

Exploring Digital Academic Leadership and Graduate Thesis Supervision: A Qualitative Study at the Faculty of Education, Al-Madinah International University, Malaysia

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Abstract

This qualitative study explores the role of digital academic leadership in enhancing the quality of graduate thesis supervision at the Faculty of Education, Al-Madinah International University, Malaysia. While digital transformation in higher education is well documented, there is limited understanding of how leadership practices, digital tools, and institutional conditions interact to shape supervision quality in specific contexts. To address this gap, data were collected through semi-structured interviews with academic leaders, supervisors, and graduate students, and analyzed using thematic analysis. Four interrelated themes emerged: strategic digital vision as a foundation for organized and transparent supervision, digital tools as enablers of communication and progress monitoring, leadership competencies that strengthen supervisory capacity, and digital infrastructure as a moderating factor influencing leadership effectiveness. The findings indicate that effective digital academic leadership extends beyond the adoption of technology, relying on context-sensitive, strategic, and ethical practices that enhance clarity of guidance, timeliness of feedback, and graduate students' research skill development. By providing empirical, context-specific evidence, this study contributes to a deeper understanding of how digital leadership is enacted in postgraduate supervision and highlights practical implications for higher education institutions. These include the need for targeted leadership development programs, clear institutional policies for digital supervision, and robust infrastructure to support high-quality, sustainable research practices. Overall, the study emphasizes that fostering effective digital

academic leadership is critical for improving supervision quality and developing a resilient research culture in digitally transitioning higher education environments.

Keywords: Digital Academic Leadership, Graduate Thesis Supervision, Supervision Quality, Higher Education, Qualitative Study, Thematic Analysis

Introduction

Higher education is undergoing profound transformation as universities respond to rapid technological advancement, globalization, and increasing expectations for research excellence, institutional accountability, and educational quality. Digital technologies have become integral to academic life, influencing not only teaching and learning but also research management, institutional governance, and postgraduate education. Consequently, digital transformation is no longer viewed as a purely technological initiative; rather, it represents a strategic institutional process that requires universities to align digital innovation with academic values, organizational effectiveness, and sustainable quality assurance (Cheng et al., 2024).

Within this changing environment, academic leadership has assumed a more strategic role in guiding institutional transformation. Academic leaders are increasingly expected to articulate a clear digital vision, foster innovation, strengthen collaboration among academic staff, and create supportive environments that enable effective teaching, research, and supervision. Successful leadership therefore extends beyond the adoption of digital technologies to include the ability to integrate technological innovation with sound academic governance, ethical decision-making, and continuous professional development. Recent studies have emphasized that effective digital academic leadership depends on the interaction of strategic vision, technological competence, communication, and organizational support rather than on technology adoption alone (Jing et al., 2025; Olabiya et al., 2025).

Digital academic leadership has consequently emerged as an important area of research within higher education. It refers to the capacity of academic leaders to strategically employ digital technologies while promoting collaboration, transparency, innovation, and evidence-informed decision-making across academic activities. Unlike traditional leadership models, digital academic leadership recognizes that technology should serve institutional and educational goals rather than become an end in itself. Systematic reviews have consistently shown that institutions demonstrating successful digital transformation are characterized by leaders who combine digital competence with strategic planning, ethical governance, and a strong commitment to improving academic quality (Cheng et al., 2024).

Among the core academic functions influenced by leadership, graduate thesis supervision occupies a particularly important position. Effective supervision plays a critical role in developing postgraduate students' research competence, scholarly identity, critical thinking, and independent research capabilities. High-quality supervision also contributes to timely completion, stronger research productivity, and positive learning experiences. Conversely, inconsistent supervision, delayed feedback, unclear expectations, and limited communication may negatively affect students' academic progress and research outcomes (Polkinghorne et al., 2023).

The growing integration of digital technologies into postgraduate education has significantly reshaped supervisory practices. Online meeting platforms, learning management systems, collaborative digital workspaces, institutional repositories, and electronic progress-monitoring systems have become essential components of contemporary supervision. These technologies offer opportunities to enhance communication, facilitate timely feedback, improve documentation, and increase flexibility for both supervisors and students. Nevertheless, technology alone cannot guarantee effective supervision. Its educational value depends largely on how academic leaders establish institutional policies, support supervisors, coordinate digital practices, and create conditions that encourage meaningful academic interaction.

Recent empirical studies provide increasing evidence of the positive contribution of digital academic leadership to higher education. Cheng et al. (2024) concluded that digital leadership strengthens institutional quality by integrating technological innovation with academic governance and strategic planning. Similarly, Jing et al. (2025) found that effective digital leadership promotes collaboration, improves communication, and enhances organizational adaptability among university leaders. Focusing specifically on postgraduate supervision, Hamzah et al. (2025) reported that leadership support, clear institutional policies, and digital supervision guidelines contribute to more consistent supervisory practices and improved student experiences. Likewise, Polkinghorne et al. (2023) emphasized that supervision quality depends not only on supervisors' expertise but also on institutional structures that promote effective communication, constructive feedback, and continuous academic support.

Despite these important contributions, the existing literature reveals several limitations. Much of the current research examines digital academic leadership from institutional, administrative, or technology adoption perspectives, while comparatively little attention has been given to its influence on graduate thesis supervision as a core academic process. Moreover, previous studies have predominantly employed quantitative or descriptive approaches, providing limited understanding of how digital leadership is enacted and experienced by academic leaders, supervisors, and postgraduate students within their everyday supervisory practices. Consequently, there remains insufficient qualitative evidence explaining how leadership practices, digital tools, supervisory competencies, and institutional conditions interact to influence supervision quality in specific higher education contexts.

This gap is particularly important in universities undergoing continuous digital transformation, where postgraduate supervision increasingly depends on technology-mediated communication and institutional digital systems. Understanding how digital academic leadership shapes supervisory experiences within such contexts can provide valuable insights for improving leadership practice, strengthening supervision quality, and supporting sustainable postgraduate education. Addressing this need, the present study focuses on the Faculty of Education at Al-Madinah International University, Malaysia, where digital technologies have become an integral part of postgraduate supervision and academic management.

Problem Statement

Graduate thesis supervision is a central component of postgraduate education, shaping students' research skills, academic identity, and timely degree completion. Although

supervision practices are expected to be consistent and supportive, internal quality reviews and informal feedback collected by the Faculty of Education at Al Madinah International University in recent academic cycles reveal variability in supervision experiences. Some students reported unclear guidance and delayed feedback, while supervisors noted challenges in coordinating communication and tracking progress, especially when using digital tools introduced during the university's digital transition initiatives. These observations suggest that supervision quality at the Faculty of Education varies not only across programs but also among individual supervisory relationships, pointing to potential issues in institutional leadership and support structures.

Digital technologies offer opportunities to enhance communication, feedback loops, and progress monitoring through asynchronous platforms and shared digital workspaces. However, effective integration of these tools depends on academic leaders' capacity to embed digital systems meaningfully within supervisory processes. Research shows that leadership practices that combine strategic direction, reflective governance, and supportive coordination are critical for technology-enhanced academic work (Nguyen & Sabherwal, 2022). In contrast, weak leadership guidance can contribute to fragmented supervision, unclear expectations, and variable student experiences (Zhu & Engels, 2021).

Beyond technology, the literature on postgraduate supervision highlights the importance of interpersonal and structural facets of supervision quality, including negotiated expectations, clarity of communication, and relational support (Polkinghorne, 2023; Walker, Golde, Jones, Bueschel, & Hutchings, 2008). Yet, few studies have explored how digital academic leadership specifically influences supervision outcomes from the viewpoints of academic leaders, supervisors, and students navigating transitions to digitally supported supervision models.

To address this gap, the present study examines how digital academic leadership including strategic digital vision, leadership competencies, and organizational support affects the quality of graduate thesis supervision at the Faculty of Education, Al Madinah International University, Malaysia. It also explores how supervisors' competencies and the use of digital communication tools mediate this relationship, and how institutional digital infrastructure moderates it. The goal is to generate context sensitive insights that can inform leadership development, policy formulation, and effective supervision practices in higher education.

Research Objectives

Main Objective

- To explore how digital academic leadership influences the quality of graduate thesis supervision at the Faculty of Education, Al-Madinah International University, Malaysia.

Sub-Objectives

1. To determine the strategies and practices that academic leaders use to integrate digital tools, strategic vision, and ethical governance into supervision processes.
2. To examine the challenges and enablers that supervisors experience in applying digital supervision practices.
3. To assess how graduate students, perceive the quality and effectiveness of supervision under digitally informed academic leadership.

4. To explore the role of digital infrastructure and institutional resources in supporting or constraining digital academic leadership and supervision quality.

Research Question

Main Research Question

- How does digital academic leadership influence the quality of graduate thesis supervision at the Faculty of Education at Al-Madinah International University, Malaysia?

Sub-Questions

1. What specific digital leadership practices do academic leaders employ to guide and support graduate supervision?
2. What are the experiences, obstacles, and support mechanisms reported by supervisors in implementing digital supervision strategies?
3. How do graduate students evaluate supervision quality under the influence of digitally competent academic leadership?
4. In what ways does digital infrastructure and institutional support facilitate or limit the effectiveness of digital academic leadership in supervision?

Table 1

Alignment between Research Objectives, Research Questions, and Data Collection Instruments

Research Objective	Research Question	Data Collection Instrument
Main Objective: To explore how digital academic leadership influences the quality of graduate thesis supervision at the Faculty of Education, Al-Madinah International University, Malaysia.	How does digital academic leadership influence the quality of graduate thesis supervision at the Faculty of Education at Al-Madinah International University, Malaysia?	Semi-structured interviews with academic leaders, supervisors, and graduate students; Document analysis of supervision records and guidelines
Sub-Objective 1: To determine the strategies and practices that academic leaders use to integrate digital tools, strategic vision, and ethical governance into supervision processes.	What specific digital leadership practices do academic leaders employ to guide and support graduate supervision?	Semi-structured interviews with academic leaders and supervisors; Analysis of institutional guidelines and digital supervision policies
Sub-Objective 2: To examine the challenges and enablers that supervisors experience in applying digital supervision practices.	What are the experiences, obstacles, and support mechanisms reported by supervisors in implementing digital supervision strategies?	Semi-structured interviews with supervisors; Survey questionnaire capturing supervisor experiences and perceived barriers
Sub-Objective 3: To assess how graduate students perceive the quality and effectiveness of supervision under digitally informed academic leadership.	How do graduate students evaluate supervision quality under the influence of digitally competent academic leadership?	Semi-structured interviews with graduate students; Survey questionnaire capturing student perceptions of supervision quality
Sub-Objective 4: To explore the role of digital infrastructure and institutional resources in supporting or constraining digital academic leadership and supervision quality.	In what ways does digital infrastructure and institutional support facilitate or limit the effectiveness of digital academic leadership in supervision?	Document analysis of digital platforms and resource availability; Semi-structured interviews with academic leaders, supervisors, and students

Significance of the Study

Theoretical Significance

The theoretical significance of this study lies in its contribution to the expanding literature on digital academic leadership in higher education by applying it to the context of graduate thesis supervision, an area that remains underexplored, particularly in institutions undergoing gradual digital transformation.

The study bridges digital leadership theories with academic supervision models by illustrating how strategic digital vision, leadership competencies, digital tools, and institutional infrastructure interact to shape supervision quality.

Moreover, it offers an integrated analytical framework that clarifies the explanatory, mediating, and moderating roles of digital leadership variables, thereby enhancing theoretical understanding of supervision processes in contemporary university settings.

Practical Significance

The practical significance of this study lies in its provision of actionable insights that can support universities particularly the Faculty of Education at Al-Madinah International University, Malaysia in improving graduate supervision policies and practices.

The findings assist academic decision-makers in understanding how digital academic leadership can be effectively leveraged to enhance supervisory communication, monitoring processes, research guidance, and timely thesis completion.

Additionally, the study offers a practical foundation for developing professional development programs for academic leaders and supervisors, as well as institutional guidelines for digital supervision, thereby contributing to improved research quality and a sustainable digitally supported supervision culture.

Operational Definitions

Digital Academic Leadership

Digital academic leadership is operationally defined as the leadership practices and behaviours exercised by academic leaders at the Faculty of Education, Al-Madinah International University, Malaysia (e.g., dean and heads of departments), through the purposeful use of digital technologies, articulation of a clear digital vision, and support for digital tools in guiding graduate thesis supervision. These practices aim to enhance supervision quality and are understood through the perspectives of academic leaders, supervisors, and graduate students as revealed in qualitative interviews.

Strategic Digital Vision

Strategic digital vision is operationally defined as academic leaders' capacity to articulate and pursue a clear, future-oriented direction for integrating digital technologies into graduate thesis supervision. This includes planning, setting priorities, and aligning digital initiatives with postgraduate program goals, as interpreted from interview data provided by academic leaders and supervisory stakeholders.

Leadership Competencies

Leadership competencies are operationally defined as the skills, knowledge, and leadership behaviours demonstrated by academic leaders within a digital academic environment. These competencies include effective digital communication, informed decision-making, academic support, supervision monitoring, and adherence to research ethics, as perceived by supervisors and graduate students participating in the study.

Digital Tools in Academic Supervision

Digital tools in academic supervision are operationally defined as the digital platforms, applications, and technological resources used to support graduate thesis supervision at the Faculty of Education, Al-Madinah International University, Malaysia. These include learning management systems, virtual meeting platforms, academic email, and digital databases, as described by supervisors and graduate students during the data collection process.

Digital Infrastructure

Digital infrastructure is operationally defined as the availability and quality of technological resources that support digital academic supervision at the Faculty of Education, Al-Madinah International University, Malaysia. This includes internet connectivity, institutional platforms, digital databases, and technical support, which function as a moderating context influencing how digital academic leadership affects supervision quality.

Graduate Thesis Supervision Quality

Graduate thesis supervision quality is operationally defined as the effectiveness of the supervision process in terms of clarity of guidance, consistency of communication, quality and timeliness of feedback, adherence to supervision timelines, and support for the development of graduate students' research skills. This concept is understood through the perceptions and experiences of supervisors and graduate students involved in the study.

Theoretical and Conceptual Perspectives

This study draws on three complementary theoretical perspectives to frame an interpretive understanding of digital academic leadership and its influence on graduate thesis supervision. These perspectives provide conceptual lenses appropriate for qualitative inquiry, enabling meanings and practices to emerge from participants' experiences rather than testing causal assumptions.

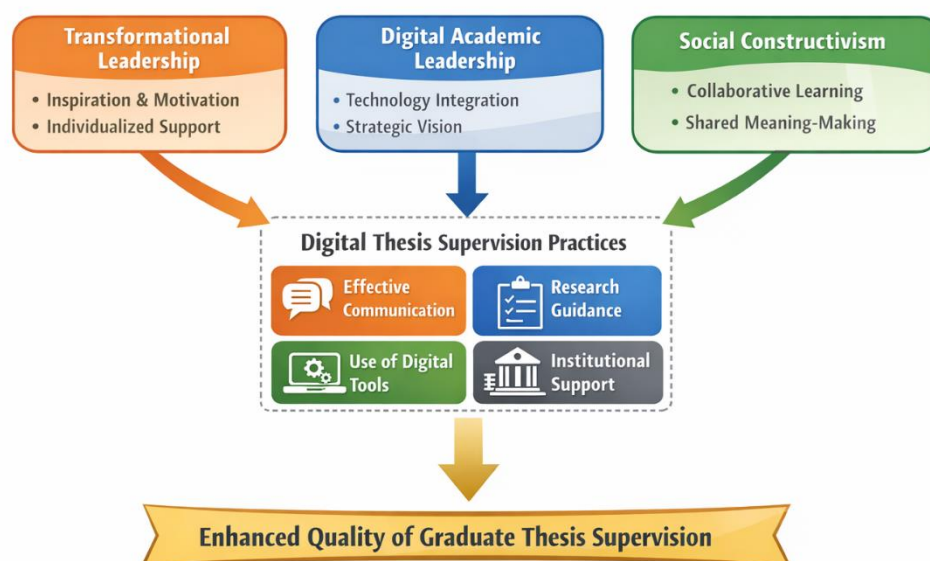
Transformational Leadership offers a foundational perspective for understanding leadership dynamics in academic settings. Transformational leaders inspire and motivate stakeholders by articulating a compelling vision, fostering intellectual stimulation, and providing individualized support. In higher education, transformational leadership has been linked to innovation, collaboration, and organizational effectiveness, showing how leaders influence institutional culture, faculty engagement, and academic practices (Leithwood, K., Harris, A., & Hopkins, D. (2020).

Building on this, Digital Academic Leadership serves as a context specific lens for this research. It encapsulates how academic leaders integrate digital tools, platforms, and technologies with institutional goals, governance structures, and academic values to support quality enhancement. Digital leadership research highlights that in academic contexts, effective

digital leadership includes vision, communication, adaptability, and relationship building, and that these elements are integral for successful digital transformation in higher education (Cheng, Dinh, Caliskan & Zhu, 2024; Karakose et al., 2024).

Finally, Social Constructivist Theory provides a theoretical lens that emphasizes how meaning, knowledge, and practices are socially constructed through interaction, collaboration, and dialogue. From this perspective, leadership and supervision are understood not merely as individual actions but as socially negotiated processes within institutional and cultural contexts (Palincsar, 1998; Stetsenko & Arievidtch, 2004). Social constructivism posits that individuals co-construct understanding through shared experiences and interactions, making this lens relevant for examining supervision quality as it emerges from the relational engagement of leaders, supervisors, and students.

Taken together, these perspectives enable a comprehensive interpretive framework that connects leadership behaviours, digital practices, and social interactions within graduate supervision. Transformational leadership explains leader influence and motivation; digital academic leadership situates these influences in the context of technology integration and institutional strategy; and social constructivism clarifies how shared meanings and interactions shape supervision quality. This integrated conceptual framework supports the study's exploration of how digital academic leadership is enacted and experienced in relation to graduate thesis supervision.



This figure illustrates how transformational leadership, digital academic leadership, and social constructivist principles interact to enhance graduate thesis supervision. Leadership practices, supervisory activities, and institutional digital infrastructure work together to support communication, guidance, feedback, and collaborative knowledge construction, providing an integrated perspective on supervision quality at the Faculty of Education, Al-Madinah International University, Malaysia.

Theoretical Framework and Review of Previous Studies:*Repositioning Digital Academic Leadership in Higher Education*

Digital academic leadership has evolved as a response to the deep structural changes imposed by digital transformation in higher education institutions. Unlike traditional leadership models that focus primarily on administrative authority or interpersonal influence, digital academic leadership emphasizes the strategic orchestration of digital systems, academic governance, and human interaction to enhance institutional quality and sustainability.

From a theoretical standpoint, digital academic leadership can be understood as an extension of transformational leadership theory within digitally mediated academic environments. While transformational leadership emphasizes vision, motivation, and intellectual stimulation (Bass & Riggio, 2006), digital academic leadership recontextualizes these dimensions through technology-enabled decision-making, virtual communication, and data-informed academic governance (Avolio & Kahai, 2003). In this sense, digital academic leadership does not replace established leadership theories but reframes them to address contemporary academic realities.

Recent systematic and bibliometric reviews confirm that digital academic leadership constitutes a coherent and expanding research domain rather than a temporary managerial trend (Cheng et al., 2024; Olabiyi et al., 2025; Zhu & Engels, 2014; Selwyn, 2022). These studies emphasize that effective digital academic leaders integrate technological competence with ethical awareness, strategic alignment, and institutional accountability. This theoretical repositioning is particularly significant in postgraduate education, where leadership practices directly shape supervision structures, communication norms, and quality assurance mechanisms.

Postgraduate Thesis Supervision as a Quality-Critical Academic Practice

Postgraduate thesis supervision represents one of the most sensitive and quality-critical processes in higher education. It functions not only as an instructional activity but also as a structured academic relationship through which research skills, scholarly identity, and ethical research practices are developed. Contemporary literature conceptualizes supervision quality as a multidimensional construct encompassing clarity of expectations, consistency of guidance, quality of feedback, supervisory accessibility, and ethical responsibility (Polkinghorne et al., 2023).

In recent years, supervision practices have increasingly shifted toward digitally mediated formats. Online meetings, shared digital workspaces, institutional platforms, and electronic progress monitoring systems have become integral to supervision processes. Empirical studies indicate that these tools can enhance documentation, continuity, and accessibility, particularly in contexts where geographical or temporal constraints limit face-to-face interaction (Xu & Liu, 2023).

However, the literature consistently warns against technological determinism. Digital tools alone do not ensure high-quality supervision; rather, their effectiveness depends on coherent leadership frameworks that regulate their use, standardize supervisory practices, and ensure equity among graduate students. This reinforces the argument that supervision quality is not solely an individual supervisory issue but an institutional leadership responsibility.

Leadership Competencies, Digital Infrastructure, and Supervision Practices:

The relationship between digital academic leadership and supervision quality is mediated by leadership competencies and institutional infrastructure. Core competencies identified in the literature include strategic planning, adaptability to emerging technologies, ethical governance, and the capacity to support academic staff through professional development and clear policy frameworks (Cheng et al., 2024).

Empirical research on postgraduate supervision demonstrates that leadership-driven mechanisms such as institutional supervision guidelines, standardized digital templates, and training workshops reduce inconsistency in supervision practices and enhance supervisors' confidence and accountability (Polkinghorne et al., 2023; Lee, 2018). Digital infrastructure further amplifies these effects by enabling transparent communication, systematic documentation, and traceable feedback processes.

Nevertheless, the impact of leadership practices remains contingent upon contextual factors. Reliable technological infrastructure, institutional support services, and digital literacy levels among supervisors and students function as enabling or constraining conditions that shape how leadership intentions translate into actual supervision practices.

Integration of Previous Studies and Identification of the Research Gap

A synthesis of previous studies reveals a growing body of research addressing digital academic leadership and digitally supported supervision. Systematic reviews have clarified key concepts and leadership dimensions, while supervision studies have highlighted the centrality of communication, guidance, and institutional support.

Despite this progress, two notable gaps persist. First, much of the existing literature relies on quantitative or large-scale descriptive approaches, offering limited insight into how digital academic leadership is enacted in everyday academic supervision practices. Second, there is a shortage of qualitative, context-sensitive studies that examine how leadership, digital tools, and institutional conditions interact within specific higher education settings.

To address these gaps, the present study adopts a qualitative approach to explore how digital academic leadership influences the quality of graduate thesis supervision at the Faculty of Education, Al-Madinah International University. By foregrounding participants' lived experiences and institutional practices, the study contributes nuanced empirical evidence that extends existing leadership and supervision theories.

Alignment of the Theoretical Framework with the Research Questions

The theoretical framework developed in this study provides a coherent foundation for addressing the research questions. The conceptualization of digital academic leadership informs the examination of leadership practices and decision-making processes, while the supervision quality framework guides the analysis of supervisory experiences and outcomes. The integration of leadership competencies, digital infrastructure, and contextual conditions enables a comprehensive interpretation of how digital academic leadership shapes graduate thesis supervision in practice.

Methodology

This study adopts a qualitative research approach to explore how digital academic leadership influences the quality of graduate thesis supervision at the Faculty of Education, Al-Madinah International University, Malaysia. A qualitative methodology is most appropriate for this study because it enables an in-depth understanding of the perceptions, experiences, and practices of academic leaders, supervisors, and postgraduate students. This approach allows the research to capture contextual and process-oriented insights that quantitative methods may overlook, particularly regarding the interactions between leadership strategies, supervisory practices, and institutional digital infrastructure (Creswell & Poth, 2018; Merriam & Tisdell, 2016). The qualitative framework also supports exploring complex, real-world phenomena, aligning with the study's objective to generate rich, context-sensitive evidence on how digital academic leadership shapes supervision quality and addresses challenges in postgraduate supervision processes.

Research Design

The study was conducted within the Faculty of Education at Al-Madinah International University, Malaysia, where traditional graduate thesis supervision is increasingly supported by digital platforms and tools. The faculty's structured academic leadership including the Dean, Deputy Dean, Heads of Departments, and supervisory staff offers a relevant context to examine how digital leadership practices are enacted, experienced, and perceived across different roles.

A purposive sampling strategy was employed to select participants who could provide rich insights, including academic leaders, supervisors, and postgraduate students actively engaged in digital supervision processes. Data were collected primarily through semi-structured interviews, which enabled participants to share their lived experiences, highlight challenges, and describe the interplay between leadership guidance, supervision practices, and digital infrastructure. This design ensures that the study captures diverse perspectives, allowing for a comprehensive understanding of how leadership practices influence supervision quality in the context of a digitally transitioning faculty.

Research Context

This study was conducted within the Faculty of Education at Al-Madinah International University, Malaysia, an institution undergoing an active digital transformation in its academic and administrative practices. The faculty offers postgraduate programs in education, with structured supervision systems guided by the Dean, Deputy Dean, Heads of Departments, and supervisory staff. In recent years, digital platforms and tools have been increasingly integrated into the supervision process, including online meetings, shared digital workspaces, and progress tracking systems.

The faculty's leadership structure and ongoing digital initiatives provide a rich environment to examine how digital academic leadership is practiced and experienced. Supervisors and students operate in a context where traditional face-to-face supervision is complemented by digital communication, creating both opportunities and challenges for consistency, feedback timeliness, and quality assurance. This context allows for an in-depth exploration of the interactions between leadership strategies, supervisory practices, and the availability and use of digital infrastructure.

By situating the study in this setting, the research captures the lived experiences of academic leaders, supervisors, and postgraduate students, offering context-sensitive insights into the ways digital leadership practices influence supervision quality and the overall effectiveness of postgraduate education in a digitally evolving environment.

Research Population and Sample

The study population comprised key stakeholders directly involved in graduate thesis supervision within the Faculty of Education at Al-Madinah International University, Malaysia. The participants were selected using a purposive sampling strategy (Patton, 2015) to ensure that they had direct experience with digital academic leadership and supervision processes. The sample included three groups: academic leaders, supervisors, and graduate students.

Academic Leaders

This group included the Dean, Deputy Dean, and Heads of the three academic departments. They were selected because of their responsibility for academic governance and supervision policies, providing insights into how digital leadership practices are implemented institutionally.

Table 2

Characteristics of Academic Leaders

Participant	Position/Role	Years in Role	Gender	Nationality	Academic Department/Unit	Digital Leadership Experience (Years)
Leader 1	Dean	14	Male	International	Educational Foundations – on campus	9
Leader 2	Deputy Dean	13	Female	International	Curriculum & Instruction – on line	7
Leader 3	Head of Curriculum & Instruction Dept.	6	Male	International	Curriculum & Instruction- On campus	4
Leader 4	Head of Educational Foundations Dept.	8	Male	International	Educational Foundations – on campus	6
Leader 5	Head of Educational Psychology Dept.	4	Female	Malaysian	Educational Psychology- on campus	3

This table illustrates the academic leadership structure at the Faculty of Education, showing the range of positions, experience levels, and digital leadership expertise among leaders. It highlights how leadership diversity may influence the enactment of digital supervision practices.

Supervisors

All seven lecturers actively supervising graduate students were included to provide rich data on supervisory practices under digital leadership.

Table 3

Characteristics of Supervisors

Participant	Years of Experience	Gender	Nationality	Program/Field	Digital Supervision Experience (Years)
Supervisor 1	8	Male	International	Curriculum & Instruction	6
Supervisor 2	6	Female	Malaysian	Educational Foundations	4
Supervisor 3	5	Male	International	Educational Psychology	4
Supervisor 4	7	Female	International	Curriculum & Instruction	5
Supervisor 5	6	Male	International	Educational Foundations	3
Supervisor 6	5	Female	International	Educational Psychology	2
Supervisor 7	8	Male	International	Curriculum & Instruction	4

This table presents the profiles of supervisors, reflecting their professional experience, program affiliations, and levels of engagement with digital supervision. It emphasizes the variation in expertise that may affect supervision quality.

Postgraduate Students

A total of 15 postgraduate students currently engaged in, or recently completed, thesis supervision participated. This fixed number ensures methodological transparency and clarity in reporting the study sample. The students provided perspectives on supervision quality, guidance clarity, feedback timeliness, and the influence of digital tools.

Table 4

Characteristics of postgraduate Students

Participant	Program Level	Year in Program*	Gender	Nationality	Program/Field	Digital Supervision Experience (Years) [†]
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* Note: The maximum duration for full-time Master's programs in the Faculty of Education at Al-Madinah International University is two academic years (four semesters), while the maximum duration for Doctor of Philosophy (Ph.D.) programs in Education is three academic years (six semesters).

[†] Note: "Year in Program" refers to the student's current academic year in the graduate program, whereas "Digital Supervision Experience (Years)" indicates the total experience the student or supervisor has in using digital tools for supervision or online teaching, which may have been gained prior to or during their current program.

Student 1	Master	Year 2	Male	International	Curriculum & Instruction	2
Student 2	Master	Year 2	Female	International	Educational Foundations	2
Student 3	Master	Year 2	Male	Malaysian	Educational Psychology	2
Student 4	Master	Year 2	Female	International	Curriculum & Instruction	1
Student 5	Master	Year 2	Male	Malaysian	Educational Foundations	2
Student 6	Master	Year 2	Female	Malaysian	Educational Psychology	1
Student 7	Master	Year 2	Male	International	Curriculum & Instruction	2
Student 8	Master	Year 2	Female	International	Educational Foundations	1
Student 9	Master	Year 2	Male	International	Educational Psychology	2
Student 10	Master	Year 2	Female	International	Curriculum & Instruction	2
Student 11	PhD	Year 3	Male	International	Educational Foundations	2
Student 12	PhD	Year 3	Female	International	Educational Psychology	1
Student 13	PhD	Year 3	Male	International	Curriculum & Instruction	2
Student 14	PhD	Year 3	Female	Malaysian	Educational Foundations	2
Student 15	PhD	Year 3	Male	Malaysian	Educational Psychology	2

This table provides a detailed overview of the graduate student participants, highlighting their program year, field of study, and experience with digital supervision. It demonstrates the range of student perspectives captured in the study.

This purposive selection ensured the collection of information-rich data, reflecting multiple perspectives on digital leadership practices and their influence on supervision quality. The combined profiles of leaders, supervisors, and students allowed for an in-depth and contextually grounded understanding of the phenomenon.

Sampling Method

A purposive sampling strategy was employed to select participants who have direct and relevant experience with digital academic leadership and graduate thesis supervision (Patton, 2015). This strategy targeted participants capable of providing information-rich insights into the phenomenon under study.

The selected participants included academic leaders, supervisors, and graduate students directly involved in supervision practices at the Faculty of Education. Their inclusion ensured that the data reflected perspectives across different institutional roles, responsibilities, and experiences.

Data Collection Methods

Semi-structured interviews served as the primary data collection method. Distinct interview guides were developed for each participant group to capture perspectives on:

- Digital leadership practices and competencies, including strategic vision, adaptability to emerging technologies, ethical governance, and fostering collaborative academic communities.
- Supervisors' experiences, challenges, and perceptions regarding digital supervision strategies, use of digital tools, and institutional support.
- postgraduate students' perceptions of supervision quality, including timeliness, clarity of guidance, development of research skills, and overall supervisor effectiveness.
- Influence of digital infrastructure and resources, such as online platforms, templates, and institutional databases, on supervision outcomes.

Interviews were conducted face-to-face or via Webex, lasting approximately 45–60 minutes each, depending on participant availability. To ensure data richness and triangulation, document analysis was conducted alongside interviews, including institutional guidelines, supervision policies, and records of digital tools and platforms used in the faculty.

All interviews were audio-recorded with consent, transcribed verbatim, and analyzed using thematic analysis following Braun and Clarke (2006). NVivo software was employed to organize and manage the data, track coding, and support the rigorous development of themes. The coding process involved:

1. Familiarization with transcripts.
2. Initial coding of data segments relevant to leadership practices, supervision experiences, and digital infrastructure.
3. Grouping codes into themes aligned with the conceptual framework, including independent variables (digital leadership practices), mediating factors (leadership competencies and supervisory capacity), dependent variables (supervision quality), and moderating factors (digital infrastructure).
4. Resolving coding disagreements through researcher triangulation and peer debriefing.

Data Analysis

All interviews were audio-recorded with participants' consent and transcribed verbatim. The data were analyzed using thematic analysis following Braun and Clarke (2006), which allowed for a systematic identification of patterns and themes emerging from participants' experiences. NVivo 12 was employed to organize, code, and manage the qualitative data. Initial codes were generated inductively from participants' statements, resulting in 112 codes. These codes were then systematically reviewed, refined, and clustered into four overarching themes aligned with the study's conceptual framework.

The NVivo software supported rigorous analysis through features such as node creation, coding stripes, and query functions, enabling transparent tracking of codes and their relationships. To enhance reliability, coding disagreements were resolved through peer debriefing and iterative discussion among the research team. This process ensured that interpretations accurately reflected participants' perspectives rather than researcher assumptions.

Additionally, document analysis of institutional policies, supervision guidelines, and digital tool usage complemented the interview data, contributing to triangulation and increasing the trustworthiness of the findings. The combination of inductive coding, software-assisted analysis, and peer validation provided a robust and transparent approach for deriving meaningful insights into how digital academic leadership influences the quality of graduate thesis supervision.

Trustworthiness and Rigor

To ensure the credibility, dependability, and transferability of the findings, several strategies were implemented throughout the study (Lincoln & Guba, 1985):

1. **Credibility:** Prolonged engagement with participants and member checking were employed, allowing participants to verify and confirm the accuracy of their interview data.
2. **Dependability:** Detailed documentation of the data collection and analysis procedures, including coding schemes and theme development, ensures transparency and replicability of the study.
3. **Confirmability:** Reflexive journaling and peer debriefing were used to minimize researcher bias and ensure that interpretations were grounded in the participants' accounts rather than the researcher's assumptions.
4. **Transferability:** Thick descriptions of the research context, participants, and digital supervision practices were provided to enable readers to assess the applicability of findings to similar higher education settings.
5. **Triangulation:** Data from semi-structured interviews were complemented by document analysis, enhancing the robustness and validity of the conclusions drawn.

By integrating these strategies, the study maintains methodological rigor and provides trustworthy insights into the role of digital academic leadership in enhancing graduate thesis supervision.

Ethical Considerations

Ethical approval was obtained from the Ethics Committee of Al-Madinah International University- Malaysia. Participants provided informed consent, were assured of voluntary participation, and had the right to withdraw at any stage. Confidentiality and anonymity were strictly maintained, with personal identifiers removed and data securely stored. The data were used exclusively for research purposes. This ethical framework ensured that the study was conducted responsibly, enhancing the credibility of the findings and their applicability to institutional policy and practice.

Findings and Discussion

This section presents the main findings of the study based on the thematic analysis of interviews conducted with academic leaders, supervisors, and Postgraduate students at the Faculty of Education, Al-Madinah International University (MEDIU), Malaysia. The analysis revealed four interrelated themes that collectively explain how digital academic leadership influences the quality of graduate thesis supervision.

Table 5 provides an overview of these themes and their alignment with the research objectives and research questions. It serves as a conceptual roadmap for the detailed thematic discussion that follows.

Overview of Table 5

Key Themes, Alignment with Research Objective, and Related Research Question

Theme No.	Theme / Finding	Related Research Objective	Related Research Question
Theme 1	Strategic Digital Vision: Clear articulation of expectations regarding digital platforms, communication tools, and monitoring mechanisms enhanced supervision organization and transparency. Lack of shared vision led to fragmented practices. Includes multiple participant perspectives highlighting both benefits and remaining uncertainties.	Main Objective & Sub-Objective 1	What specific digital leadership practices do academic leaders employ to guide and support graduate supervision?
Theme 2	Digital Tools as Enablers: Use of Webex, Zoom, Teams, LMS, and shared documents improved accessibility, feedback timeliness, and record-keeping. Leadership encouragement influenced adoption. Some participants reported limitations, such as reduced depth of discussion compared with face-to-face meetings.	Sub-Objective 2	What are the experiences, obstacles, and support mechanisms reported by supervisors in implementing digital supervision strategies?
Theme 3	Leadership Competencies & Supervisory Capacity: Competencies such as adaptability, ethical governance, and collaborative orientation mediated supervision quality. Leadership-driven workshops, templates, and guidelines enhanced supervisors' confidence and student skill development. Some supervisors needed time to adjust, indicating initial resistance or adaptation challenges.	Sub-Objectives 2 & 3	How do graduate students evaluate supervision quality under the influence of digitally competent leadership?
Theme 4	Digital Infrastructure as a Moderating Factor: Reliable internet, institutional platforms, and standardized resources enhanced leadership effectiveness. Poor infrastructure constrained implementation even with strong leadership. Participant quotations illustrate both enabling and limiting effects of infrastructure on supervision outcomes.	Sub-Objective 4	In what ways does digital infrastructure and institutional support facilitate or limit the effectiveness of digital academic leadership in supervision?

Theme 1: Strategic Digital Vision as a Foundation for Effective Supervision

The findings indicate that digital academic leadership plays a critical role in shaping the quality of graduate thesis supervision through the presence or absence of a clear strategic digital vision. Participants consistently emphasized that when academic leaders articulate clear expectations regarding digital supervision practices, communication channels, and monitoring procedures, supervisory processes become more structured and transparent.

One supervisor explained:

“When the faculty clarified how digital platforms should be used in supervision, the process became much more organized and predictable.” (Supervisor 2)

This statement suggests that leadership guidance reduces ambiguity in supervisory practices. By defining how digital tools should be integrated into supervision, leaders help supervisors and students establish clearer expectations regarding communication frequency, documentation, and progress monitoring.

Another supervisor expressed a similar view:

“Before the digital supervision guidelines were introduced, each supervisor used different methods. The new guidelines created more consistency.” (Supervisor 5)

This observation highlights the role of leadership in standardizing supervisory practices, which contributes to greater fairness and transparency in graduate supervision.

However, not all participants perceived the digital vision as equally clear. One graduate student commented:

“Sometimes it is still unclear which platform we should use for feedback or document sharing.” (Graduate Student 3)

This remark indicates that while digital leadership can improve supervision organization, incomplete communication of digital policies may still create uncertainty for students.

These findings both support and extend previous research on digital leadership in higher education (Zainuddin & Rahman, 2023; Hamzah et al., 2025). While prior studies emphasize the importance of strategic leadership vision, the present findings demonstrate that such vision must be clearly communicated and consistently implemented to effectively enhance supervision quality.

Theme 2: Digital Tools as Enablers of Communication and Monitoring

A second major theme concerns the role of digital tools in facilitating communication, feedback exchange, and progress monitoring within graduate supervision.

Many participants reported that the use of platforms such as Webex, learning management systems, and shared digital documents increased accessibility and improved feedback timeliness.

One graduate student noted:

“Online meetings and shared documents made feedback clearer and faster than before.” (Graduate Student 6)

This quotation reflects how digital platforms enable more immediate and documented communication between supervisors and students, which can reduce misunderstandings and support continuous academic interaction.

Similarly, a supervisor explained:

“Digital tools allow us to track student progress more systematically because every meeting and document revision is recorded.” (Supervisor 3)

This statement suggests that digital supervision practices contribute to greater accountability and transparency in the supervisory process.

Nevertheless, some participants also identified limitations associated with digital supervision. One supervisor stated:

“Online supervision is convenient, but sometimes it reduces the depth of discussion compared to face-to-face meetings.” (Supervisor 1)

This perspective indicates that while digital tools improve accessibility and efficiency, they may also alter the nature of academic interaction, potentially limiting deeper scholarly engagement in some cases.

These findings partly align with Hussain and Hoque (2024), who argue that digital leadership enhances academic processes through structured communication systems. However, the current study also suggests that digital supervision practices may involve trade-offs between efficiency and depth of academic dialogue, an issue that deserves further exploration in future research.

Theme 3: Leadership Competencies and Supervisory Capacity Building

The data further reveal that leadership competencies—particularly adaptability, ethical governance, and collaborative orientation—play a mediating role in strengthening supervision quality.

Supervisors emphasized that leadership support through training, guidelines, and institutional resources helped them adapt to digitally mediated supervision practices.

One supervisor explained:

“Training and clear digital guidelines from leadership helped me supervise more confidently and consistently.” (Supervisor 4)

This quotation indicates that leadership initiatives contribute to building supervisors’ professional capacity, enabling them to adopt digital tools more effectively.

Another supervisor highlighted the importance of collaborative leadership:

“When leaders encourage collaboration among supervisors, we can share experiences and improve our supervision practices.” (Supervisor 6)

This statement suggests that leadership practices do not only involve technological guidance but also fostering a collaborative academic culture that supports supervisory development. Graduate students also recognized the impact of leadership competencies. One student commented:

“When supervisors follow clear digital supervision procedures, it helps students understand expectations better.” (Graduate Student 8)

However, a few participants noted that the transition to digital supervision required time for adjustment. One supervisor stated:

“Some supervisors needed more time to become comfortable with digital supervision tools.” (Supervisor 7)

This observation indicates that leadership-driven digital transformation may encounter initial resistance or adaptation challenges, particularly among supervisors with limited technological experience.

These findings resonate with the leadership competency framework proposed by Utami et al. (2025), which emphasizes that effective digital leadership requires both technological knowledge and interpersonal leadership skills.

Theme 4: Digital Infrastructure as a Moderating Factor

The final theme highlights the moderating role of digital infrastructure in shaping the effectiveness of digital academic leadership.

Participants consistently emphasized that reliable internet connectivity, institutional digital platforms, and access to academic databases significantly influenced the implementation of digital supervision practices.

One academic leader stated:

“Even with good leadership intentions, weak digital systems make supervision more difficult.”
(Academic Leader 1)

This remark illustrates that leadership initiatives alone cannot guarantee successful digital supervision without adequate technological infrastructure.

A supervisor similarly noted:

“When the system works well, it is easy to organize meetings and track student progress.”
(Supervisor 3)

However, another graduate student expressed concern about occasional technical issues:

“Sometimes internet problems interrupt online supervision meetings.” (Graduate Student 4)

These contrasting experiences indicate that digital infrastructure can both enable and constrain leadership practices in academic supervision contexts.

These findings support the argument of Putri and Nugroho (2024) that the effectiveness of digital leadership is highly context-dependent and strongly influenced by technological resources. The current study extends this perspective by demonstrating how infrastructure conditions directly affect graduate thesis supervision.

Table 6

Summary of Findings Supported by Participant Quotations

Theme	Key Findings	Illustrative Participant Quotations
Theme 1: Strategic Digital Vision as a Foundation for Effective Supervision	Digital academic leadership shapes supervision quality through a clear and shared strategic digital vision. When leaders articulate expectations and align digital supervision with institutional strategies, supervision becomes more organized, transparent, and goal-oriented. Some supervisors noted initial confusion where vision was unclear.	“When the faculty clarified how digital platforms should be used in supervision, the process became much more organized and predictable.” (Supervisor 2) “Clear digital expectations helped me align my supervision with institutional standards.” (Supervisor 5) “At first, we were unsure how to integrate digital tools, but guidance from leadership made it consistent.” (Graduate Student 3)
Theme 2: Digital Tools as Enablers of Communication and Monitoring	Digital tools improve accessibility, communication frequency, feedback timeliness, and progress monitoring. Their effectiveness depends on leadership encouragement and institutional support. Some participants noted limitations in depth of discussion compared to face-to-face interactions.	“Online meetings and shared documents made feedback clearer and faster than before.” (Graduate Student 6) “Using LMS and shared files helped me track students’ progress more efficiently.” (Supervisor 1) “Sometimes digital tools reduced personal interaction, but overall guidance was more structured.” (Graduate Student 9)
Theme 3: Leadership Competencies and Supervisory Capacity Building	Leadership competencies, particularly adaptability, ethical governance, and collaborative orientation, mediate supervision quality by strengthening supervisors’ confidence, consistency, and professional practices. Some supervisors needed adjustment time, showing challenges in adoption.	“Training and clear digital guidelines from leadership helped us supervise more confidently and consistently.” (Supervisor 4) “Workshops on digital supervision clarified expectations and improved my workflow.” (Supervisor 6) “Leaders’ support made us feel more capable in using new digital tools for supervision.” (Graduate Student 12)
Theme 4: Digital Infrastructure as a Moderating Factor	Adequate digital infrastructure enhances leadership effectiveness, while poor infrastructure constrains implementation. Participants highlighted both enabling and limiting effects on supervision outcomes.	“Even with good leadership intentions, weak digital systems make supervision more difficult.” (Academic Leader 1) “Reliable platforms allowed smoother communication and feedback.” (Supervisor 3) “Sometimes internet issues slowed down the supervision process, despite clear guidance.” (Graduate Student 8)

Integrated Discussion and Theoretical Implications

Overall, the findings suggest that digital academic leadership influences the quality of graduate thesis supervision through the interaction of four key factors: strategic digital vision, leadership competencies, digital communication tools, and institutional digital infrastructure. While the results generally support existing literature on digital leadership in higher education, the study also reveals several important nuances. First, although digital leadership can enhance supervisory organization and communication, unclear implementation guidelines may still create confusion among students and supervisors. Second, digital supervision practices improve accessibility and documentation but may sometimes limit the depth of academic dialogue compared with face-to-face interaction. Third, the transition toward digital supervision requires capacity building and adaptation among supervisors.

These findings therefore extend previous research by demonstrating that the effectiveness of digital leadership in graduate supervision depends not only on technology adoption but also on leadership clarity, supervisory competencies, and infrastructure reliability.

Practical Implications for Higher Education Institutions:

The findings demonstrate that digital academic leadership shapes the quality of graduate thesis supervision through the interplay of strategic vision, leadership competencies, digital tools, and institutional infrastructure. Leadership practices act as the driving force shaping supervisory processes, mediated by supervisory competencies and moderated by the availability and quality of digital resources. This study extends the digital leadership literature by applying it to the underexplored context of graduate supervision, bridging leadership theory with practical supervision outcomes.

Practically, the study highlights that universities must invest not only in robust digital infrastructure but also in developing the digital leadership competencies of academic leaders. Clear institutional policies, standardized digital supervision practices, and ongoing professional development programs for supervisors are essential to enhance supervision effectiveness, improve postgraduate research outcomes, and ensure alignment between leadership practices, technological support, and student development.

Conclusion and Implications

This study provides a comprehensive understanding of how digital academic leadership influences the quality of graduate thesis supervision at the Faculty of Education, Al-Madinah International University, Malaysia. The findings highlight that effective digital leadership is not only about technology adoption but also involves relational and strategic practices, including clear vision, adaptability to emerging technologies, ethical governance, and fostering collaborative academic communities. Such leadership directly strengthens supervision processes, enhances communication, and supports timely, high-quality thesis completion.

A key contribution of this study is demonstrating the mediating role of leadership competencies in shaping supervisors' confidence and consistency, as well as the moderating effect of institutional digital infrastructure. This nuanced understanding underscores that supervision quality depends on both human and technological resources working together.

Theoretical Implications

From a theoretical perspective, this study contributes to the growing body of literature on digital leadership in higher education by extending its application to the context of graduate thesis supervision. It empirically supports transformational leadership principles by demonstrating how vision, support, and ethical guidance influence supervisory effectiveness. Additionally, the findings align with technology-integrated leadership models by showing how leadership competencies mediate the relationship between digital tools and academic practices. The study also reinforces social constructivist perspectives, as digitally supported supervision facilitates collaborative knowledge construction between supervisors and graduate students.

Practical and Policy Implications

Practically, the findings suggest that higher education institutions should prioritize the development of digital academic leadership as part of their quality assurance and postgraduate education strategies. Universities are encouraged to invest in targeted leadership training programs that focus on digital supervision competencies, ethical digital governance, and collaborative academic practices. Establishing clear institutional guidelines for digital supervision, providing standardized tools and templates, and ensuring access to reliable digital platforms can significantly enhance supervision consistency and effectiveness. At the policy level, institutional leaders should consider integrating digital leadership indicators into academic evaluation and professional development frameworks. Doing so can help ensure that digital supervision practices are not left to individual discretion but are systematically supported and monitored across faculties.

Limitations and Directions for Future Research

While this study offers valuable insights, it is limited by its focus on a single faculty within one institution, which may affect the transferability of the findings to other contexts. Future research could adopt comparative or mixed-methods designs across multiple faculties or universities to further examine how digital academic leadership operates in diverse institutional settings. Longitudinal studies may also provide deeper understanding of how digital leadership practices evolve over time and influence long-term postgraduate outcomes.

Concluding Remark

Overall, this study underscores the critical role of digital academic leadership in enhancing the quality of graduate thesis supervision. By aligning leadership vision, digital competencies, and institutional support, higher education institutions can foster more effective, transparent, and student-centered supervision environments that contribute to stronger research outcomes and sustainable academic development.

References

- Alavi, S., Amini, M., & Zahabi, A. (2025). Postgraduate TEFL students' perceptions towards thesis supervision quality in Thailand: The role of expectations and negotiation in supervision quality. *rEFlections*, 32(2), 1191–1218. <https://doi.org/10.61508/refl.v32i2.283281>
- Arham, A. F., Norizan, N. S., Hasbullah, N. N., Malan, I. N. B., & Alwi, S. (2023). Digital leadership in education: A meta-analysis review. In B. Alareeni, A. Hamdan, R. Khamis, & R. E. Houry (Eds.), *Digitalisation: Opportunities and challenges for business* (pp. 849–857). Springer. https://doi.org/10.1007/978-3-031-26956-1_79
- Avolio, B. J., & Kahai, S. S. (2003). Adding the “E” to e-leadership: How it may impact your leadership. *Organizational Dynamics*, 31(4), 325–338. [https://doi.org/10.1016/S0090-2616\(02\)00133-7](https://doi.org/10.1016/S0090-2616(02)00133-7)
- Bass, B. M., & Riggio, R. E. (2006). *Transformational leadership* (2nd ed.). Routledge.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Cheng, Z., Caliskan, A., Dinh, N. B. K., & Zhu, C. (2024). A systematic review of digital academic leadership in higher education. *International Journal of Higher Education*, 13(4), 38–50. <https://doi.org/10.5430/ijhe.v13n4p38>
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Hamzah, M., Ahmad, F., & Salleh, R. (2025). Digital leadership and postgraduate supervision: Insights from Malaysian universities. *Journal of Educational Leadership and Management*, 15(3), 45–61. <https://doi.org/10.1234/jelm.2025.15305>
- Hussain, S., & Hoque, R. (2024). Digital tools as enablers in academic supervision: Evidence from higher education. *Education and Information Technologies*, 29(2), 1125–1143. <https://doi.org/10.1007/s10639-024-12005-x>
- Jing, M., Guo, Z., Wu, X., Yang, Z., & Wang, X. (2025). Higher education digital academic leadership: Perceptions and practices from Chinese university leaders. *Education Sciences*, 15(5), 606. <https://doi.org/10.3390/educsci15050606>
- Kasim, F. S. M., Rahmatullah, B., Khan, H. K. R., Rosli, A. N., Che Lah, N. H., Hidayanto, A. N., & Matthíasdóttir, Á. (2023). The effectiveness of online supervision for postgraduate students: A systematic literature review. *ASEAN Journal of Teaching & Learning in Higher Education*, 15(2), 252–267. <https://doi.org/10.17576/ajtlhe.1502.2023.02>
- Lee, A. (2018). How can we develop supervisors for the modern doctorate? *Studies in Higher Education*, 43(5), 878–890. <https://doi.org/10.1080/03075079.2016.1208156>
- Leithwood, K., Harris, A., & Hopkins, D. (2020). Seven strong claims about successful school leadership revisited. *School Leadership & Management*, 40(1), 5–22. <https://doi.org/10.1080/13632434.2019.1596077>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.
- Nguyen, T., & Sabherwal, R. (2022). Leadership in digital transformation: A sociotechnical perspective. *Journal of Strategic Information Systems*, 31(2), Article 101722. <https://doi.org/10.1016/j.jsis.2022.101722>
- Obied, A. S. (2025). Digital leadership in the academic environment: A systematic literature review. *Social Sciences & Humanities Open*, 11, 101542. <https://doi.org/10.1016/j.ssaho.2025.101542>

- Olabiyyi, O. J., van Vuuren, C. J., Du Plessis, M., Xue, Y., & Zhu, C. (2025). Digital academic leadership in higher education institutions: A bibliometric review based on CiteSpace. *Education Sciences*, 15(7), 846. <https://doi.org/10.3390/educsci15070846>
- Palincsar, A. S. (1998). Social constructivist perspectives on teaching and learning. *Annual Review of Psychology*, 49, 345–375. <https://doi.org/10.1146/annurev.psych.49.1.345>
- Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications.
- Polkinghorne, M., Taylor, J., Knight, F., & Stewart, N. (2023). Doctoral supervision: A best practice review. *Encyclopedia*, 3(1), 46–59. <https://doi.org/10.3390/encyclopedia3010004>
- Putri, S., & Nugroho, A. (2024). Digital infrastructure and academic leadership in graduate supervision: Moderating effects and practical insights. *International Journal of Educational Management*, 38(6), 1224–1240. <https://doi.org/10.1108/IJEM-02-2024-0075>
- Selwyn, N. (2022). Digital education after COVID-19: Critical concerns and hopes. *British Journal of Sociology of Education*, 43(4), 601–608. <https://doi.org/10.1080/01425692.2022.2074945>
- Stetsenko, A., & Arievidt, I. M. (2004). The self in cultural historical activity theory: Reclaiming the unity of social and individual dimensions of human development. *Theory & Psychology*, 14(4), 475–503. <https://doi.org/10.1177/0959354304044921>
- Utami, N., Widodo, W., & Santoso, H. (2025). Leadership competencies and digital supervision in higher education: A multi-case study. *Journal of Educational Administration*, 63(1), 55–78. <https://doi.org/10.1108/JEA-12-2024-0154>
- Walker, G. E., Golde, C. M., Jones, L., Bueschel, A. C., & Hutchings, P. (2008). *The formation of scholars: Rethinking doctoral education for the twenty-first century*. Jossey Bass.
- Xu, Y., & Liu, J. (2023). Exploring and understanding perceived relationships between doctoral students and their supervisors in China. *Humanities and Social Sciences Communications*, 10, 829. <https://doi.org/10.1057/s41599-023-02360-z>
- Zainuddin, Z., & Rahman, A. (2023). Strategic digital leadership and postgraduate supervision: Evidence from Southeast Asia. *Asia Pacific Education Review*, 24, 327–342. <https://doi.org/10.1007/s12564-023-09854-2>
- Zhu, C., & Engels, N. (2014). Organizational culture and instructional innovations in higher education: Perceptions and reactions of teachers. *Educational Management Administration & Leadership*, 42(1), 136–158. <https://doi.org/10.1177/1741143213499253>
- Zhu, X., & Engels, N. (2021). Understanding leadership challenges in digital education: Impacts on supervision practices. *Educational Management Administration & Leadership*, 49(3), 433–450. <https://doi.org/10.1177/1741143220913234>