

# Assessing Digital Leadership of Middle Leaders in Malaysian Primary Schools

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## ABSTRACT

Middle leaders play a pivotal role in promoting digital initiatives and supporting instructional transformation. As digital transformation accelerates in educational settings, understanding teachers' perceptions of middle leaders' digital leadership has become critical. The research objectives of this quantitative study are to examine the level of digital leadership and its dimensions among middle leaders in primary schools. A total of 260 participants from the Northern Zone of Malaysia were selected through a multistage sampling technique. Data were collected using an adapted questionnaire with a ten-point Likert Scale, and analyzed descriptively, including mean and standard deviation, using the Statistical Package for the Social Sciences (SPSS) Version 26. The findings reveal that middle leaders exhibit a moderate-high level of digital leadership ( $M = 5.77$ ,  $SD = 0.598$ ) on a 10-point Likert scale. Among the dimensions, Support and Empowerment (SE) and Professional Learning (PL) recorded the highest means ( $M = 5.87$ ), underscoring the prioritization of teacher capacity building and collaborative digital integration. Conversely, the Assessment and Feedback (AF) dimension scored the lowest ( $M = 5.49$ ), suggesting that digital assessment practices remain underdeveloped among middle leaders. The study contributes to ongoing discussions on differentiated digital leadership competencies and emphasizes the need for balanced engagement across all dimensions of digital leadership. In conclusion, leadership development programs should emphasize assessment and feedback mechanisms. Tailored coaching and reflective practices could enhance digital leadership among middle leaders in schools.

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## 1. Introduction

The integration of digital technologies in education has become a transformative force, reshaping teaching and learning globally. As middle leaders hold a crucial role in navigating these changes, their digital leadership practices directly influence teachers' capacity to employ these technologies effectively. It is critical to highlight that while substantial literature focuses on principal leadership in fostering digital transformation, there remains a notable gap

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concerning the specific practices of middle leaders in this context. Middle leaders are positioned to provide essential support for professional development initiatives aimed at enhancing teachers' digital competencies. Research indicates that innovative leadership is vital in facilitating educational transformations, emphasizing that such leaders should possess a vision and a strong commitment to engendering change within their institutions (Halimah et al., 2024; Mallillin, 2022). Furthermore, as indicated by the review conducted by Lipscombe et al. (2021), middle leaders facilitate communication between senior management and teaching staff, thereby mediating the adoption of digital initiatives in schools. This pivotal function is compounded by the unique challenges they face, such as balancing their teaching responsibilities with leadership demands, which necessitates a supportive organizational culture that can elevate their role as change agents (Fang & Wang, 2024; Bush, 2023).

Empirical evidence in the Malaysian context shows that teachers' perceptions of their middle leaders' digital leadership are crucial for understanding the broader application of technology in education. Luo and Wang (2024) asserts that collaboration between teachers and leaders enhances educational outcomes, particularly when embracing technological advancements. This aligns with findings by Fengchao and Mingchi (2023), who argue that effective leadership during the digital transformation phase promotes innovative teaching practices essential for fostering student engagement and autonomous learning. Additionally, the work of Brunner et al. (2023) underscores the significance of digital leadership in orchestrating technology-driven changes, echoing the sentiment that leadership's approach can facilitate or hinder the seamless integration of technological resources within the educational framework.

With the COVID-19 pandemic further emphasizing the necessity for adaptive leadership, it becomes increasingly clear that middle leaders can drive substantial innovation by fostering a conducive environment for knowledge sharing and continuous professional growth (Nugroho et al., 2021). This innovative culture is intrinsic to their roles, as they are tasked with guiding educational reform while ensuring that teachers are well-supported in their use of technology (Shaked, 2023). Thus, the need for focused research examining teachers' perceptions of middle leaders' digital leadership practices emerges as critical, particularly about understanding how these middle leaders can be better supported to fulfill their roles effectively in a rapidly evolving educational landscape. In summary, middle leaders play an indispensable role in the effective digital transformation of education. Therefore, the main objective of this research is to examine the level of digital leadership among middle leaders in Malaysian primary schools. This research will not only fill the current research gaps but also inform future leadership training and development initiatives aimed at harnessing the full potential of digital technologies in education.

### **1.1 Research Objectives**

This research aims to achieve the following research objectives:

- To examine the overall level of digital leadership among middle leaders in Malaysian primary schools.
- To examine the level of digital leadership dimensions among middle leaders in Malaysian primary schools

## **2. Literature Review**

### **2.1 Digital Leadership in Education**

Digital leadership has emerged as a cornerstone of effective digital transformation in educational institutions. It involves the strategic use of digital tools to enhance organizational performance, teaching quality, and innovation culture (Sukandi, 2024). While traditionally associated with top-level administrators, recent research highlights the growing influence of middle leaders, such as department heads and teacher leaders, in driving this transformation (Fitriani et al., 2023). Ridho et al. (2023) identify three core dimensions of digital leadership: the application of digital tools, critical reflection on their impact, and strategic actions that support school-wide change. Middle leaders are uniquely positioned to operationalize these dimensions by translating institutional vision into classroom practice. As Brunner et al. (2023) note, they serve as mentors and facilitators, guiding their teams through the complexities of

technology integration. Their support is vital not only for adoption but also for fostering environments that encourage pedagogical innovation (Hamzah et al., 2021; Sari et al., 2023). While the literature acknowledges the importance of digital leadership and the emerging role of middle leaders, there is limited empirical research that specifically measures the extent and effectiveness of digital leadership practices among middle leaders. This study aims to fill that gap by assessing the level of digital leadership demonstrated by middle leaders and identifying the factors that influence their leadership capacity in digital contexts.

## **2.2 Middle Leaders in Education**

Middle leaders occupy a dual role that blends administrative oversight with pedagogical leadership. This positioning enables them to influence both teacher development and student outcomes, particularly in digitally evolving schools. Edwards-Groves et al. (2023) emphasize their role in professional development, curriculum alignment, and mentoring, functions that are critical for sustaining innovation. Their impact is especially evident in technology integration. Alajmi (2022) found that strong digital leadership among middle leaders correlates with improved teacher engagement and student performance. By modeling effective technology use and fostering a culture of collaboration, middle leaders help embed digital practices into everyday teaching (Ridho et al., 2023). Moreover, they play a key role in shaping digital pedagogy. Väättäjä and Ruokamo (2021) argue that meaningful integration of technology requires shifts in teacher and student roles, which middle leaders can facilitate through strategic support and professional learning. Acting as intermediaries between senior leadership and classroom teachers, they ensure that digital initiatives are both practical and pedagogically sound (Riski et al., 2023). Although the literature outlines the responsibilities and potential of middle leaders in digital transformation, there is a lack of detailed analysis on how these leaders perceive their digital leadership roles and how effectively they enact them. This study addresses this gap by exploring middle leaders' self-assessed digital leadership competencies and the contextual factors that support or hinder their leadership in practice. In summary, middle leaders are instrumental in bridging strategic goals with classroom realities. Their leadership not only supports digital adoption but also cultivates a sustainable culture of innovation, making them central to 21st-century educational leadership.

## **2.3 Related Past Studies**

The increasing emphasis on digital transformation in education has reshaped leadership dynamics, extending beyond principals to include middle leaders such as department heads and teacher-leaders. These individuals are now recognized as key agents in cultivating digital teaching cultures and facilitating technology integration at the instructional level (Niu, 2025; Terania, 2023). Unlike previous literature that focused predominantly on top-level leadership, emerging studies underscore the strategic importance of middle leaders in bridging institutional goals with classroom realities. Middle leaders influence teachers' digital engagement through modeling, mentoring, and fostering collaborative environments. Sunu (2022) emphasizes that leadership support, particularly from middle leaders, significantly affects teachers' willingness to adopt ICT, suggesting that relational and instructional leadership are critical to successful digital integration. This aligns with findings from Antonopoulou et al. (2024) and Sari et al. (2024), who highlight the role of middle leaders in promoting experimentation and professional development tailored to digital competencies.

While previous sections addressed the structural and strategic roles of middle leaders, this body of literature adds a relational dimension—how teachers perceive and respond to digital leadership. Xie and Wang (2023) argue that the evolution of digital leadership requires adaptive behaviors from middle leaders, which directly shape the digital learning culture. However, despite growing recognition of their influence, empirical studies exploring teachers' perceptions of middle leaders' digital leadership remain scarce. Much of the existing research continues to prioritize principal leadership (Karaköse et al., 2021), leaving a gap in understanding how middle leaders enact and are perceived in their digital roles. Furthermore, comparative frameworks such as Niu's (2005) and strategic reviews by Terania (2023) suggest that leadership effectiveness varies across contexts, reinforcing the need for localized and role-specific investigations. Benoliel and Schechter (2023) advocate for leadership development programs that reflect these nuanced roles, yet such programs often lack data on middle leaders' actual impact from the perspective of teaching staff. Although literature increasingly acknowledges the importance of middle leaders in digital transformation, there is limited insight into how teachers perceive their digital leadership practices. Therefore, this

study addresses this gap by examining teachers’ perspectives, offering a bottom-up view of their digital leadership. By doing so, it contributes to the development of more responsive leadership models and informs professional development strategies that align with the realities of digital teaching and learning.

### 3. Research Methodology

This quantitative study employed a descriptive survey design to investigate teachers' perceptions of middle leaders' digital leadership practices in Malaysian schools. A total of 260 respondents were selected through a multistage sampling technique, ensuring representation across urban and rural school settings. The sample included teachers from various departments and grade levels, providing diverse insights into middle leaders’ practices. Data was collected using a structured, adapted questionnaire based on validated instruments aligned with ISTE Standards for Leaders and the digital leadership framework. The instrument employed a 10-point Likert scale and consisted of items grouped under key dimensions such as digital vision, instructional leadership, innovation support, and equity-driven technology use. The decision to employ a 10-point Likert scale in this study was guided by the need for finer granularity in capturing respondent perceptions (Joshi et al., 2015; Mohd Rokeman, 2024). Compared to traditional 5- or 7-point scales, the 10-point format allows for more nuanced expression of attitudes, which is particularly beneficial in contexts requiring detailed differentiation. Researchers have also emphasized that larger scales, such as 10-point formats, provide respondents with greater autonomy and flexibility, which can lead to more accurate and meaningful data (Joshi et al., 2015; Mohd Rokeman, 2024).

Before full deployment, the instrument was reviewed by experts and underwent pilot testing to confirm its clarity and reliability. The internal consistency was evaluated using Cronbach’s Alpha, which yielded a value of 0.91, indicating excellent reliability of the instrument. Feedback from participants also highlighted the ease of navigating the 10-point Likert scale and the logical flow of the questionnaire. For the expert review aspect, the inter-rater agreement among experts was calculated using Cohen’s Kappa statistics, which provided a value of 0.81, indicating almost perfect agreement according to Landis and Koch’s (1977) benchmark scale. This result suggests strong content validity and consistency in expert evaluation, affirming that the instrument is suitable for further data collection in the main study. The data collection process was conducted over four weeks, utilizing both online and paper-based formats to maximize response rates. Descriptive statistics, including mean and standard deviation, were used to analyze the data, and the results of each dimension were interpreted based on Table 1 (Nunnally, 1978). Ethical approval was obtained from the relevant institutional research ethics committee. All participants provided informed consent, and confidentiality and anonymity were strictly maintained throughout the study.

**Table 1**  
Range and Its Interpretation

Range	Interpretation
1.00–2.99	Very Low
3.00–3.99	Low
4.00–4.99	Moderate Low
5.00–5.99	Moderate High
6.00–7.99	High
8.00–10.00	Very High

*\*Note. Adapted from Nunnally (1978).*

## 4. Results

### 4.1 Demographic Variables of Respondents

The demographic profile of the 260 respondents in this study offers essential context for interpreting the findings. A majority of the participants were female, comprising 60.8% (n = 158), while male respondents accounted for 39.2% (n = 102). In terms of age distribution, the largest group was between 36–45 years old (40.0%, n = 104), followed by

those aged 26–35 years (32.3%, n = 84), and the remaining 27.7% (n = 72) were aged 46 years and above. Regarding teaching experience, most respondents had between 6–10 years of experience (38.5%, n = 100), followed by those with more than 10 years (34.6%, n = 90), and the rest with 1–5 years of experience (26.9%, n = 70). As for current leadership roles, 43.1% (n = 112) were heads of departments, 28.1% (n = 73) were subject coordinators, and 28.8% (n = 75) held other middle leaders’ positions. Lastly, most respondents were from urban schools (65.0%, n = 169), while 35.0% (n = 91) were from rural schools. Table 2 provides a summary of demographic variables of the respondents in this study.

**Table 2**  
Demographic Profile of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	102	39.2%
	Female	158	60.8%
Age	26–35 years	84	32.3%
	36–45 years	104	40.0%
	46 years and above	72	27.7%
Teaching Experience	1–5 years	70	26.9%
	6–10 years	100	38.5%
	More than 10 years	90	34.6%
Leadership Role	Head of Department	112	43.1%
	Subject Coordinator	73	28.1%
	Other Middle Leaders’ Roles	75	28.8%
School Location	Urban	169	65.0%
	Rural	91	35.0%

#### 4.2 Level of Digital Leadership among Middle Leaders

The study aimed to examine the levels of digital leadership dimensions among middle leaders using descriptive statistical analysis. Table 3 presents the means and standard deviations for each construct measured.

**Table 3**  
Level of digital leadership and its dimensions among middle leaders

Dimension	Mean (M)	Standard Deviation (SD)	Interpretation
Vision and Goal Setting (VG)	5.70	0.765	Moderate-High
Digital Responsibility (DR)	5.84	0.670	Moderate-High
Support and Empowerment (SE)	5.87	0.722	Moderate-High
Standard and Practices (SP)	5.82	0.676	Moderate-High
Professional Learning (PL)	5.82	0.676	Moderate-High
Culture Building (CB)	5.78	0.741	Moderate-High
Assessment and Feedback (AF)	5.49	0.594	Moderate-High
<b>Middle Leader Digital Leadership (MLDL)</b>	<b>5.77</b>	<b>0.598</b>	<b>Moderate-High</b>

Based on Table 3, the overall mean for middle leaders’ digital leadership (M\_MDDL) was 5.77 (SD = 0.598), indicating a moderate-high level of digital leadership on a 10-point Likert scale. Among the dimensions, both dimensions, Support and Engagement (SE) and Professional Learning (PL) recorded the highest means at 5.87 (SD = 0.722 and SD = 0.760, respectively), suggesting that these areas are emphasized by middle leaders. This was followed by Vision and Goal Setting (VG), with a mean of 5.84 (SD = 0.670), and Standard and Practices (SP), with a mean of 5.82 (SD = 0.676). Dimension Culture Building (CB) had a mean of 5.78 (SD = 0.741), slightly above the overall mean. Digital Responsibility (DR) dimension scored 5.70 (SD = 0.765), while the lowest mean was observed for the Assessment and Feedback (AF) dimension, with a mean of 5.49 (SD = 0.594), indicating relatively lower engagement in this area. These

descriptive results suggest varied strengths across dimensions of digital leadership, with notable emphasis on strategic implementation and professional development.

## 5. Discussion

The findings of this study reveal that middle leaders exhibit a moderate-high level of digital leadership across all seven measured dimensions, with an overall mean score of 5.77. This indicates consistent, yet not optimal, engagement with digital leadership competencies. The highest-rated dimensions were Support and Empowerment (SE) and Professional Learning (PL), both with mean scores of 5.87, reflecting the priority given to fostering teacher agency and continuous digital upskilling. When compared to prior studies, such as one by Hanania et al. (2024) where similar patterns emerge, emphasizing empowerment and learning as central to successful digital leadership. The findings of this study are consistent with the literature, emphasizing that middle leaders are pivotal in fostering digital innovation through mentorship, collaboration, and capacity building (Brunner et al., 2023; Ridho et al., 2023). Their role in cultivating a professional learning culture is particularly aligned with findings from Edwards-Groves et al. (2023), who noted that middle leaders drive instructional improvement through targeted support and digital modeling.

In contrast, the Assessment and Feedback (AF) dimension emerged as the lowest-rated ( $M = 5.49$ ), which aligns with international reviews that highlight existing gaps in leveraging data-driven instructional feedback among mid-level leaders (Hasanah & Yusoff, 2024). It also resonates with gaps highlighted in earlier studies, which point to the need for deeper integration of evaluative digital practices (Hamzah et al., 2021). While middle leaders have shown strength in leadership and support roles, the literature confirms a shortfall in leveraging digital tools for ongoing formative assessment (Väättäjä & Ruokamo, 2021), suggesting this is an area requiring strategic attention. Comparatively, the mean scores reflect what Niu (2025) identifies as differentiated leadership competencies, where not all digital leadership domains are uniformly strong. This supports the idea that digital transformation requires more than technical integration, demands strategic alignment across all dimensions, and challenges middle leaders are still navigating.

Recent empirical studies further bolster the results of this study. Shaked (2023) explored instructional leadership among middle leaders and identified that these leaders, while proficient in areas like empowerment and professional learning, often encounter challenges in implementing systematic assessment and feedback mechanisms. Similarly, Hasanah and Yusoff (2024) found that while digital leadership is instrumental in promoting innovation and strategic direction, there remains a significant need for professional development in utilizing technology effectively for assessment and feedback in educational contexts. Dexter and Barton (2021) demonstrated that team-based instructional leadership interventions can enhance digital competencies among middle leaders, potentially addressing the observed deficiencies in data-driven feedback processes. Baldera et al. (2025) also emphasize the need for a comprehensive framework for digital leadership that integrates capacity building with continuous evaluative feedback, essential for achieving optimal digital engagement in educational settings.

The implications of these findings are twofold. Theoretically, they reinforce models of transformational digital leadership where capacity-building initiatives are central. The findings enrich the framework proposed by Sukandi (2024) by emphasizing the nuanced distribution of digital leadership roles beyond senior leaders. Practically, the data suggests the necessity for targeted professional development, particularly in using technology for formative assessment and feedback processes, to bridge identified competency gaps. It is important to note, however, that the study is limited by its descriptive nature and reliance on self-reported data, which may be subject to social desirability bias, and by a geographically bounded sample that limits the generalizability of the results.

Future research should explore longitudinal effects of digital leadership practices, especially in assessment, and include teacher and student outcome data to triangulate perceptions. Furthermore, expanding the study across diverse school types and regions can uncover contextual variations and further refine leadership support models. This research underscores the transformative potential of middle leaders in leading sustainable digital change in education. Exploring causal relationships using inferential statistics and investigating the impact of digital leadership

on teacher innovation or student outcomes through longitudinal or mixed-methods approaches should be emphasized in the future.

## 6. Conclusion

This study examined the level of digital leadership among middle leaders across seven validated dimensions. The findings show a moderate-high level overall, with strong emphasis on Support and Empowerment and Professional Learning, indicating a commitment to teacher development and continuous digital growth. However, lower scores for Assessment and Feedback highlight a gap in using data to inform practice. Importantly, this study focused specifically on middle leaders, a group often overlooked despite their strategic role in bridging policy and practice. By exploring teachers' perceptions, the study provides empirical insights into how middle leaders enact digital leadership in real-world educational settings. This study's insights benefit policymakers, school leaders, and professional development providers by identifying which areas of digital leadership need further support. Addressing these gaps can help design targeted training and build a balanced leadership profile across all dimensions, supporting effective technology integration and sustainable instructional improvement. Future research could explore interventions to strengthen weaker dimensions and measure their impact on student outcomes. In conclusion, these findings contribute to building digitally ready leaders in schools.

## Declarations

### **Acknowledgements**

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### **Competing Interests**

None.

### **Ethical Approval**

This study was granted an exemption from requiring ethics approval as it does not involve human participants or the collection of sensitive personal data. The research is based on the perceptions of teachers via a questionnaire. As such, it adheres to institutional guidelines that classify this type of study as low-risk and not subject to formal ethics approval.

### **Author's Contribution**

Goh Kok Ming 1: Conceptualization, Data curation, Formal analysis, Writing – original draft, Methodology, Resources, Software, Writing – Review and editing, Validation, Investigation

### **Data availability**

The data was collected and analyzed based on statistical descriptive methods. The collection and analysis processes were detailed in the Method section of this study.

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