0.23	High Level
Overall Digital Pedagogical Skills	3.49	0.12	High Level

Legend*: 3.50 - 4.00 Very High Level, 2.50 - 3.49 High Level, 1.50 - 2.49 Low Level, 1.00 - 1.49 Very Low Level*

1. The Digital Pedagogical Skills in Digital Literacy

Results of the study demonstrate a solid overall digital literacy among participants, with notable proficiency in several key areas. There are high ratings for skills in using word processing applications like MS Word and web design tools like Dreamweaver, indicating that participants are adept at creating, editing, and formatting documents and designing and maintaining websites. This proficiency aligns with the expectations for digital literacy in professional and academic settings, where these skills are crucial (Li, 2019). The high ratings for social networking services like Facebook and photo-sharing sites like Picasa reflect significant engagement with social media and digital content sharing. This highlights the growing importance of these platforms in personal and professional communication (Zhang, 2020). Similarly, high proficiency in using presentation tools like MS PowerPoint and wikis like PBworks suggests that participants effectively create engaging presentations and collaborate on content, essential for educational and collaborative projects.

Skills in using spreadsheet applications like MS Excel and database applications like MS Access are rated high, though slightly lower compared to other areas. This indicates a solid, but somewhat less pronounced, competence in data organization and management. The variability in these scores might reflect differing experience levels or usage frequency among participants (Chen, 2021). The ability to use communication applications like Skype and learning management systems like Moodle is rated high, demonstrating effective use of these tools for online interactions and course management. The slightly lower ratings for using web search engines like Google and dictionary apps like Dictionary.com suggest that while participants are competent in these areas, there may be room for improvement in efficient information retrieval and vocabulary enhancement (Li & Liu, 2017). The data indicates that participants possess strong digital skills, with exceptionally high proficiency in document creation, social networking, and web design. This comprehensive digital literacy reflects their readiness for modern digital environments, where these skills are increasingly vital.

2. Digital Pedagogical Skills in Pedagogical Integration of Technology

The results showed high technology integration in teaching practices, with notable strengths in certain areas. Participants demonstrate a very high level of proficiency in using essential computer functions and keyboard shortcuts in their classes. These skills are essential for efficient computer use and effective teaching. Additionally, participants report a very high level of using computers for teaching purposes and finding it easy to teach by watching content on the computer screen. These findings indicate that technology is well integrated into their teaching methods, facilitating a more interactive and multimedia-rich learning experience. The ability to use digital teaching resources competently and maintain an online community to augment lessons further underscores participants' effective use of technology. These aspects reflect a solid capability to utilize digital tools and platforms to enhance teaching and engage with educational content. However, the ratings for having a personal homepage or portfolio for teaching purposes and using social networking services in teaching are slightly lower but still considered high. This suggests that while participants are engaged with some advanced technological tools, there may be less emphasis on personal online presence and the use of social networks in their teaching practices.

The ease of teaching by reading and using mobile apps for language teaching is rated high, indicating that participants generally find these methods compelling. However, they show some variability in ease of implementation. The data indicates that participants have a high level of pedagogical integration of technology, with very high proficiency in several key areas. This integration indicates a robust approach to leveraging technology in teaching, although there is room for enhancement in specific aspects of technology use. The data on pedagogical integration of technology reveals several key insights into how participants incorporate technology into their teaching practices. Participants exhibit a very high level of proficiency in using essential computer functions and keyboard shortcuts. This suggests that they are highly skilled in leveraging essential computer tools, which are crucial for efficient and effective teaching. The high rating for using computers for teaching purposes and for finding it easy to teach by watching content on the computer screen indicates that technology is deeply integrated into their teaching methods. These high ratings demonstrate that participants effectively use technology to enhance their teaching practices and engage students through multimedia content.

The high proficiency in using digital teaching resources and maintaining an online community to support lessons suggests that participants can utilize various digital tools and platforms to enrich their teaching. This reflects a solid capability to create an interactive and collaborative learning environment, utilizing digital resources and online networks to support educational goals. Despite these strengths, the slightly lower ratings for having a personal homepage or portfolio for teaching purposes and using social networking services in teaching indicate areas where participants may have less emphasis or less frequent use. This could reflect a less pronounced focus on developing a personal online presence or integrating social media into their teaching strategies. These areas could be further explored to enhance teaching practices (Li, 2021). The high ratings for teaching by reading from the computer screen and using mobile apps for language teaching suggest that while participants find these methods useful, there is some variability in their ease of use and implementation. This variability might point to differences in individual experiences or preferences, which could be addressed by providing additional training or resources (Wang & Zhang, 2020). Thus, the data reveals that participants are proficient in integrating technology into their teaching, with exceptionally high skill levels in using essential tools and resources. While there is a solid overall integration, there are specific areas where participants could further develop their technological practices to enhance their teaching effectiveness.

3. Digital Pedagogical Skills in the Use of Digital Resources

The data indicates a high level of comfort and engagement with digital tools, with specific areas of notable strength. Participants report a very high level of enjoyment and comfort in using digital devices. They also demonstrate a very high level of awareness regarding using various digital devices and an understanding of digital literacy. These ratings suggest that participants are familiar with digital tools and find joy and comfort in their use, indicating a positive attitude toward digital technology. Participants also exhibit a high willingness to learn more about digital technologies and a lack of threat when discussing digital technology with others. This reflects an openness to continued learning and confidence in their technological skills, essential for adapting to technological advancements.

While participants generally feel confident about their digital skills, the slightly lower rating for feeling that they are on par with fellow teachers in using digital technologies suggests some variability in self-assessed competence compared to peers. Despite this, the overall sentiment is still high, indicating that participants are motivated to enhance their digital fluency further and believe digital tools can improve their teaching. The importance of including technology-enhanced language learning in teacher education programs is recognized, though this is rated slightly lower compared to other indicators. This suggests that while participants see value in such training, it may not be as immediate a priority compared to other aspects of their digital engagement. The data reveals that participants have a solid positive attitude towards digital resources and technologies, with a high level of comfort, enjoyment, and willingness to develop their digital skills further. The high overall rating indicates a robust engagement with digital resources, highlighting a cheerful disposition towards integrating technology into their professional practice. The data reveals a generally positive engagement with technology. Participants report an intense enjoyment and comfort in using digital devices, which aligns with Liu et al. (2021), who found that positive attitudes towards technology significantly enhance its effective integration into professional practices. This comfort supports productive technology use, contributing to more effective teaching and learning outcomes, as highlighted by Chen and Zhang (2022).

Participants also demonstrate a robust awareness of various digital devices and a solid understanding of digital literacy, indicating they can leverage technology in their educational activities. Huang and Lin (2021) emphasize that such foundational knowledge is essential for effectively utilizing digital tools in diverse teaching contexts. This understanding helps participants navigate and apply technology to enrich instructional delivery. Moreover, the participants' willingness to learn more about digital technologies and confidence in discussing these tools reflect a proactive attitude toward professional development. This openness is supported by Zhang and Zhao (2021), who argue that a continuous learning mindset and confidence in technology are crucial for adapting to ongoing technological advancements. Thus, the results suggest that participants are comfortable and engaged with digital tools and committed to further enhancing their digital skills, which is vital for integrating technology effectively into their teaching practices. Results on the level of Digital Pedagogical Skills indicate that participants exhibit a high level of proficiency across various aspects of digital pedagogical skills. Digital Literacy, with a mean of 3.48 and a standard deviation of 0.16, reflects a strong capability in fundamental and advanced digital skills. This aligns with the findings of Huang and Lin (2021), who emphasized that robust digital literacy is crucial for effectively navigating and using digital tools in educational contexts.

Pedagogical Integration of Technology, with a mean of 3.48 and a standard deviation of 0.22, shows that participants are skilled at incorporating technology into their teaching practices. This rating supports the research by Chen and Zhang (2022), who found that successfully integrating technology into pedagogy enhances instructional methods and student engagement.

The highest rating is for Digital Resources, with a mean of 3.49 and a standard deviation of 0.23. This indicates that participants are particularly adept at utilizing and managing digital resources. This proficiency is consistent with Zhang and Zhao (2021), who highlighted the importance of the effective use of digital resources in improving educational practices and supporting diverse learning needs. Overall, Digital Pedagogical Skills is rated slightly higher, with a mean of 3.49 and a standard deviation of 0.12. This overall high rating, combined with a lower standard deviation, suggests a consistent and robust proficiency across all aspects of digital pedagogy. This comprehensive capability aligns with the research by Li and Wang (2020), who noted that a high level of digital pedagogical skills is essential for integrating technology effectively into teaching and maximizing its impact on learning outcomes. The data indicates that participants demonstrate a robust set of digital pedagogical skills, with high proficiency in digital literacy, integration of technology, and management of digital resources. This reflects a well-rounded capability in leveraging technology to enhance educational practices.

D. Conclusion

The findings of this study underscore the high level of digital pedagogical skills among vocational college English teachers, particularly in areas such as digital literacy, technology integration, and the effective use of digital resources. The teachers demonstrated strong capabilities with essential digital tools, including word processing, social networking, and web design. Despite this proficiency, there remains room for improvement in specific areas, such as developing a personal online presence and leveraging social media for educational purposes. These insights point to the teachers' solid foundation in digital skills and openness to further skill enhancement, suggesting an adaptive approach to ongoing technological advancements in education.

The descriptive quantitative methodology applied in this study proved effective for assessing the digital pedagogical competencies of these educators, as it facilitated a detailed, objective overview of their strengths and areas needing development. This approach successfully addressed the research objectives by providing quantifiable data that aligns with modern pedagogical needs, thus answering the research question regarding teachers' preparedness to integrate digital technology in teaching. However, a limitation of this study is its focus on a single institution, which may limit the generalizability of the findings to other contexts. Future research could expand the sample to include educators from various institutions and regions, offering broader insights into digital pedagogical skills across different educational settings.

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