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Digital Leadership Practices of Principals and Teachers' Self-Efficacy in Secondary Schools

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Abstract

Effective digital leadership practices can drive a culture of innovation and collaboration in schools, ensuring that teachers integrate digital technology into the teaching process and enhance their self-efficacy. This study aims to identify the relationship between the digital leadership practices of principals and the self-efficacy of History teachers in secondary schools within the Petaling Utama district, Selangor. The study adopts a survey design with a quantitative approach, utilizing an online questionnaire. The study sample consists of 162 History teachers working in 26 secondary schools in the Petaling Utama district. Descriptive and inferential analysis, using SPSS version 29.0, was conducted to address the research questions. Pearson's Correlation Test analysis revealed a significant but weak positive relationship between the principals' digital leadership practices and teachers' self-efficacy ($r=0.235$, $p<0.01$). The implications of this study suggest that stakeholders such as the Ministry of Education (KPM), State Education Departments (JPN), and District Education Offices (PPD) can use the findings to plan, design, and implement programs or courses aimed at enhancing the quality of school principals' digital leadership and teachers' self-efficacy. This study's findings may also influence the rethinking of training approaches focused on the elements of digital leadership, which, in turn, will positively impact school quality and student outcomes through the professional development of school leaders. Data was collected using an adapted questionnaire administered to 30 teachers. In conclusion, effective digital leadership practices can enhance teachers' self-efficacy, thereby having a positive impact on the quality of education.

Keywords: Digital Leadership of Principals, Teacher Self-Efficacy, Petaling Utama District, Secondary Schools.

Introduction

The education system in Malaysia has undergone a transformation, facing the policies outlined in the Malaysia Education Development Plan (PPPM 2013-2025), which is being implemented in phases across various dimensions. The fourth shift in the PPPM 2013-2025 aims to transform the teaching profession into a preferred career. Digital leadership refers to the ability of school leaders, particularly principals, to leverage technology in performing

leadership tasks such as strategic planning, resource management, and monitoring teacher effectiveness (Arokiasamy et al., 2023).
Furthermore, digital leadership also refers to the capacity of school leaders to integrate technology into administration and learning to enhance the effectiveness of school operations and student performance (Kotze et al., 2021). Therefore, it is evident that research regarding the gaps in the level of digital leadership practices by principals from the teachers' perspectives is necessary (Ertmer et al., 2022; Wang et al., 2023). Teachers' ICT skills are an advantage and a necessity in shaping engaging and meaningful teaching and learning processes (Kurt, 2023; Rahman et al., 2024).

Teacher self-efficacy is an essential quality that every teacher must possess to improve the quality of teaching and the effectiveness of schools. In the era of educational modernization, which is grounded in technology, digital leadership practices have become a critical necessity for school principals to lead more effectively. In the Malaysian context, digital leadership practices in education play an essential role in enhancing school effectiveness and the quality of teaching and learning (Ministry of Education Malaysia, 2021). Additionally, the rapid development of information and communication technology (ICT) has transformed the global educational landscape. This study is crucial in understanding how the digital leadership practices of principals affect teachers' self-efficacy. This research is significant as digital leadership practices have the potential to drive school operational effectiveness, increase teacher motivation, and produce students who are better prepared to face the challenges of the 21st century (Avolio et al., 2021; Yusof & Ibrahim, 2023).

Previous studies have focused more on traditional leadership in education and its impact on school performance (Ismail, 2021). However, research on digital leadership remains limited, especially within the context of secondary schools in Malaysia. The lack of studies connecting principals' digital leadership with teachers' self-efficacy is an important issue that needs to be addressed. Therefore, this study aims to fill this gap by focusing on schools in the Petaling Utama District. Based on existing literature and information, several studies have been conducted on technology leadership practices and teachers' self-efficacy. However, such studies need to be continued due to the potential impact they could have on the Malaysian education system. This article is significant for the Ministry of Education Malaysia (KPM) in the need to enhance the technological environment in Malaysian schools. Technology is seen as a driver of organizational commitment, linked to curriculum management and teachers' self-efficacy (Jailani & Izham, 2023).

This study will contribute to new knowledge about how principals' digital leadership affects teachers' confidence in using technology in teaching. The fourth shift (PPPM 2013–2025) aims to make teaching a career of choice. Furthermore, to improve teacher quality and school effectiveness, each teacher should possess self-efficacy characteristics. The findings of this study can provide guidance to policymakers and principals in formulating more effective leadership strategies to enhance teachers' self-efficacy.

The practices of principals' digital leadership and teachers' self-efficacy are critical aspects in improving education quality in the rapidly developing digital technology era. This study has introduced the research background, the problems to be addressed, the research objectives, and the significance of the study, further deepening our understanding of the impact of digital

leadership practices on teachers' self-efficacy. A null hypothesis (Ho) has also been stated before starting this study, which posits that there is no significant relationship between the level of digital leadership practices by principals and the level of self-efficacy among teachers in secondary schools in the Petaling Utama District, Selangor.

The objectives of this study are:

i. To identify the level of digital leadership practices by principals in secondary schools in the Petaling Utama District.
ii. To identify the level of teachers' self-efficacy in secondary schools in the Petaling Utama District.
iii. To identify the relationship between the level of digital leadership practices by principals and the level of teachers' self-efficacy in secondary schools in the Petaling Utama District.

Literature Review

Digital Leadership of Principals

Digital leadership refers to the ability of educational leaders to leverage technology in management and teaching (Heath & Coates, 2022). A study by Heath & Coates (2022) in the United Kingdom, involving 20 secondary schools, found that principals with technological literacy demonstrated higher effectiveness in leading their schools. Teachers in schools led by technologically skilled principals were more likely to incorporate technology in their teaching, which ultimately improved student performance.

According to a study by Johnson and Stewart (2021) in Australia, involving 250 teachers, it was found that schools led by technology-literate principals showed better performance because these principals encouraged the use of technology in the classroom. Teachers were provided with training and support to use technological tools to enhance their teaching, which in turn improved student achievement.

Digital leadership practices of principals refer to the actions and approaches taken by principals to lead, manage, and integrate digital technologies into the administration and teaching of schools (Ismail et al., 2023). In a study conducted by Ismail et al. (2023) in the Federal Territory of Kuala Lumpur, involving 6 secondary schools, it was found that principals who were skilled in technology usage helped drive the integration of technology into teaching. The study also found that the support provided by principals enhanced the effectiveness of teachers' use of technology, leading to improved learning outcomes.

A study by Ahmad & Hassan (2021) conducted in Selangor, involving 8 secondary schools, found that principals who were technologically skilled helped teachers integrate technology into their teaching, thereby improving the quality of teaching and learning in the schools. The findings of this study suggest that the digital leadership of principals plays a key role in creating an environment that supports the use of technology in education.

A study by Zainuddin and Latif (2021), conducted in the Petaling Utama District, Selangor, involving 120 teachers, showed that principals who were competent in digital technology could enhance the quality of teaching and learning in their schools. However, there were challenges in providing adequate technological infrastructure and ensuring that all teachers were effectively trained.

Teacher Self-Efficacy

Teacher self-efficacy refers to teachers' belief in their ability to effectively perform their professional tasks (Bandura, 1997). A study by Lim et al. (2022) in Malaysia, involving 200 teachers, found that teachers with high self-efficacy were more dedicated and creative in their teaching. This study indicated that teachers with high self-efficacy were more likely to embrace technology in their teaching.

A study by Friedman & Kass (2002) conducted in Israel, involving 150 teachers, found that teachers with high self-efficacy were more successful in managing classrooms and ensuring a conducive learning environment. These teachers were also more likely to use effective teaching strategies to improve student achievement.

According to Tschannen-Moran and Hoy (2001), teacher self-efficacy consists of three main elements: (i) teaching strategies, (ii) classroom management, and (iii) student engagement. This study, conducted in the United States with 200 teachers, found that teachers with high self-efficacy were better at managing classrooms and ensuring active student involvement in teaching.

A study by Bandura (2021) in Canada, involving 300 teachers, found that teachers with high self-efficacy were better able to apply new teaching techniques and utilize technology to improve the effectiveness of their teaching. These teachers were also more innovative and confident in changing their approaches in the classroom. A study by Mahmud (2023) in Malaysia, involving 150 teachers, showed that teachers confident in their abilities were more likely to embrace new technologies and experiment with more innovative teaching methods.

The Relationship Between Digital Leadership and Teacher Self-Efficacy

Studies have shown a positive relationship between the digital leadership practices of principals and the level of teacher self-efficacy. A study by Rahim et al. (2021) conducted in the Klang District, Selangor, involving 150 teachers, found that principals who encouraged the use of technology in teaching and provided adequate support helped boost teachers' confidence in the digital classroom. Teachers who felt supported by their principals were more confident in trying new technologies in their teaching.

A study by Lee and Chua (2023) in Singapore, involving 100 teachers, found that support from principals in the form of training and opportunities for innovation in the use of technology had a positive impact on teacher self-efficacy. Teachers were more willing to change their teaching methods when they received full support from their principals.

A study by Aziz and Ibrahim (2023) in Johor, involving 120 teachers, showed that principals who were actively involved in the use of technology could enhance teachers' confidence in using technology in teaching. Teachers who felt that their principals were skilled in technology were more likely to engage in the digital transformation of education.

A study by Yeo Jia Ying & Bity Salwana Alias (2023) conducted in Kuala Lumpur showed that when teachers received support from principals who were skilled in technology, they were more motivated to integrate technology into 21st-century learning. This study confirms that the digital leadership of principals directly impacts teachers' motivation and self-efficacy.

Conceptual Framework

This study integrates demographic factors with the National Educational Technology Standards for Administrators (NETS-A) Model (2009) and the Teacher Self-Efficacy Theory by Tschannen-Moran & Hoy (2001). In the National Educational Technology Standards for Administrators (NETS-A) 2009, five dimensions are used to assess the digital leadership practices of principals. These dimensions include five elements: (i) visionary leadership, (ii) digital-age learning culture, (iii) excellence in professional academic practice, (iv) systemic improvement, and (v) digital citizenship.

In the Teacher Sense of Efficacy Scale (TSES), the teacher self-efficacy model consists of three components: (i) teaching strategies, (ii) classroom management, and (iii) student engagement (Tschannen-Moran & Hoy, 2001). The ability of teachers to demonstrate their capacity as high-quality educators depends on the components of the TSES (Cocca et al., 2018). Figure 1 illustrates the conceptual structure of this study.

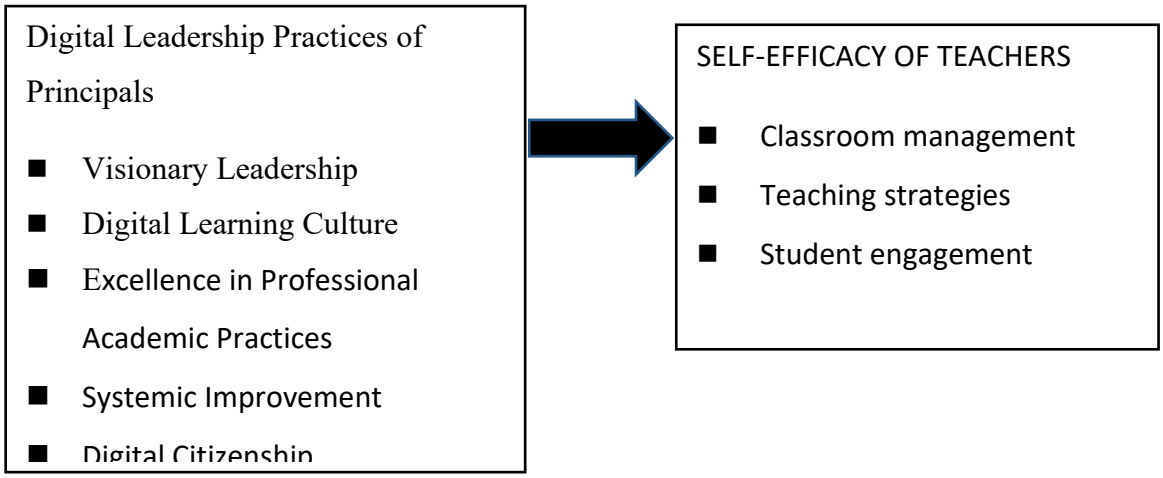

Figure 1: Conceptual Framework of the Study
(Source: National Educational Technology Standards for Administrators (NETS-A) Model, 2009, and Tschannen-Moran & Hoy's (2001) Self-Efficacy Model)

Methodology

This study employs a survey research design with a quantitative approach. The primary instrument used is a questionnaire distributed to history teachers in secondary schools in the Petaling Utama district. The study adopts a descriptive correlation design to identify the relationship between the digital leadership practices of principals and the self-efficacy of history teachers. This design is appropriate as it allows the researcher to measure the strength of the relationship between variables without manipulating them (Creswell, 2021).

The questionnaire aims to measure the digital leadership practices of principals and the level of teachers' self-efficacy in using technology. A quantitative approach is considered the best for this purpose (Noraini Idris, 2013 & Creswell, 2014). The use of a questionnaire facilitates the data collection process and is an easy and efficient method. Moreover, the use of questionnaires also helps in reducing the research costs while simplifying the data collection process (Sekaran & Bougie, 2016). The data collected from the questionnaire is easy, systematic, and straightforward to analyze, particularly for explaining the relationship and influence between variables. This research design is entirely quantitative, using a survey to

test the digital leadership practices of principals (independent variable) and teachers' self-efficacy.

The study population consists of history teachers in secondary schools in the Petaling Utama district. A random sample will be selected from 26 secondary schools in the district. Based on the sample size determination table by Krejcie and Morgan (1970), for a respondent population of 280, this study requires at least 162 teachers as a sample. The sample will be selected using random sampling after determining the sample size. This strategy is appropriate as it provides an equal opportunity for everyone to be selected as part of the sample (Bhardwa, 2019).

The research instrument used is a questionnaire adapted from previous studies (Rahman, 2023; Ahmad, 2021). The questionnaire is divided into three main sections: respondent demographics, digital leadership practices of principals, and teachers' self-efficacy. A 5-point Likert scale is used to assess teachers' perceptions of digital leadership practices and their confidence in using technology. The instrument used in this study is an online questionnaire (Google Forms) divided into three (3) sections.

The instrument begins with Section A, which contains demographic information of the respondents, including age, location of service, and teaching experience. Section B contains 31 items based on the digital leadership practices of principals, measured according to five elements in the NETS-A framework published by ISTE (2009), adapted from the study by Leong et al. (2016) in the study by Mohd Norakmar, Siti Noor, and Abd Latif (2019) and aligned with the Principal Technology Leadership Assessment (PTLA) instrument (ISTE, 2009). These five elements are: (i) Visionary Leadership; (ii) Digital Age Learning Culture; (iii) Excellence in Professional Practice; (iv) Systemic Improvement; and (v) Digital Citizenship. Section C contains 25 items related to teachers' self-efficacy, adapted from the Teacher Sense of Efficacy Scale (TSES) proposed by Tschannen-Moran and Hoy (2001), with three elements: (i) Teaching Strategies; (ii) Classroom Management; and (iii) Student Engagement. All elements are measured using a Likert scale from 1 to 5 to assess teachers' perceptions of the level of digital leadership practices and their self-efficacy.

The validity of the instrument will be tested through adaptation from previous studies with validation from experts in education and technology. The reliability of the questionnaire will be tested using Cronbach's Alpha coefficient to ensure the internal consistency of the instrument. Content validity will be determined using the correlation coefficient, while reliability will be tested using Cronbach's Alpha coefficient. An alpha value of more than 0.8 for each subscale indicates high reliability. For example, the self-efficacy scale shows an alpha value of 0.87, while the digital leadership scale shows a value of 0.89 (Creswell, 2021).

Research Findings

The data were analyzed using SPSS software version 29. Descriptive analysis was used to determine the level of digital leadership practices and self-efficacy. Pearson correlation testing was employed to identify the relationship between variables. Additionally, linear regression analysis was conducted to determine the relative contribution of digital leadership to teachers' self-efficacy. The data will be analyzed using SPSS software. Descriptive statistics such as mean, median, and standard deviation will be used to measure the level of digital

leadership practices and teachers' self-efficacy. Pearson correlation tests will be conducted to determine the relationship between the two variables.

A detailed analysis of the research findings involves two types of analysis: the first is descriptive analysis, which looks at the mean values and standard deviation to measure the level of digital leadership practices of principals and teachers' self-efficacy. The second analysis is inferential, using Pearson's correlation test to examine the relationship between the two variables being studied. The first research question is as follows:

Research Question 1: What is the level of digital leadership practices of principals in secondary schools in the Petaling Utama district?

Table 1
Level of Digital Leadership Practices of Principals by Element

Element	Mean	Standard Deviation	Interpretation
Visionary Leadership	4.09	0.30	High
Digital Age Learning Culture	3.99	0.38	High
Excellence in Professional Academic Practice	4.03	0.33	High
Systemic Improvement	4.00	0.37	High
Digital Citizenship	3.95	0.40	High

N = 162

The findings show that the element of visionary leadership recorded the highest mean score of 4.09 with a standard deviation of 0.30, indicating a high level. The element of digital age learning culture had a mean score of 3.99 with a standard deviation of 0.38, also indicating a high level. The element of excellence in professional academic practice scored a mean of 4.03 with a standard deviation of 0.33, also at a high level. The element of systemic improvement had a mean score of 4.00 with a standard deviation of 0.37, indicating a high level as well. Finally, the element of digital citizenship showed a mean score of 3.95 with a standard deviation of 0.40, which is also at a high level. Overall, the Principal Digital Leadership practice received an average score of 4.23 with a standard deviation of 0.32, reflecting that principals in these schools demonstrate very high levels of digital leadership.

Research Question 2: What is the level of teachers' self-efficacy in secondary schools in the Petaling Utama district?

Table 2
Level of Teachers' Self-Efficacy By Element

Element	Mean	Standard Deviation	Interpretation
Classroom Management	4.21	0.33	Very High
Teaching Strategies	4.26	0.31	High
Student Engagement	4.10	0.29	High
Teachers' Self-Efficacy	4.32	0.28	High

N = 162

The findings show that the element of classroom management recorded a mean score of 4.21 with a standard deviation of 0.33, indicating a very high level. The element of teaching strategies had a mean score of 4.26 with a standard deviation of 0.31, indicating a high level. The element of student engagement scored a mean of 4.10 with a standard deviation of 0.29, also at a high level. Finally, overall, the teachers' self-efficacy element had the highest mean score of 4.32 with a standard deviation of 0.28, indicating a high level. This shows that teachers have high confidence in their ability to carry out their teaching duties, manage students, and achieve educational goals.

Research Question 3: Is there a significant relationship between the digital leadership practices of principals and teachers' self-efficacy in secondary schools in the Petaling Utama district? For this research question, the null hypothesis (Ho) is formulated as follows:
Ho: There is no significant relationship between the digital leadership practices of principals and the level of teachers' self-efficacy in secondary schools in the Petaling Utama district.

Table 3
Correlation Relationship Between Digital Leadership Practices of Principals and Teachers' Self-Efficacy

		Teachers' Self-Efficacy
Digital Leadership Practices of Principals	Pearson Correlation (r)	0.235**
	Sig. (1-tailed)	0.000
	N	162

In this study, the Pearson correlation value (r) of 0.235 shows a weak but significant relationship between the digital leadership practices of principals and teachers' self-efficacy. This means that the better the digital leadership practices employed by principals, the higher the teachers' self-efficacy in their teaching. The significance value (Sig.) of 0.000 indicates that this relationship is highly significant and not due to chance, emphasizing the important role of principals in enhancing teachers' confidence in technology and the use of digital tools in the classroom.

Discussion of Findings

Principal's Digital Leadership

The element of visionary leadership recorded the highest mean score, indicating that school principals in the study area demonstrate the ability to plan strategic goals and vision to drive the school toward excellence in the digital age. This finding is consistent with Hallinger (2020), who emphasized that visionary leadership is crucial in ensuring that schools can adapt to technological changes and meet the needs of 21st-century learning.

Additionally, the element of digital-era learning culture recorded a mean score of 3.99, which falls within the high range. This suggests that a learning culture integrating technology has been widely implemented, aligning with the findings of Leithwood and Azah (2022), who asserted that digital-era learning culture fosters innovation and collaboration among teachers and students.

The element of excellence in professional academic practices is also at a high level. This finding reflects that teachers in the secondary schools within the study area exhibit a high

level of professionalism in their teaching and learning activities. This is supported by Fullan (2023), who stated that professional academic practices are closely related to student achievement and the improvement of teachers' competencies in the digital era.

Next, the element of systemic improvement recorded a mean score of 4.00, which is also at a high level. This indicates that systemic improvements within the school are consistently implemented to support 21st-century learning. Robinson and Timperley (2021) support this finding by highlighting that systemic improvements are critical for the success of digital initiatives at the school level.

Finally, the element of digital citizenship showed a mean score of 3.95, indicating a good level of awareness and practice of digital citizenship values among the school community. Ribble et al. (2022) argued that digital citizenship is essential for shaping a responsible school community in the ethical and effective use of technology. Overall, all five elements examined are at a high level, reflecting that the digital leadership practices and management of digital-era learning in these secondary schools have met high standards. This finding aligns with the study's objective to assess the level of digital leadership practices by principals and their impact on teachers' self-efficacy.

Teachers' Self-Efficacy

The element of classroom management shows a very high level. This suggests that teachers in the secondary schools involved in this study employ effective classroom management techniques that create a conducive learning environment. According to Salleh et al. (2023), effective classroom management plays a crucial role in enhancing teaching and learning effectiveness. Well-managed classrooms help teachers control student behavior and ensure smooth teaching execution (Rahman et al., 2022).

Next, the teaching strategies used by teachers are at a high level. Ismail (2022) found that the use of diverse and innovative teaching strategies can increase student engagement and reinforce their academic achievements. Teachers who employ varied approaches, such as project-based learning or student-centered learning, tend to achieve better results in enhancing students' understanding of the subjects taught (Hussin & Yusoff, 2021).

The element of student engagement in the teaching and learning process is high. Active student engagement is a key factor in ensuring successful learning outcomes. Ahmad et al. (2023) emphasized that student involvement in learning activities, both physically and mentally, enhances the effectiveness of learning and motivates them. Therefore, the high level of student engagement indicates that teachers in these schools are effective in capturing students' attention and interest to engage actively in learning.

Overall, with a mean score of 4.32 and a standard deviation of 0.28, teachers' self-efficacy in this study is at a very high level. This reflects teachers' confidence in their ability to teach and address challenges in the classroom. High self-efficacy is closely related to improved teacher performance and teaching effectiveness. Kamaruddin et al. (2024) found that teachers with high self-efficacy are more likely to overcome obstacles in teaching and innovate in their pedagogical practices, thus improving students' learning outcomes.

Relationship between Digital Leadership and Teachers' Self-Efficacy

The digital leadership practices of principals can be seen as a key driver that influences teachers' self-efficacy in the context of 21st-century teaching. Principals who are active in leading and providing technological support, such as technology training and sufficient resources, can enhance teachers' confidence in using technology effectively in their teaching. Ahmad and Hassan (2021) asserted that effective digital leadership can strengthen teachers' competencies in using digital tools, which in turn boosts their self-efficacy.

Previous studies also support this finding, showing that principals who integrate technology into school management and administration help create an environment conducive to teachers using technology in teaching. Ismail et al. (2023) suggested that principals who provide continuous support, including training opportunities and appropriate digital tools, can alleviate teachers' concerns about using technology and enhance their confidence in trying new teaching approaches.

Implications

Implications for Education Policy

In the educational context, integrating digital leadership by principals should align with national education policies. Education policies that encourage the use of technology in teaching and learning, such as the Malaysia Education Development Plan 2013-2025, emphasize the development of 21st-century skills. Therefore, principals need to understand the importance of using technology in school administration and student learning. This policy implication calls for comprehensive education policies on the use of digital tools and the strengthening of digital resource management in schools.

Implications for Principal Practices

For principals, digital leadership practices involve using technological tools in school management and professional development. Principals with high digital skills can manage school resources more efficiently and encourage the use of technology among teachers and students. This increases teachers' self-efficacy, as they feel more confident using technology in teaching. This practice also empowers principals to provide ongoing guidance and support to teachers, particularly in monitoring and evaluating the use of technology in teaching and learning.

Implications for Teacher Training

For teachers, training in the use of digital technology is critical to enhancing their skills. Teachers without in-depth knowledge of educational technology may feel less confident and face difficulties in using digital tools in their teaching. Therefore, the implication for training suggests the need to introduce continuous training programs that equip teachers with the necessary technological skills. This training should also cover aspects of digital classroom management and the safe and effective use of technology. Training focused on professional development, particularly in the context of digital leadership, helps teachers become more confident and efficient in using technology, ultimately enhancing their self-efficacy in carrying out their teaching duties.

Conclusion

The conclusion of this study shows a positive but weak and significant relationship between the digital leadership practices of principals and teachers' self-efficacy in history teaching at secondary schools in the Petaling Utama District, Selangor. This finding suggests that although principals' digital leadership practices influence teachers' self-efficacy, the strength of this relationship still needs to be enhanced. Principals who practice more effective digital leadership can provide better support to teachers in integrating technology into the teaching and learning process. The implications of this study are crucial for stakeholders in the education system, such as the Ministry of Education Malaysia (MOE), State Education Department (JPN), and District Education Office (PPD). The findings can be used to design and implement professional development programs aimed at improving principals' digital leadership quality and enhancing teachers' digital skills. Additionally, this study suggests that changes in training and professional development approaches should be made to focus on digital leadership elements. These changes can improve the quality of teaching and learning, strengthen teachers' teaching skills, and ultimately enhance student outcomes.

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