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## DEVELOPMENT OF A DIGITAL LEADERSHIP COMPETENCY MODEL FOR SCHOOL PRINCIPALS IN MALAYSIA: A NEEDS ANALYSIS

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### Abstract:

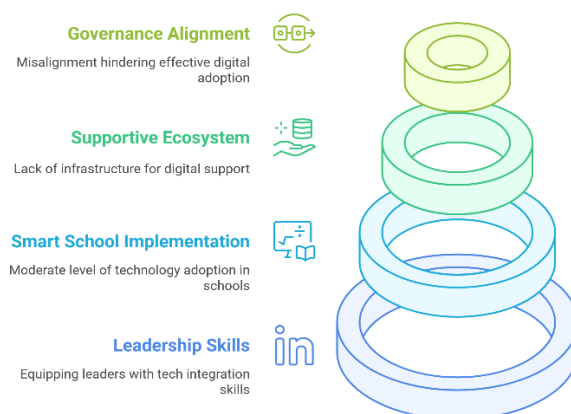
The digital era has brought significant changes to the education sector, placing school principals in a crucial role as digital leaders. This study, part of the first phase of the Design and Development Research (DDR) approach, aims to (1) explore the challenges faced by school principals as digital leaders and (2) analyze the need for developing a digital leadership competency model for school principals in Malaysia. Through semi-structured interviews with five field experts selected via purposive sampling, including digital leadership specialists and school leaders, the research identifies key challenges in integrating technology into schools. These challenges span technical, cultural, financial, and operational domains, with notable issues such as a digital skills gap among teachers, inadequate infrastructure, and financial constraints. Further difficulties arise from the lack of continuous technical support, resistance from parents and the community, and shifting attitudes toward technology. Constraints in providing ongoing training complicate digital leadership efforts while ensuring a secure digital environment remains a priority. The study also outlines essential components for an effective digital leadership competency model, including clear guidelines for leadership, a self-assessment tool for principals, and frameworks addressing ethics and cybersecurity. Collaboration, building networks, and community engagement are vital for overcoming these barriers. This study emphasizes the importance of equipping school leaders with the tools, training, and support necessary to lead successful digital transformations in education.

**Keywords:**

Digital Leadership, School Principals, Competency Model, Needs Analysis, Educational Technology.

**Introduction**

The rapid advancement of technology in the 21st century has significantly transformed various sectors, including education. Digitalization has not only changed the way knowledge is accessed and delivered but also reshaped the roles and responsibilities of educational leaders (McCarthy, Maor, McConney, & Cavanaugh, 2023; Orfanidou & Kopsidas, 2023). School principals, as key decision-makers, and influencers in educational institutions, are expected to embrace and lead digital transformation effectively (Ghavifekr & Yue, 2022). This expectation underscores the need for school principals to possess comprehensive digital leadership competencies that enable them to navigate the challenges and opportunities of the digital era (Dasruth, Naicker, & Smith, 2024; Karaköse & Tulubas, 2023). In Malaysia, this imperative aligns with the objectives outlined in the Malaysian Education Blueprint (2013-2025), which emphasizes the integration of technology to enhance the quality and accessibility of education (Mat Rahimi, Mohd Yusri, & Zahari, 2016). School principals play a crucial role in driving technological transformation within educational institutions (Mehmood, Taresh, Hafizah, & Hassan, 2023). As Malaysia progresses toward a more digitalized education system, the Digital Leadership Competency Model serves as a framework to equip school leaders with the necessary skills to integrate technology effectively in administration and teaching (Badawy et al., 2024). However, implementing this model faces several challenges that hinder its success. These challenges include the moderate level of smart school implementation, the lack of a supportive digital ecosystem, a one-size-fits-all approach to digital adoption, and governance misalignment (MOE, 2023). The level of smart school implementation in Malaysia remains moderate, indicating challenges in adopting digital leadership effectively. According to the data given in the Malaysia Digital Policy (2023), 52.7% of schools were rated at level three or below in the Smart School rating system in 2019 (MOE, 2023). This statistic suggests that more than half of Malaysian schools have yet to achieve an optimal level of digital transformation. The slow progress in smart school implementation reflects difficulties in integrating technology efficiently into school management and teaching processes (Zainal & Zainuddin, 2020). Addressing these issues is essential to ensure that school principals can lead their institutions towards a future-ready education system.



**Figure 1: Issues of Digital Leadership in Education**

Source: Ministry of Education Malaysia (2023)

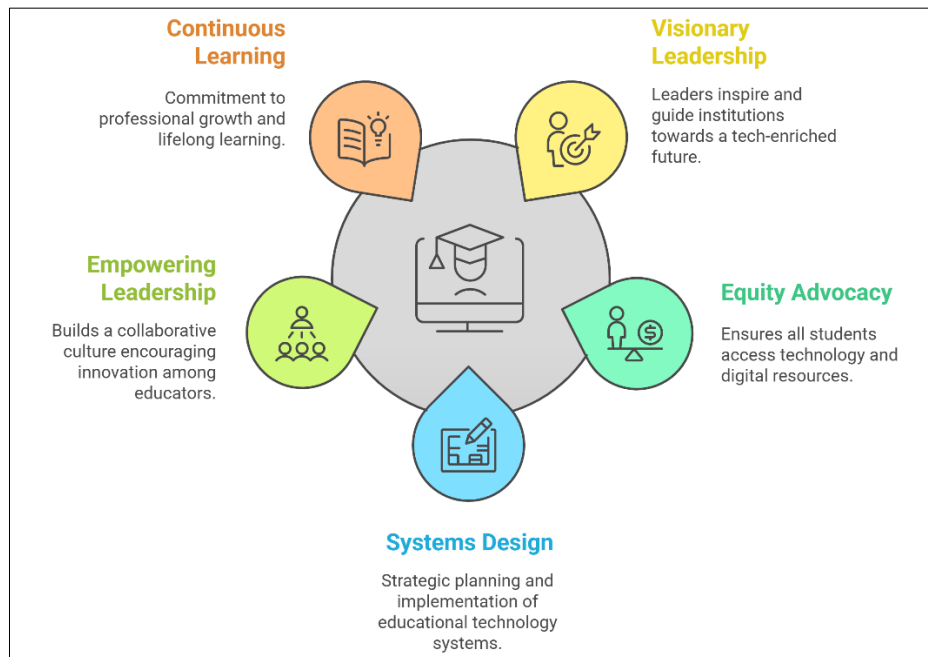
Digital leadership, at its core, involves the ability to use technology strategically to achieve organizational goals, foster a digital culture, and drive innovation (Tagscherer & Carbon, 2023; Torres, Zerna, Ramirez, & Uy, 2024). For school principals, this role extends beyond managing technical infrastructure; it encompasses leading pedagogical changes, promoting professional development, ensuring equitable access to digital tools, and engaging stakeholders in the digitalization process (Badawy et al., 2024; McCarthy et al., 2023; Sterrett & Richardson, 2020). Effective digital leaders must also inspire and motivate their teams to adopt new technologies, foster collaborative learning environments, and prioritize the ethical use of digital tools (Ambika & Asrafi, 2024; Tagscherer & Carbon, 2023). However, the transition to becoming effective digital leaders is fraught with challenges (Abbu, Mugge, & Gudergan, 2022; Buonocore, Annsi, de Gennaro, & Riemma, 2024). Many principals face barriers such as limited technical expertise, resistance to change among staff, inadequate resources, and a lack of clear guidelines or frameworks to support their leadership journey (Khaw et al., 2022). Despite the increasing demand for digital leadership, there remains a gap in the literature and practical frameworks addressing the specific competencies required by school principals to excel in this role (Karaköse & Tulubas, 2023; Kok Ming & Mansor, 2024). Existing studies predominantly focus on digital leadership within corporate or higher education contexts, leaving a significant void in understanding the unique needs of school leaders in primary and secondary education settings (Jameson et al., 2022; Yusof, Yaakob, & Ibrahim, 2019). Additionally, the rapid pace of technological change often outstrips the ability of school leaders to keep up, further exacerbating the challenges they face (Badawy et al., 2024; Cantos & Callo, 2022). Furthermore, while there is recognition of the importance of digital leadership, there is limited empirical research exploring the challenges faced by school principals in this domain or the specific needs for developing a digital leadership competency model tailored to their context (Nubun, Hassan, & Hamidi, 2024a; Ridho, Wiyono, & Mustiningsih, 2024).

This study aims to address these gaps by conducting a needs analysis as part of the first phase of the Design and Development Research (DDR) approach. The objectives of this research are twofold: (1) to explore the challenges faced by school principals in their role as digital leaders, and (2) to analyze the requirements for developing a comprehensive digital leadership competency model. By focusing on the Malaysian context, this study seeks to provide insights that are both relevant and actionable for policymakers, educators, and researchers dedicated to enhancing school leadership in the digital age. The Malaysian context, characterized by diverse socio-economic and cultural backgrounds, offers a unique perspective on how digital

leadership competencies can be tailored to address varying levels of technological infrastructure and readiness. The significance of this research lies in its potential to contribute to the development of a practical and context-sensitive digital leadership competency model. Such a model could serve as a guideline for professional development programs, inform policy decisions, and empower school principals to lead their institutions effectively in an increasingly digitalized educational landscape (Mthanti & Msiza, 2023; Raptis, Psyrras, Koutsourai, & Konstantinidi, 2024). By equipping school leaders with the necessary competencies, this study aims to support the broader goal of preparing schools to meet the demands of the 21st-century learning environment, ultimately benefiting students, teachers, and the education system (Alainati, 2024; Culduz, 2023). Furthermore, this research emphasizes the critical role of leadership in bridging the digital divide, fostering innovation, and ensuring that all students have equitable access to quality education in a rapidly evolving world (Ahuja, 2023; Torres et al., 2024).

### Literature Review

Digital leadership is a multifaceted concept that has gained prominence in the context of technological advancement. It involves the strategic use of digital tools and technologies to influence, innovate, and enhance organizational processes and outcomes (Haleem, Javaid, Qadri, & Suman, 2022; Qiao, Li, & Hong, 2024). Sheninger (2019) defines digital leadership as the capacity to drive change and innovation in an organization by leveraging technology (Al-Hadrawi & Reniati, 2023). In education, digital leadership is essential for school principals to guide their institutions through digital transformation effectively (Karaköse & Tulubas, 2023; McCarthy et al., 2023). It encompasses not only the adoption of technology but also fostering a culture of innovation and continuous improvement among educators and students (Haleem et al., 2022; Vičič Krabonja, Kustec, Skrbinjek, Aberšek, & Flogie, 2024). In the school context, digital leadership requires principals to balance traditional leadership roles with the demands of the digital era (Navaridas-Nalda, Clavel-San Emeterio, Fernández-Ortiz, & Arias-Oliva, 2020; Orfanidou & Kopsidas, 2023). This includes ensuring that digital tools are effectively integrated into teaching and learning processes, promoting professional development in digital competencies, and addressing ethical and equity issues related to technology use (Gottschalk & Weise, 2023). The concept also emphasizes adaptability and lifelong learning, as digital leaders must continuously update their skills and knowledge to stay relevant in an ever-evolving technological landscape (Tagscherer & Carbon, 2023). Several frameworks have been proposed to conceptualize digital leadership, each highlighting specific competencies, and domains relevant to the digital age. For instance, the International Society for Technology in Education (ISTE) Standards for Education Leaders outline key areas such as visionary leadership, equity and citizenship advocacy, systems design, empowering leadership, and continuous learning (Lim & Teoh, 2022). These frameworks provide valuable guidance for school leaders, but their applicability often depends on the specific context and challenges faced by individual schools.

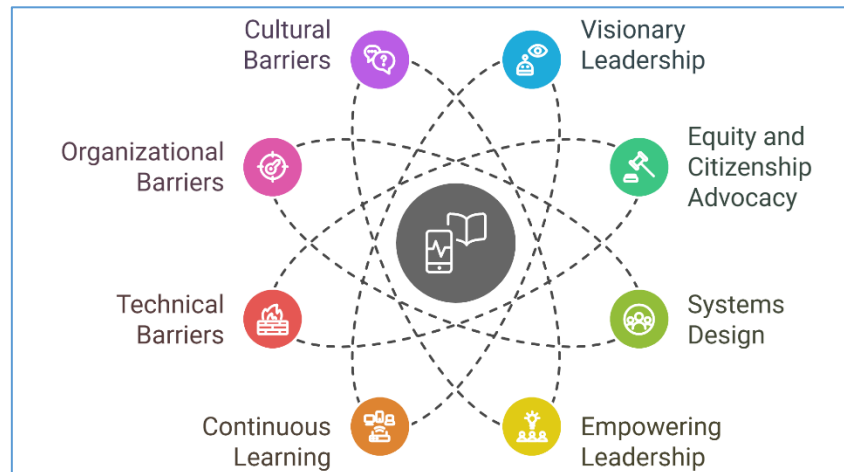


**Figure 2: ISTE Standards for Education Leaders**

Source: ISTE, 2021

In Malaysia, for example, frameworks must consider the diverse socio-economic and technological readiness levels of schools. Visionary leadership emphasizes the development of a clear and strategic vision for integrating technology into education (Siong, 2024; Yorman, 2023). Equity and citizenship advocacy ensure all students and staff have equitable access to digital resources, while systems design focuses on establishing sustainable systems and processes for digital transformation (Gottschalk & Weise, 2023; McCarthy et al., 2023). Empowering leadership involves encouraging innovation and collaboration among staff, and continuous learning requires staying informed about emerging technologies and best practices (Ye, Liu, & Tan, 2022). Moreover, a growing body of research highlights the interplay between digital leadership and organizational culture. Digital leadership is not solely about implementing new technologies but also about cultivating a culture that embraces innovation and continuous improvement (Ogunbukola, 2024; Tagscherer & Carbon, 2023). Principals must foster an environment where teachers and staff feel empowered to experiment with digital tools, collaborate on innovative practices, and share their successes and challenges. This cultural shift requires strong communication, inclusive decision-making processes, and ongoing professional development opportunities tailored to the needs of the school community (Eden & Adeniyi, 2024). Studies by Avolio and Kahai (2020) underline that effective digital leaders act as change agents who inspire and motivate their teams to align with the school's digital vision (Tan, Garcia, Maleriado, & Uy, 2023). Needs analysis is a critical step in the development of competency models, as it provides insights into the specific requirements and gaps in knowledge and skills. In the context of digital leadership, needs analysis involves identifying the challenges faced by school principals, the competencies required to address these challenges, and the resources needed for successful implementation. Studies have shown that effective needs analysis involves engaging key stakeholders, including school leaders, teachers, policymakers, and community members, to gather diverse perspectives (Maurer et al., 2022). Techniques such as interviews, focus groups, and surveys are commonly used to collect data, which is then analyzed to identify recurring themes and priorities (Naem, Ozuem,

Howell, & Ranfagni, 2023). This process ensures that the resulting competency model is relevant, practical, and aligned with the unique needs of the target audience.

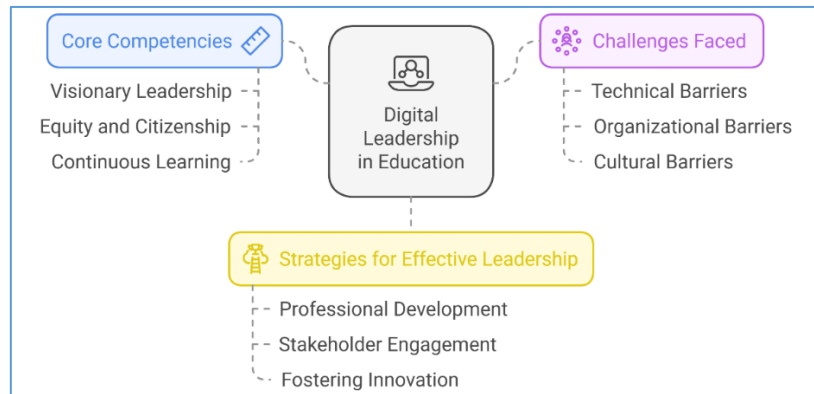


**Figure 3: Components of Digital Leadership in Education**

Source: Lim & Teoh, 2022

The Malaysian education system has prioritized the integration of technology as part of its national agenda, as outlined in the Malaysian Education Blueprint (2013-2025). However, the implementation of digital initiatives varies significantly across schools due to disparities in resources, infrastructure, and readiness. Research indicates that Malaysian school principals face unique challenges in their roles as digital leaders, including limited access to reliable internet and digital devices in rural areas, a lack of professional development opportunities focused on digital leadership, resistance to technology adoption among teachers and staff, and policy and support gaps at the national and local levels (Razak, Ab Jalil, & Ismail, 2019; Yusof et al., 2019). These challenges highlight the need for a context-specific digital leadership competency model that addresses the unique realities of Malaysian schools. By tailoring the model to the local context, school principals can be better equipped to lead digital transformation efforts effectively. Several studies have delved into the impact of digital leadership on educational outcomes. Karaköse and Tulubas (2023) suggest that digital leadership positively influences teaching quality, student engagement, and overall school performance. Effective digital leaders facilitate the integration of technology into pedagogical practices, enabling personalized and engaging learning experiences for students. Furthermore, digital leadership fosters a culture of collaboration and shared responsibility, wherein teachers work collectively to develop innovative strategies and address common challenges (Zitha, Mokganya, & Sinthumule, 2023). The role of school principals as instructional leaders is thus amplified in the digital age, as they are tasked with guiding teachers in designing and implementing technology-enhanced instructional methods. The literature underscores the importance of digital leadership in education and highlights several gaps that warrant further investigation. Future research should focus on exploring the specific competencies required for digital leadership in different educational contexts, examining the effectiveness of professional development programs in enhancing digital leadership skills, investigating the impact of digital leadership on student outcomes, teacher performance, and overall school effectiveness, and developing and validating context-sensitive competency models that cater to the unique needs of diverse educational settings (Anwar & Saraih, 2024). By addressing these areas, future

research can contribute to a deeper understanding of digital leadership and provide practical solutions for school leaders navigating the challenges of the digital age.



**Figure 4: Digital Leadership in Education**

Source: Karaköse and Tulubas (2023)

Various researchers have explored the key competencies required for digital leadership, emphasizing the need for adaptability, ethical awareness, and the ability to drive technological transformation in schools. The table below summarizes the key findings from different studies on digital leadership competencies.

**Table 1: Key Findings on Digital Leadership Competencies**

Author(s)	Findings on Digital Leadership Competencies
Gill & Van Boskirk (2016)	Digital leadership involves managing schools in the digital age and integrating technology into school administration.
Karakose et al. (2021); Sheninger (2019)	Digital leaders set direction, persuade others, create change, and anticipate future developments to ensure school success.
Sagbas & Erdogan (2022)	Digital leadership prioritizes digital transformation, enabling schools to cultivate a digital learning culture.
Ilomäki et al. (2016)	Digital competence includes knowledge and skills needed for functioning in a digitalized knowledge society.
Ferrari (2012)	Defines digital competence as a mix of knowledge, skills, attitudes, and strategies for ICT use in problem-solving, communication, and collaboration.
International Society for Technology in Education (2009)	Proposed National Educational Technology Standards for Administrators (NETS-A), including: - Visionary Leadership (Technology integration vision) - Digital-Age Learning Culture (Creating a digital learning environment) - Excellence in Professional Practice (Promoting innovation through digital tools) - Systematic Improvement (Utilizing digital resources for management) - Digital Citizenship (Understanding ethical, social, and legal issues in digital education).
Munsamy (2022)	Proposed a digital leadership competency framework with six clusters: - Digital Competitive Intelligence (Market trends and networking) - Digital Skills (Continuous digital skills development) - Cultivating a

Author(s)	Findings on Digital Leadership Competencies
Eremina et al. (2019); Van Laar et al. (2017)	Digital Culture (Innovation and diversity) - Embracing Digital (Role-modeling digital adoption) - Leadership Facilitating the Digital Drive (Decision-making and employee well-being) - Digital Adaptiveness & Resilience (Flexibility and responsiveness to digital changes).  Identified essential digital leadership skills: - Ethical awareness - Cultural sensitivity - Adaptability & self-guidance - Continuous learning & information management - Effective communication & collaboration - Creativity, critical thinking & problem-solving.

Source: (Nubun, Hassan, & Hamidi, 2024)

### *Needs Analysis in the Development of the Digital Leadership Competency Model*

Needs analysis is a crucial phase in this study, aiming to identify the fundamental questions and current issues faced by school principals in performing their roles as digital leaders. This approach aligns with the views of Muqsith (2018), Mohd Jamil (2016), Sukor Beram, Marinah Awang, and Ramlee Ismail (2020), and Siraj et al. (2013) who emphasize that needs analysis is an essential preliminary step before developing any model. Furthermore, needs analysis is vital in assessing the gap between the actual conditions and the ideal state, as described in McKillip's Discrepancy Model (1987). In this study, this gap refers to the difference between the current digital leadership competencies of school principals and the competencies required to address the challenges of the digital education era. This process involves identifying existing issues, such as a lack of technical skills, difficulties in fostering a digital culture within schools, and limited access to support resources, as well as proposing solutions to address these challenges. As a concrete step, this study employs face-to-face interviews with five experts selected through purposive sampling. This approach adapts the characteristics of McKillip's Discrepancy Model, which emphasizes normative expectations and expert evaluations (McKillip, 1987). Data obtained from these interviews are analyzed thematically to identify key themes and propose elements to be included in a digital leadership competency model for school principals. By adopting this approach, the study provides a comprehensive understanding of the needs and challenges faced by school principals in their roles as digital leaders. Moreover, it establishes a solid foundation for developing a relevant and practical competency model. This needs analysis ensures that the proposed model effectively addresses the real requirements of the education sector in the digital era. Here is a table of key findings on digital leadership competencies:

### **Research Questions**

Research questions serve as the foundation for any study, particularly in a needs analysis, by defining the scope, focus, and direction of the research. In this study, the research questions are formulated to address the specific objectives of exploring challenges faced by school principals as digital leaders and analyzing the requirements for developing a digital leadership competency model tailored to the Malaysian context. The study employs semi-structured interviews with five experts including educational digital leadership specialist and school leaders. This qualitative approach ensures a deeper exploration of insights while allowing flexibility to probe further into significant issues raised by the experts. The research questions have been crafted to guide the data collection and analysis process, ensuring the study remains focused on its objectives and produces actionable outcomes. By answering these questions, the study aims to bridge the gap between the current realities faced by school principals and the

ideal competencies required for digital leadership. The findings will provide evidence-based recommendations for developing a competency model that is not only theoretically robust but also practically applicable in Malaysian schools. Additionally, these research questions ensure the study remains aligned with the broader goals of empowering school principals to lead digital transformations effectively, thereby enhancing the overall quality of education in the digital era. They reflect a systematic and targeted approach, ensuring that the needs analysis captures critical information for designing a relevant and impactful competency model. Here are the research questions;

- i) What are the key challenges faced by school principals in Malaysia in their roles as digital leaders, as identified by experts?
- ii) What are the essential needs and components required to develop an effective digital leadership competency model for school principals in Malaysia, based on expert insights?

## Method

This study employs the Design and Development Research (DDR) approach to develop a Digital Leadership Competency Model for school principals in Malaysia. DDR was chosen because it is a systematic and structured research method that is particularly suitable for studies involving model or framework development (Jamil & Noh, 2020). According to Richey and Klein (2007), DDR consists of three key phases: Needs Analysis, Design and Development, and Evaluation (including usability testing). This approach ensures the research is grounded in empirical evidence, allowing for the systematic development, validation, and refinement of educational models. DDR is widely used in educational research, particularly in areas related to educational technology and curriculum development, as it provides valid and reliable data to support the creation of practical and applicable solutions (Siraj et al., 2013). One of the main advantages of DDR is its structured and iterative nature, which ensures that the competency model developed is based on expert-driven insights and real-world needs. This study focuses on the Needs Analysis Phase, utilizing a qualitative research design to gather expert insights on the necessity of a digital leadership competency model for school principals. A semi-structured interview method was employed, involving five experts selected through purposive sampling. These experts comprised educational technology specialists, school leadership experts, and educational model developers, ensuring diverse perspectives relevant to the study. To guide the data collection process, an interview protocol was developed based on themes identified from a comprehensive literature review. Before conducting the interviews, the protocol underwent expert validation to ensure clarity in language, content accuracy, and qualitative rigor. The interviews were conducted face-to-face, allowing for an in-depth exploration of expert perspectives. With informed consent, the interviews were audio-recorded and later transcribed verbatim. The transcriptions were validated by the informants before being coded and analyzed thematically following the framework outlined by Cohen, Manion, and Morrison (2013). The population for this study consisted of experts in education, school leadership, and educational technology, with a minimum of five years of experience, as suggested by Berliner (2004). The sample size of five experts was determined based on the need for thematic saturation in qualitative research. Data management posed several challenges, including expert availability, as scheduling interviews with highly experienced informants required flexibility due to their professional commitments. Additionally, ensuring the accuracy of transcriptions necessitated careful review and verification to maintain the integrity of the data. Thematic analysis was used to systematically identify key themes related to digital leadership competencies, ensuring that the findings from the Needs Analysis Phase

would effectively inform the subsequent design and development of the competency model. By employing a rigorous qualitative research approach, this study ensures that the Digital Leadership Competency Model is developed based on expert-driven insights, enhancing its relevance and applicability within the Malaysian school leadership context.

### Research Findings

Five experts were involved in this study, all with more than five years of experience in their respective fields, including educational technology, school leadership, and educational model development. The informants were selected based on their expertise and experience, which provided valuable insights into the challenges and needs of school principals in Malaysia regarding digital leadership. The experts were chosen using purposive sampling to ensure that the data collected was relevant and accurate in addressing the research objectives.

**Table 2: Demographic of Study Informants**

Informants	Year of Service	Current Position	Workplace Location
P1	More than 20 years	School Principal	Kuala Lumpur
P2	More than 20 years	School Principal	Selangor
P3	More than 20 years	IAB Lecturer	Pahang
P4	More than 20 years	IAB Lecturer	Negeri Sembilan
P5	More than 20 years	KPM Senior Officer	Putrajaya

Table 2 provides an overview of five informants, all with more than 20 years of service, highlighting their extensive professional experience in the Malaysian education system. Two of the informants, P1 and P2, are school principals based in Kuala Lumpur and Selangor, respectively. They bring valuable insights from their leadership roles in schools. P3 and P4 are lecturers at the Institute Aminuddin Baki (IAB), located in Pahang and Negeri Sembilan, respectively, offering perspectives rooted in educational training and capacity-building. P5 serves as a senior officer in the Ministry of Education (KPM), stationed in Putrajaya, contributing expertise from a policy and administrative standpoint. Collectively, these informants represent a broad spectrum of roles and locations, ensuring diverse viewpoints for the study. Based on the verbatim transcription analysis, the experts agreed that there is a clear need to develop a digital leadership competency model for school principals in Malaysia to effectively navigate the challenges of the digital era. The need for such a model is driven by the increasing demand for school principals to lead digital transformation while ensuring the continuity of educational excellence.

### *Key Challenges Faced by School Principals in Malaysia as Digital Leaders*

In today's rapidly evolving educational landscape, the role of school principals has become more complex, especially in the face of digital transformation. In Malaysia, as in many other countries, digital leadership has become a crucial aspect of educational reform. However, despite the increasing demand for technology integration, school principals in Malaysia face a range of challenges that significantly hinder their ability to lead digital transformation efforts effectively. This research, based on semi-structured interviews with experts in educational leadership, highlights the primary barriers school principals encounter, spanning technical, cultural, financial, and operational domains. The following sections present a deeper exploration of these challenges;

### ***1. Digital Skills Gap Among Teachers and School Staff***

The digital skills gap among teachers and school staff is perhaps the most significant barrier to successful digital leadership. School principals rely on their staff to implement technology-enhanced teaching and learning strategies, yet many teachers face challenges in adapting to these tools effectively. According to the experts interviewed, a large portion of the teaching workforce in Malaysia lacks the necessary skills to use digital tools in their classrooms. This is particularly evident in rural areas, where access to professional development opportunities is limited. One expert explained, “Many teachers are not comfortable with using digital tools, and their level of competence varies widely. Some teachers struggle to even use basic software like word processors, let alone integrate complex digital learning platforms into their classrooms.” This skills gap manifests in several ways. For instance, teachers may be unable to incorporate interactive technologies that enhance student engagement or fail to leverage data analytics tools to track student progress. Without sufficient digital literacy, the benefits of technology integration are significantly diminished. Additionally, teachers often lack knowledge in key areas such as digital pedagogy, which is the effective use of digital tools for teaching and learning. “Digital tools are only effective if used properly, but many teachers still apply traditional teaching methods to digital platforms. They use digital tools in a way that doesn't fully capitalize on their potential,” said an expert. This mismatch between technology and pedagogy further compounds the difficulties faced by school principals who are attempting to lead digital transformation. Experts suggest that ongoing, targeted professional development is crucial. However, as will be discussed later, continuous training opportunities are scarce due to financial and logistical constraints.

### ***2. Inadequate Technological Infrastructure and Resources***

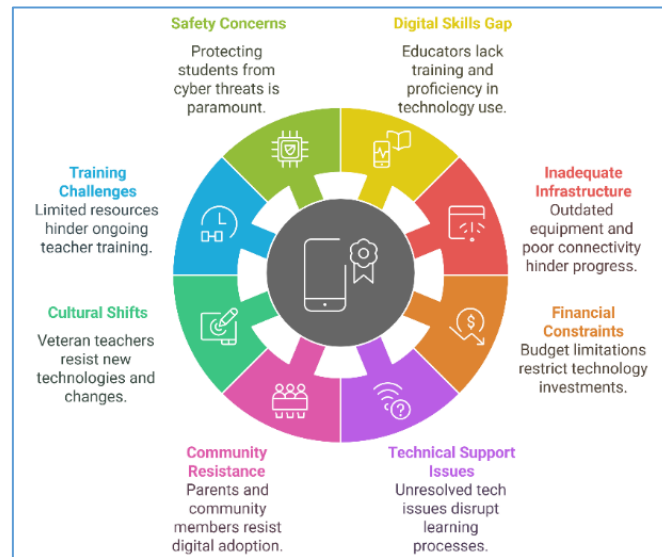
Another significant challenge faced by school principals is the lack of adequate technological infrastructure. Experts agree that many schools, particularly those in rural or less affluent areas, lack the basic resources required for effective digital transformation. “Access to technology is uneven across the country,” stated one expert. “While some schools in urban areas are well-equipped with computers, tablets, and high-speed internet, schools in rural areas often struggle with outdated equipment or even a lack of electricity and internet connectivity.” This gap in technological infrastructure creates a stark divide in the educational experience of students, with those in under-resourced schools facing significant disadvantages in terms of their ability to engage with digital learning platforms. In many cases, schools simply do not have the financial means to invest in the necessary resources. The shortage of hardware (e.g., laptops, projectors, and tablets) and reliable internet access means that even if teachers are willing and able to incorporate digital tools, they are limited by their physical environment. Experts also pointed out that some schools still rely on outdated equipment, such as old desktop computers that are slow, incompatible with modern software, or lacking basic functionalities. As one expert noted, “The hardware is often a major stumbling block. Some teachers are trying to teach using 10-year-old computers, which is not only inefficient but also discourages the use of digital tools.” Without the proper infrastructure, digital leadership efforts are undermined. For example, school principals may have great plans for integrating technology, but without the necessary resources, those plans cannot be executed. This challenge highlights the need for targeted investment in school infrastructure to ensure equitable access to technology for all students and educators.

### ***3. Financial Constraints***

Financial limitations are another key challenge that hampers the ability of school principals to lead digital transformation. Education budgets in Malaysia are often stretched thin, with funds allocated primarily to other needs, such as teacher salaries, school maintenance, and educational materials. As a result, there is little left to invest in digital tools and resources. “One of the biggest challenges for school principals is securing funding for digital transformation,” said an expert. “Most schools have tight budgets, and the money available is not enough to cover the costs of training, equipment, software, or maintenance.” These financial constraints mean that schools are unable to update their technological infrastructure regularly, making it difficult to keep pace with technological advancements. Even when funds are available, they may not be sufficient to meet the demands of digital transformation. This issue is particularly pronounced in government schools, where budget allocations are limited and not flexible enough to accommodate technology upgrades. Moreover, school principals often struggle to justify the cost of digital transformation to stakeholders, including parents and the community, who may not fully understand the importance of technology in education. As one expert explained, “There is often a reluctance from parents to spend money on digital tools if they don't see the immediate benefits for their children. Convincing the school board and the community to invest in technology can be a real challenge.” Given these financial constraints, school principals are often forced to look for alternative funding sources, such as government grants, corporate sponsorships, or donations. However, these sources are often unreliable and insufficient to meet the long-term needs of schools.

### ***4. Absence of Continuous Technical Support***

Once the digital tools are introduced and teachers are trained, many schools struggle with a lack of ongoing technical support. While initial training is often provided, there is little follow-up or support to ensure that teachers and staff continue to use the tools effectively. “When problems arise with the technology, there is no one readily available to assist,” said one expert. “Teachers often have to rely on their troubleshooting skills or wait for external support, which can be slow and inefficient. “This gap in technical support can significantly undermine the effectiveness of digital transformation efforts. Teachers may become frustrated with malfunctioning equipment, software glitches, or technical issues that hinder their ability to teach. As a result, they may abandon digital tools or revert to traditional teaching methods, further exacerbating the digital divide. School principals also struggle to find staff members who are qualified to provide technical support on an ongoing basis. Many schools do not have dedicated IT personnel, and even if they do, these individuals often have other responsibilities. One principal shared, “We have one IT staff member for the entire school, and they are often overwhelmed with other duties. As a result, technical issues are not addressed promptly, which disrupts teaching and learning.” Continuous technical support is critical for the successful integration of technology into education. Without it, teachers and school principals are left to face the challenges of technology alone, which can lead to disillusionment and a lack of engagement with digital tools.



**Figure 5: Key Challenges Faced by School Principals**

### ***5. Resistance or Confusion Among Parents and the School Community***

A significant cultural challenge highlighted by experts is the resistance or confusion among parents and the broader school community about the need for digital transformation in schools. Many parents are sceptical about the value of digital tools in education, especially if they perceive them as a distraction or as replacing traditional methods. "Parents often don't understand the value of digital tools and see them as unnecessary," noted one expert. "They are used to the traditional way of teaching and may not be willing to embrace new approaches." This resistance can be compounded by concerns about screen time and the potential negative effects of technology on children's health and development. Some parents fear that excessive use of digital devices may lead to physical and mental health issues, such as eye strain, poor posture, and addiction to screens. As a result, parents may oppose the integration of technology into their children's education, creating a barrier for school principals trying to implement digital transformation. Experts also pointed out that some parents may be confused about the purpose of digital learning. "There's often a lack of understanding about what digital education entails," said one expert. "Parents may not know that digital tools can be used to support personalized learning, enhance student engagement, and improve outcomes." For school principals, this resistance can lead to tension with parents and hinder their efforts to promote digital initiatives. Building trust and educating the community about the benefits of digital transformation is therefore essential.

### ***6. Challenges in Changing the Culture and Attitudes Toward Technology***

Changing the culture and attitudes towards technology within schools is another significant challenge. Many teachers and administrators still hold traditional views about education and may be reluctant to adopt digital tools. "There is a cultural shift that needs to happen, but it's difficult to move people away from what they know and are comfortable with," explained one expert. This resistance is often rooted in a fear of change or a lack of confidence in using technology. For some teachers, the digital transformation may seem overwhelming or unnecessary, particularly if they have been successful using traditional methods. "Teachers are comfortable with the way they have been teaching for years, and it can be difficult to convince them that digital tools will enhance their practice," said an expert. School principals play a crucial role in driving cultural change, but this task is challenging. Principals must not only

encourage teachers to embrace digital tools but also create an environment where innovation is supported and failure is seen as part of the learning process. "Changing attitudes towards technology requires ongoing support, encouragement, and sometimes a change in mindset," said one expert.

### ***7. Constraints in Providing Continuous Training and Guidance***

Ongoing professional development is crucial for helping teachers stay updated with the latest digital tools and pedagogical strategies. However, many schools face constraints in providing continuous training and guidance to staff. "Training is often sporadic, and there is no consistent program in place to help teachers keep up with the ever-evolving digital landscape," stated one expert. In many cases, professional development opportunities are limited to occasional workshops or one-off seminars, which are not enough to ensure that teachers are continuously improving their digital skills. Additionally, teachers may struggle to apply what they learn in training sessions due to the lack of support or follow-up. "Without ongoing guidance, it's difficult for teachers to integrate new knowledge into their teaching practices," said an expert. To overcome this challenge, experts suggest that schools invest in long-term, structured professional development programs that provide teachers with continuous learning opportunities. Such programs could include online courses, peer mentoring, and collaborative learning communities.

### ***8. Demand for Ensuring a Safe Digital Environment***

Finally, ensuring a safe and secure digital environment for students remains a top priority for school leaders. As technology becomes more integrated into education, the risks associated with cybersecurity, data privacy, and online safety have increased. Experts emphasized the importance of protecting students from online threats, such as cyberbullying, inappropriate content, and online predators. "We need to make sure that our students are not only digitally literate but also digitally safe," one expert said. "This means providing education on responsible online behaviour, implementing strong data protection policies, and ensuring that students' personal information is secure." The demand for cybersecurity expertise has placed an additional burden on school principals, many of whom lack the technical knowledge to manage digital safety effectively. Ensuring that students can learn in a secure and protected digital environment is a challenge that requires constant vigilance and expertise. Here's a table summarizing the key challenges faced by school principals in Malaysia as digital leaders:

**Table 3: Key Challenges Faced by School Principals in Malaysia as Digital Leaders**

<b>No.</b>	<b>Challenges</b>	<b>Description</b>
1	Digital Skills Gap Among Teachers and School Staff	Many teachers lack the necessary skills to effectively integrate digital tools into teaching. This issue is more pronounced in rural areas where professional development opportunities are limited.
2	Inadequate Technological Infrastructure and Resources	Schools, especially in rural areas, face challenges in accessing modern equipment, reliable internet, and updated software, which limits digital transformation efforts.
3	Financial Constraints	Limited budgets restrict schools from investing in digital tools, training, and infrastructure, making it difficult to keep pace with technological advancements.

No.	Challenges	Description
4	Absence of Continuous Technical Support	Many schools lack dedicated IT personnel to provide ongoing technical assistance, causing teachers to abandon digital tools due to unresolved technical issues.
5	Resistance or Confusion Among Parents and the School Community	Parents often misunderstand or resist digital transformation, fearing negative impacts such as excessive screen time or questioning the effectiveness of digital learning.
6	Challenges in Changing the Culture and Attitudes Toward Technology	Teachers and administrators accustomed to traditional teaching methods may resist adopting digital tools due to fear of change or lack of confidence in using technology.
7	Constraints in Providing Continuous Training and Guidance	Professional development opportunities are sporadic and inconsistent, preventing teachers from staying updated with evolving digital tools and pedagogical strategies.
8	Demand for Ensuring a Safe Digital Environment	School leaders must address cybersecurity, data privacy, and online safety concerns to protect students from cyber threats, but they often lack the necessary expertise.

### ***Essential Needs for a Digital Leadership Competency Model for School Principals***

Based on the second research question, the findings highlight several essential needs and components that must be included in the development of an effective model. These components will enable school principals to navigate the complexities of digital leadership and drive transformation in schools;

#### ***1. Clear Guidelines for Digital Leadership***

One expert emphasized that “Principals must have a structured roadmap that provides them with a clear understanding of their roles and responsibilities in driving digital transformation.” This expert stressed the importance of clear guidelines to ensure that principals are fully aware of what is expected in leading digital initiatives. Another informant further added, “These guidelines should include specific strategic steps and measurable standards, which will act as a reference for principals to track their progress and evaluate their effectiveness.” This indicates that the model should offer strategic steps, implementation methods, and competency standards that can guide school principals through the digital leadership journey.

#### ***2. Self-Assessment Model for Principals***

An informant remarked, “A self-assessment model allows principals to evaluate their competencies systematically, which is crucial for their growth.” This model, they explained, helps principals identify their strengths and weaknesses, ultimately allowing them to focus on areas that need improvement. Another expert stated, “This model provides a framework for professional development, helping principals tailor their growth plans based on identified gaps.” This self-assessment component would help principals take ownership of their growth and ensure that their professional development efforts are targeted and focused.

#### ***3. Ethics and Cybersecurity***

The importance of ethics and cybersecurity was consistently highlighted by the informants. One expert shared, “Principals need to promote digital ethics to ensure that both teachers and students behave responsibly online. This includes safeguarding personal information and

encouraging ethical conduct on digital platforms.” Another informant echoed this, stating, “Cybersecurity must be a priority for school principals. The protection of student and staff data is non-negotiable, and principals must be well-versed in implementing security measures to guard against potential threats.” These perspectives emphasize that ethical behaviour and cybersecurity are essential components in fostering a safe and responsible digital environment within schools.

#### 4. Collaboration and Building Networks

Collaboration was noted as another key element by one expert, who stated, “Principals must be skilled in creating collaborative networks, both inside and outside the school. This helps schools remain innovative and ensures that all stakeholders are aligned in their digital transformation efforts.” Another informant highlighted, “Digital leadership is not a solo effort; it requires fostering a sense of shared responsibility among teachers, staff, students, and even external partners, which can be achieved through collaborative networks.” The informants emphasized that collaboration is central to achieving shared goals and fostering a supportive environment for digital initiatives.

#### 5. Community Engagement and Support

The role of the community in digital transformation was also discussed in detail by the informants. One expert said, “Engaging the community, including parents, school associations, and other stakeholders, is critical in ensuring that digital transformation is fully supported and successful.” Another informant shared, “When parents and the wider community are informed and involved, they are more likely to provide the necessary resources and advocate for digital initiatives.” This illustrates the importance of community engagement in driving and sustaining digital transformation. Another expert explained, “Engaging with the community helps address resistance, especially from parents who may have concerns about technology in education. It is essential to align the school’s digital vision with the community’s expectations and values.”



**Figure 6: Essential Needs for a Digital Leadership Competency Model for School Principals**

In developing a comprehensive digital leadership competency model for school principals, several essential components have been identified. These elements are crucial for guiding school leaders through the complexities of digital transformation and equipping them with the necessary skills and resources to drive change within their schools. Based on expert insights, the following table outlines the key needs that should be addressed to support principals in their role as digital leaders. These needs encompass strategic guidance, self-assessment, ethics,

collaboration, and community involvement, all of which are vital for fostering a successful digital environment in educational institutions.

**Table 4: Key Findings for Essential Needs of a Digital Leadership Competency Model for School Principals**

No.	Essential Needs	Description
1	Clear Guidelines for Digital Leadership	A structured roadmap outlining principals' roles and responsibilities in digital transformation, including strategic steps and measurable standards for tracking progress.
2	Self-Assessment Model for Principals	A framework enabling principals to evaluate their digital leadership competencies, identify strengths and weaknesses, and tailor their professional development accordingly.
3	Ethics and Cybersecurity	Ensuring that principals promote digital ethics, safeguard personal information, and implement cybersecurity measures to protect students and staff from digital threats.
4	Collaboration and Building Networks	Encouraging principals to foster internal and external collaborative networks to align stakeholders and drive innovation in digital transformation efforts.
5	Community Engagement and Support	Actively involving parents, school associations, and stakeholders to gain support, resources, and alignment between school digital initiatives and community expectations.

### Discussions

The findings from the semi-structured interviews reveal that school principals in Malaysia face numerous challenges in their roles as digital leaders. One of the key challenges is the significant digital skills gap among teachers and school staff, as many educators lack the necessary competencies to integrate technology into their teaching practices effectively. This slows down the adoption of digital tools and places additional pressure on principals to provide ongoing professional development and training. Furthermore, insufficient technological infrastructure in many schools, including limited access to modern devices, high-speed internet, and digital learning tools, further hinders the effective implementation of digital education initiatives. Financial constraints exacerbate these challenges, particularly in rural or lower-income areas, where schools struggle to allocate budgets for purchasing essential technology, conducting regular training sessions, and maintaining digital infrastructure. Another major challenge is the lack of continuous technical support, as schools often do not have immediate access to IT experts, causing delays in resolving technical issues and creating frustration among staff and students. Additionally, resistance from parents and the broader school community further complicates digital transformation efforts. Many parents may not fully understand the benefits of digital technology in education and may express concerns over online security and privacy. Similarly, cultural resistance among educators, particularly those with long tenures, poses a challenge, as some teachers prefer traditional teaching methods over digital tools. To address this, principals must lead by example, foster a culture of innovation, and implement strategic measures to encourage digital adoption. Moreover, logistical, financial, and time constraints make it difficult to provide continuous professional development, preventing teachers from keeping up with technological advancements. Finally, ensuring a safe digital environment is a major concern, as increasing technology use in schools raises issues such as cyberbullying,

online predators, and data privacy breaches. To counter these risks, principals must invest in robust cybersecurity measures and promote a culture of online safety to protect students' well-being. These findings emphasize the multifaceted nature of digital leadership in schools and the urgent need for a structured competency model to support principals in navigating these challenges. The study identifies several key components necessary for an effective Digital Leadership Competency Model for school principals in Malaysia. First, clear guidelines should be established to provide a structured roadmap outlining the roles, strategic steps, implementation methods, and measurable competency standards for digital leadership. This will ensure consistency and clarity in principals' leadership practices. Second, a self-assessment model is essential for principals to evaluate their competencies, identify strengths and weaknesses, and tailor their professional development efforts accordingly. By engaging in ongoing self-reflection, principals can enhance their leadership effectiveness and address areas requiring improvement. Another crucial component is the emphasis on digital ethics and cybersecurity, ensuring that school principals create a responsible and secure digital environment that protects sensitive data and upholds ethical standards. Effective digital leadership also requires strong collaboration skills, enabling principals to build networks within the school and with external partners to foster shared responsibility for digital transformation. Engaging with parents, school associations, and other stakeholders is equally important to address resistance, secure resources, and gain support for digital initiatives. Such community involvement strengthens the school's capacity to implement and sustain digital transformation efforts.

This study successfully achieved its objectives by identifying the challenges faced by school principals in digital leadership and proposing a structured Digital Leadership Competency Model that addresses these challenges. The findings provide empirical evidence supporting the need for a systematic framework to guide school principals in leading digital transformation effectively. This study contributes to the field of educational leadership and digital transformation by offering a well-defined Digital Leadership Competency Model tailored to the Malaysian educational context. The model serves as a practical framework for school principals, policymakers, and educational stakeholders to enhance digital competency in schools. Additionally, this research provides valuable insights into the challenges of digital leadership, enabling stakeholders to develop targeted training programs, policies, and support systems to strengthen school leadership in the digital era. While this study provides a foundation for digital leadership competency development, future research could expand on its findings by conducting quantitative studies to measure the impact of digital leadership competencies on school performance. Further studies could also explore longitudinal research to examine how digital leadership competencies evolve over time and assess the effectiveness of professional development programs in strengthening principals' digital leadership skills. Additionally, future research may consider expanding the sample size and incorporating perspectives from teachers, students, and parents to provide a holistic view of digital transformation in schools.

### **Summary**

In conclusion, this study highlights the critical challenges faced by school principals in digital leadership and underscores the need for a structured Digital Leadership Competency Model to support effective digital transformation. The model incorporates clear guidelines, self-assessment mechanisms, ethical considerations, collaboration strategies, and stakeholder engagement to empower principals in leading digital innovation in schools. By addressing key

barriers such as digital skills gaps, technological infrastructure limitations, financial constraints, and cultural resistance, this study provides a comprehensive framework for enhancing digital leadership in Malaysian schools. Future research should continue to explore ways to strengthen digital leadership competencies and ensure sustainable and effective digital transformation in education.

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