RESEARCH PAPER

Instructional Leadership and Artificial Intelligence Readiness in Malaysian Schools: Developing The MADANI AI-Driven Instructional Leadership Framework for Educational Transformation

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Abstract

The rapid advancement of Artificial Intelligence (AI) is reshaping teaching, learning, administration, and decision-making in schools. Yet technological adoption alone does not ensure meaningful educational change; schools also require leadership capacity, organisational readiness, ethical governance, and sustained professional learning. This conceptual paper develops the MADANI AI-Driven Instructional Leadership Framework (MADANI-AILF) to explain how instructional leadership can strengthen school AI readiness and support educational transformation in Malaysia. Drawing on Instructional Leadership Theory, the Technology Acceptance Model, and Diffusion of Innovation Theory, the framework positions AI-driven instructional leadership competencies and school AI readiness as sequential mechanisms linking instructional leadership to educational transformation and school effectiveness. Five competency domains are proposed: strategic AI visioning, data-informed decision-making, AI-pedagogical leadership, human-centred ethical leadership, and capacity building and change management. The framework extends conventional instructional leadership by integrating AI-specific capabilities while embedding the Malaysia MADANI values of sustainability, prosperity, innovation, respect, trust, and compassion. It offers a theoretically grounded basis for leadership development, policy design, readiness assessment, instrument development, and future empirical validation in AI-enabled school environments.

Keywords: AI readiness; artificial intelligence; educational transformation; instructional leadership; Malaysia MADANI; school effectiveness

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Introduction

The rapid advancement of Artificial Intelligence (AI) is transforming education systems worldwide, reshaping how schools operate, teach and make decisions (Organisation for Economic Co-operation and Development [OECD], 2023; Sposato, 2025). The emergence of generative AI tools, including ChatGPT, Gemini and Copilot, has further accelerated digital transformation across educational institutions, creating new possibilities for curriculum design, teaching, learning, assessment and research (Bond et al., 2024; Miao et al., 2023). AI is increasingly being used to support personalised learning, automate administrative tasks, strengthen educational analytics and data-informed decision-making, and improve organisational efficiency (Bond et al., 2024; Sposato, 2025). Consequently, educational institutions need to move beyond the mere adoption of AI tools towards their strategic integration into teaching, learning, leadership and school management while addressing relevant pedagogical, ethical and organisational considerations (Fullan et al., 2024; OECD, 2023; Sposato, 2025). The increasing adoption of Artificial Intelligence (AI) has profound implications for educational leadership. Traditionally, instructional leadership has centred on enhancing teaching quality, curriculum implementation, instructional supervision and student learning by defining the school mission, managing the instructional programme and promoting a positive school learning climate (Hallinger et al., 2025; Hallinger et al., 1985). However, the emergence of AI-enabled educational environments requires school leaders to extend these established roles beyond instructional supervision to encompass technological leadership, innovation management and systemic digital transformation (Berkovich, 2025; Fullan et al., 2024). Recent scholarship further indicates that school leaders need competencies in strategic vision and planning, AI governance, data-informed decision-making, ethical and equitable technology use, stakeholder engagement and organisational capacity building to guide effective and responsible AI integration in schools (Berkovich, 2025; DeMatthews et al., 2026; Ho, 2026).

Despite these opportunities, effective AI implementation depends on strong organisational readiness. Organisational AI readiness can be understood as the extent to which a school aligns its technological and data infrastructure, human expertise, strategic vision, leadership commitment, governance arrangements, and organisational

culture to support the responsible adoption and sustained use of AI (Johnk et al., 2021; Kim, 2026). Evidence suggests that investment in technology alone is insufficient; successful school-wide integration also requires coherent policies, targeted professional development, ethical safeguards, effective communication and sustained organisational support (Bergdahl et al., 2026; Kim, 2026). At the educator level, AI readiness encompasses technological self-efficacy, pedagogical understanding, AI-related knowledge and skills, and ethical awareness, all of which should be strengthened through continuous professional learning and institutional support (Miao et al., 2024; Ramazanoglu et al., 2025; Wang et al., 2023). Recent K-12 evidence further indicates that educators' preparedness and the availability of appropriate support structures are central to responsible and sustainable whole-school AI integration (Bergdahl et al., 2026). Similarly, school leaders who possess a proactive digital mindset and combine transformational and digital instructional leadership are better positioned to develop coherent institutional strategies, address stakeholder concerns and guide sustainable AI-enabled educational transformation (Kim, 2026; Pietsch et al., 2025).

Within the Malaysian context, the strategic importance of AI adoption is increasingly reflected in national digital transformation agendas, particularly the Malaysia Digital Economy Blueprint, the Malaysia National Artificial Intelligence Roadmap 2021 – 2025 and the Digital Education Policy. Collectively, these initiatives emphasise educational digitalisation, technological innovation, digital talent development and the creation of an inclusive, responsible, and sustainable digital ecosystem (Economic Planning Unit, 2021; Ministry of Education Malaysia [MOE], 2023; Ministry of Science, Technology and Innovation [MOSTI], 2021). These policy directions demonstrate a growing recognition that educational institutions must develop the capacity to operate effectively within increasingly AI-enabled environments (MOE, 2026; Teh et al., 2026). Nevertheless, implementation challenges persist, including disparities in technological infrastructure and digital access, gaps in AI literacy and educators' professional competencies and the need for robust governance mechanisms to ensure the ethical, safe and responsible use of AI in education (MOE, 2023, 2026; MOSTI, 2024; Teh et al., 2026). Consequently, educational leaders are expected to play a critical role in strengthening organisational readiness, developing professional capacity and strategically aligning AI integration with educational improvement and sustainable development (Economic Planning Unit, 2021; Pietsch et al., 2025).

Among the various leadership approaches examined in educational research, instructional leadership remains one of the most established and widely investigated models for strengthening teaching, learning, and school effectiveness (Hallinger et al., 2025). Empirical research has associated instructional leadership with teachers' professional learning and instructional practices, organisational commitment, school climate, and student achievement, although the magnitude and pathways of these relationships may vary across educational contexts (Awang et al., 2022; Bellibas et al., 2021; Hallinger et al., 2025; Ozdogru et al., 2025). Nevertheless, much of the established instructional leadership knowledge base predates the widespread adoption of generative AI and therefore provides limited guidance regarding the competencies required to lead AI-enabled educational transformation (Adams et al., 2025; Hsieh et al., 2026). Recent empirical evidence indicates that digital instructional leadership significantly predicts teachers' AI integration, while its influence on AI-supported pedagogy occurs indirectly through AI integration, underscoring the need to reconceptualise instructional leadership within emerging technological contexts (Hsieh et al., 2026). Contemporary scholarship further emphasises that AI implementation should not be treated merely as a technological initiative but as a multifaceted organisational and leadership process involving instructional innovation, ethical governance, equity, stakeholder engagement and institutional capacity building (DeMatthews et al., 2026; Renta-Davids et al., 2025). Accordingly, school leaders must articulate strategic visions for AI integration, develop teachers' professional capacity, establish ethical and equitable AI practices, and cultivate organisational cultures that support innovation, collaboration, and continuous learning (DeMatthews et al., 2026; Fullan et al., 2024; Renta-Davids et al., 2025). The growing complexity of AI-enabled educational transformation therefore necessitates new leadership competencies capable of bridging established instructional leadership practices with emerging technological, pedagogical, ethical, and organisational demands.

Research Problem and Gap

The integration of Artificial Intelligence (AI) into education systems has emerged as one of the most significant developments shaping contemporary education. Schools are increasingly adopting AI-enabled technologies to support teaching and personalised learning, automate administrative processes, improve communication, facilitate educational analytics and strengthen data-informed decision-making. These technologies offer substantial potential to improve operational efficiency, resource allocation, instructional support and educational experiences. However, realising these benefits requires educational institutions to move beyond isolated technology adoption and

develop the organisational capabilities necessary for the strategic, responsible and sustainable integration of AI across teaching, learning, leadership and school management (Adams et al., 2025; Organisation for Economic Co-operation and Development [OECD], 2026; Sposato, 2025). Despite growing interest in AI integration, many schools remain insufficiently prepared to implement AI effectively. Technological infrastructure alone does not constitute institutional readiness. Organisational AI readiness involves the alignment of technological and data infrastructure, human expertise, strategic vision, leadership commitment, governance arrangements, organisational culture and professional learning mechanisms with clearly defined AI adoption purposes (DeMatthews et al., 2026; Johnk et al., 2021). Contemporary competency frameworks also emphasise that educators require a human-centred mindset, knowledge of AI foundations and applications, ethical awareness, AI-related pedagogical competence and opportunities for continuous professional development (Miao et al., 2024). Schools lacking these interrelated capabilities may encounter difficulties in translating technological investments into meaningful and sustainable educational improvements.

A growing body of research indicates that educational leadership plays a decisive role in the success of technology and AI-integration initiatives. School leaders are responsible for articulating a shared strategic vision, leading organisational change, allocating resources, supporting teacher professional development and creating conditions that encourage responsible innovation (Fullan et al., 2024; Pietsch et al., 2025). In AI-enabled environments, these responsibilities extend to data governance, algorithmic transparency, ethical and equitable decision-making, stakeholder engagement, human oversight and the alignment of AI applications with educational values and priorities (DeMatthews et al., 2026; Renta-Davids et al., 2025; Sposato, 2025). Consequently, effective AI implementation depends substantially on leaders' capacity to connect technological innovation with pedagogical goals, institutional values and organisational development. Although educational leadership has received considerable scholarly attention, the literature specifically connecting instructional leadership with AI remains comparatively limited. Instructional leadership has traditionally been recognised as an influential approach for strengthening curriculum implementation, instructional supervision, teacher development, school climate and student learning. Its established dimensions include defining the school mission, managing the instructional programme and promoting a positive school learning climate (Hallinger et al., 1985). A recent systematic review confirms that instructional leadership research has primarily concentrated on student achievement, school performance, teacher attitudes, school climate and instructional practices (Hallinger et al., 2025). However, because the foundational models were developed before the widespread emergence of generative AI, they do not fully specify the technological, ethical, data-related and organisational competencies required to lead AI-enabled educational transformation (Adams et al., 2025; Hsieh et al., 2026).

Moreover, much of the expanding educational AI literature continues to focus on classroom applications, teachers' and students' perceptions, technological acceptance, AI literacy and pedagogical integration. Comparatively fewer studies have investigated the organisational mechanisms through which school leaders influence institutional AI readiness (Adams et al., 2025; Renta-Davids et al., 2025). Research involving K-12 teachers shows that AI integration is influenced by educators' technological competencies, psychological readiness, pedagogical knowledge, ethical awareness, professional development and institutional support (Filiz et al., 2025). Emerging empirical evidence further demonstrates that digital instructional leadership significantly predicts teachers' AI integration and that AI integration mediates the relationship between digital instructional leadership and AI-supported pedagogy (Hsieh et al., 2026). Nevertheless, these leadership, competency, readiness and transformation variables have yet to be comprehensively examined within a single theoretical model.

A further limitation concerns the lack of a validated and context-sensitive competency construct explaining how instructional leaders should operate in AI-enabled school environments. Recent scholarship has begun to identify important leadership domains, including strategic AI visioning, ethical and equitable governance, data-informed decision-making, stakeholder engagement, continuous improvement and professional capacity development (Berkovich, 2025; DeMatthews et al., 2026; Sposato, 2025). However, these emerging competencies have not yet been fully consolidated into an extension of instructional leadership theory or systematically connected to school-level AI readiness. This theoretical limitation restricts understanding of how conventional instructional leadership practices can be expanded to address the technological, pedagogical, ethical, and organisational demands introduced by AI. This issue is particularly significant in developing education systems, including Malaysia. National initiatives such as the Malaysia Digital Economy Blueprint, the Digital Education Policy, National AI-Governance Guidelines and the AI Literacy Guidebook demonstrate Malaysia's commitment to digital transformation, responsible AI use and future-ready

human-capital development (Economic Planning Unit, 2021; MOE, 2023; MOE, 2026; MOSTI, 2024). Nevertheless, disparities in digital infrastructure and access, uneven levels of AI literacy, limited AI-related professional development and emerging governance requirements continue to present implementation challenges (MOE, 2023; MOE, 2026; Teh et al., 2026). Although policy attention to AI is increasing, Malaysia-specific empirical and conceptual evidence explaining how instructional leaders can develop school AI readiness remains limited. Malaysian schools therefore require a contextually relevant leadership framework that can support AI integration while preserving educational quality, equity, ethics, human agency and sustainable development.

AI readiness should therefore be conceptualised as an organisation-wide capacity-building process rather than a one-off technological investment. Sustainable AI adoption requires continued alignment among leadership, strategy, infrastructure, data, governance, professional competencies, organisational culture and stakeholder expectations (DeMatthews et al., 2026; Johnk et al., 2021; Pietsch et al., 2025). From this perspective, leadership functions as a catalyst for organisational learning, innovation, professional capacity development and change management. However, research remains limited regarding the specific mechanisms through which instructional leadership contributes to AI readiness as an organisational capability and subsequently facilitates long-term educational transformation (Adams et al., 2025; Hsieh et al., 2026). Based on the foregoing synthesis, four major research gaps can be identified. First, limited research has directly examined the relationship between instructional leadership and school AI readiness, although emerging evidence confirms the importance of digital instructional leadership in teachers' AI integration (Adams et al., 2025; Hsieh et al., 2026). Second, existing educational AI studies predominantly examine technology acceptance, teacher readiness, or pedagogical applications rather than leadership-driven organisational transformation (Filiz et al., 2025; Renta-Davids et al., 2025). Third, the reviewed literature does not yet provide an integrated framework that simultaneously connects instructional leadership, AI-driven leadership competencies, school AI readiness and educational transformation, particularly through theoretically specified mediating mechanisms (DeMatthews et al., 2026; Sposato, 2025). Fourth, evidence addressing these relationships within Malaysian schools remains limited despite increasing national emphasis on AI-enabled educational development (MOE, 2026; Teh et al., 2026).

To address these gaps, this study proposes the MADANI AI-Driven Instructional Leadership Framework (MADANI-AILF) for educational transformation in Malaysia. The framework introduces AI-Driven Instructional Leadership Competencies (AILC) as a novel leadership construct that extends established instructional leadership theory into the AI era. Specifically, the proposed model posits that instructional leadership contributes to educational transformation through the sequential mediating mechanisms of AILC and school AI readiness. By integrating instructional leadership theory, organisational AI-readiness perspectives and emerging AI-leadership frameworks, MADANI-AILF seeks to explain how school leaders can facilitate ethical, equitable, human-centred and sustainable educational transformation in AI-enabled school environments (DeMatthews et al., 2026; Hallinger et al., 1985; Johnk et al., 2021).

Table 1: *Synthesis of Recent Research and the Unresolved Leadership Gap*

Author(s)	Focus of Study	Key Findings	Research Gap
Hallinger (2022)	Instructional Leadership	Instructional leadership remains a significant predictor of school effectiveness and teacher performance.	Limited discussion on AI integration within instructional leadership.
Adams (2025)	AI in School Leadership	AI supports school administration, decision-making, and operational efficiency.	Limited focus on instructional leadership competencies required for AI adoption.

Author(s)	Focus of Study	Key Findings	Research Gap
Chartered College of Teaching (2025)	AI Readiness	AI readiness requires leadership support, governance, professional development, and ethical awareness.	Lack of integration between leadership practices and AI readiness.
Harris et al. (2026)	Leadership for AI Use in Schools	School leaders require new competencies in AI governance, instructional innovation, and stakeholder engagement.	No comprehensive framework linking instructional leadership and AI readiness.
Kausar et al. (2026)	AI and Educational Leadership	AI enhances administrative efficiency and data-informed decision-making. Ethical leadership remains essential.	Limited theoretical integration with instructional leadership theory.
Guan et al. (2026)	School AI Readiness	Institutional AI readiness positively influences student AI literacy through teacher capability.	Limited focus on leadership mechanisms influencing readiness.
McClure et al. (2026)	Organisational AI Readiness	AI readiness depends on leadership alignment, culture, governance, and organisational learning.	Limited application within educational leadership contexts.
Legara et al. (2026)	Institutional Readiness for AI Deployment	Institutional readiness is critical for successful AI implementation.	Limited discussion on school leadership roles.

Literature Review

Instructional Leadership

Instructional leadership remains one of the most established and influential leadership models in educational administration because of its explicit focus on strengthening teaching, learning, and school effectiveness. Since the introduction of the Principal Instructional Management Rating Scale (PIMRS) by Hallinger and Murphy, instructional leadership has developed into a substantial international field of research. A recent systematic review involving studies from diverse educational systems confirms that instructional leadership research has consistently examined its relationships with student achievement, school performance, teacher attitudes, school climate and instructional practices (Hallinger et al., 2025). Empirical evidence further associates instructional leadership with teachers' professional learning and instructional practices, organisational commitment, and student achievement, although the strength and pathways of these relationships vary across contexts (Awang et al., 2022; Bellibas et al., 2021; Ozdogru et al., 2025). The instructional leadership model comprises three primary dimensions: defining the school mission, managing the instructional programme, and promoting a positive school learning climate. These dimensions enable school leaders to formulate and communicate educational goals, coordinate and monitor instructional practices, assess student progress, support teachers' professional development, protect instructional time and establish expectations for continuous improvement (Hallinger et al., 1985; Hallinger et al., 2025). Rather than affecting student outcomes exclusively through direct interventions, instructional leadership frequently operates through

indirect mechanisms such as teacher professional learning, collective capacity, organisational commitment, instructional practice and school climate (Bellibas et al., 2021; Hallinger et al., 2025). Nevertheless, the rapid emergence of digital technologies and AI has challenged conventional conceptions of instructional leadership. AI-enabled educational environments require school leaders to extend their responsibilities beyond traditional instructional supervision to include strategic technology planning, digital capacity building, data-informed decision-making, ethical governance, stakeholder engagement and the management of organisational change (Adams et al., 2025; DeMatthews et al., 2026; Fullan et al., 2024). Empirical evidence indicates that generative AI is already influencing instructional, managerial, social and organisational aspects of school leadership, with AI-assisted instructional leadership emerging as a particularly prominent domain of use (Berkovich, 2025). Instructional leadership nevertheless remains highly relevant in the AI era because effective AI integration depends substantially on leaders' ability to establish a coherent vision, provide professional support, encourage responsible experimentation and cultivate a culture of innovation. Research involving school leaders demonstrates that digital mindsets and digital instructional and transformational leadership are associated with the implementation of AI in schools (Pietsch et al., 2025). More recent evidence also shows that digital instructional leadership significantly predicts teachers' AI integration, while its influence on AI-supported pedagogy occurs indirectly through AI integration (Hsieh et al., 2026). Although the instructional leadership knowledge base is extensive, established frameworks do not explicitly address AI governance, algorithmic transparency, data privacy, human oversight, AI-related equity, or school-level AI readiness. Contemporary reviews similarly indicate that the literature connecting AI with educational and instructional leadership remains comparatively recent and fragmented (DeMatthews et al., 2026; Renta-Davids et al., 2025). This limitation supports the theoretical extension of instructional leadership to incorporate competencies required for ethical, equitable, pedagogically meaningful, and organisationally sustainable AI integration.

Artificial Intelligence in Education

AI has emerged as one of the most transformative technologies affecting contemporary educational systems. In education, AI broadly encompasses computational systems that process data, identify patterns, generate predictions or content, and support tasks commonly associated with human cognitive activity. Recent developments in generative AI, machine learning, natural language processing, intelligent tutoring systems, and learning analytics have expanded its possible applications across teaching, learning, assessment, administration and educational leadership (Miao et al, 2023; OECD, 2026). Within schools, AI can support personalised and adaptive learning, lesson planning, assessment and feedback, educational analytics, communication, administrative automation and the identification of students' learning needs. AI can also assist leaders with scheduling, resource allocation, institutional communication, data analysis, policy development and strategic decision-making (Adams et al., 2025; DeMatthews et al., 2026; Sposato, 2025). However, these applications should augment professional judgement rather than replace educators or school leaders in decisions involving students' learning, welfare, rights and educational opportunities. The potential benefits of AI include increased administrative efficiency, improved access to information, more timely feedback, data-informed planning and greater opportunities for personalised educational support. Nevertheless, these benefits are conditional rather than automatic. The educational value of generative AI depends on its alignment with clear pedagogical objectives, appropriate instructional design, teacher mediation and robust institutional support. Completing a task more efficiently with generative AI does not necessarily produce meaningful learning unless the technology is used in accordance with sound educational principles (Miao et al., 2023; OECD, 2026).

AI adoption also introduces significant ethical and organisational challenges. Concerns regarding data privacy, security, algorithmic bias, transparency, accountability, intellectual property, academic integrity, inequitable access and the erosion of human agency have become central to AI governance in education. Educational institutions therefore require policies that provide human oversight, clarify accountability, protect learners' rights and ensure that AI systems are used safely, transparently, and equitably (DeMatthews et al., 2026; Miao et al., 2023; OECD, 2023). While educational AI research has expanded rapidly, much of the literature continues to concentrate on classroom applications, technology acceptance, AI literacy, teacher perceptions and student learning. Comparatively fewer studies examine the organisational and leadership conditions needed to support institution-wide and sustainable AI adoption (Adams et al., 2025; Renta-Davids et al., 2025). Consequently, greater attention must be given to leadership, governance, professional capacity, organisational culture and institutional readiness as interconnected foundations of responsible AI implementation.

AI Readiness

AI readiness refers to the extent to which an organisation possesses and aligns the resources, capabilities, structures, and commitments necessary to adopt and use AI effectively. Organisational AI

readiness extends beyond access to hardware and software to include strategic alignment, data availability, human expertise, leadership commitment, organisational culture, governance arrangements and change-management capacity (Johnk et al., 2021). Within schools, readiness additionally involves institutional policies, technological capacity, teacher professional development, ethical guidelines and leadership support for consistent AI implementation (Lara Nieto-Marquez et al., 2026). Contemporary literature therefore conceptualises AI readiness as a multidimensional construct. At the organisational level, Johnk et al. (2021) identify strategic alignment, resources, knowledge, culture and data as important readiness categories. The Digital Education Council's Ten Dimension AI Readiness Framework similarly addresses institution-wide readiness across teaching, governance, operations, strategy and organisational development, although this particular framework was developed primarily for higher education institutions (Digital Education Council, 2025). These frameworks demonstrate that technological resources alone are insufficient to produce successful AI adoption. At the educator level, AI readiness encompasses teachers' understanding of AI, technological self-efficacy, ability to apply AI pedagogically, ethical awareness, professional vision, and willingness to engage with AI-supported innovation (Ramazanoglu et al., 2025; Wang et al., 2023). UNESCO further identifies five areas of teacher AI competence: a human-centred mindset, ethics of AI, AI foundations and applications, AI pedagogy and AI for professional learning (Miao et al., 2024). These competencies indicate that teachers must be prepared to evaluate AI outputs critically and ethically rather than merely operate AI applications.

Recent empirical evidence supports the importance of readiness and institutional assistance. Research involving K-12 teachers shows that AI integration is shaped by psychological preparedness, pedagogical knowledge, perceived usefulness, professional development, technological access and organisational support (Filiz et al., 2025; Granstrom et al., 2025). At the institutional level, schools may demonstrate ethical awareness while continuing to lack formal AI policies, specialised support structures and sustained professional training (Lara Nieto-Marquez et al., 2026). These findings illustrate why investment in technology without corresponding investment in leadership, governance and professional capacity may produce fragmented or unsustainable implementation. AI readiness should therefore be regarded as a developing organisational capability rather than a static technological condition. This capability emerges through continuous organisational learning, strategic alignment, governance development, stakeholder engagement, leadership support and workforce preparation (Johnk et al., 2021; Pietsch et al., 2025). School leaders are particularly important because they influence how technological resources, ethical requirements, institutional goals and professional learning activities are integrated into a coherent school-wide strategy. Nevertheless, research examining school-level AI readiness remains emergent. Existing organisational frameworks were predominantly developed outside school education, while recent school-based instruments tend to focus on selected dimensions such as institutional policy and technological resources (Johnk et al., 2021; Lara Nieto-Marquez et al., 2026). Consequently, limited research explains how instructional leadership contributes to the broader development of school AI readiness encompassing leadership, human capability, governance, culture, infrastructure and organisational strategy.

AI-Driven Instructional Leadership Competencies

The emergence of AI-enabled educational environments has generated increasing interest in the competencies required of contemporary school leaders. Effective AI implementation requires leaders to possess capabilities that extend beyond traditional instructional leadership functions. These include the ability to formulate an institutional AI vision, evaluate technological applications, facilitate AI-supported instructional innovation, interpret data, establish ethical safeguards, promote equitable access, develop professional capacity and engage relevant stakeholders (Adams et al., 2025; DeMatthews et al., 2026; Renta-Davids et al., 2025). Recent frameworks provide an initial foundation for identifying these competencies. DeMatthews et al. (2026), for example, propose six AI-leadership domains encompassing strategic vision, instructional innovation, equity, stakeholder engagement, professional development and responsible implementation. Similarly, contemporary reviews and taxonomies emphasise AI literacy, data-informed decision-making, ethical and equitable governance, organisational strategy, communication, and human-centred leadership (Renta-Davids et al., 2025; Sposato, 2025).

Building on this emerging literature, the present study proposes the AI-Driven Instructional Leadership Competencies (AILC) as a multidimensional construct comprising five interconnected domains: strategic AI vision and planning, AI-supported instructional innovation, data-informed leadership, ethical and equitable AI governance, and professional and stakeholder capacity building. These domains represent the competencies through which established instructional leadership practices can be extended to support organisational AI readiness and sustainable educational transformation (DeMatthews et al., 2026; Fullan et al., 2024; Pietsch et al., 2025).

Despite growing recognition of AI-related leadership competencies, no widely accepted and empirically validated framework has yet systematically embedded these competencies within instructional leadership theory. Existing frameworks are primarily conceptual, exploratory, or focused on broader educational leadership rather than the specific instructional functions of school leaders (DeMatthews et al., 2026; Renta-Davids et al., 2025). The proposed AILC construct therefore represents a theoretical extension intended to bridge established instructional leadership theory with emerging research on AI leadership and organisational readiness.

Educational Transformation

Educational transformation refers to systematic, multidimensional and sustainable changes that improve educational processes, organisational capability, equity and student outcomes. In the digital era, transformation involves more than the introduction of technological tools; it requires coherent changes in pedagogy, leadership, organisational structures, professional competencies, governance, culture and institutional learning. A system-wide approach is therefore needed to align technologies, actors, policies, infrastructure and educational objectives (OECD, 2023). AI may accelerate educational transformation by supporting personalised learning, administrative efficiency, instructional planning, educational analytics and strategic decision-making. However, technology adoption does not automatically result in transformation. Sustainable change requires leadership commitment, professional learning, ethical governance, organisational readiness, appropriate infrastructure and a culture that supports responsible experimentation and continuous improvement (Fullan et al., 2024; OECD, 2026; Pietsch et al., 2025).

Educational transformation should consequently be conceptualised as an interaction among technological innovation, human-capital development, organisational learning, institutional governance and educational values. Leadership connects these dimensions by establishing direction, mobilising resources, building professional capacity, addressing resistance and ensuring that AI implementation remains human-centred, equitable and pedagogically meaningful (DeMatthews et al., 2026; Renta-Davids et al., 2025). Nevertheless, limited empirical evidence explains the mechanisms through which instructional leadership contributes to educational transformation by developing AI-specific leadership competencies and school AI readiness. The instructional leadership literature continues to be dominated by univariate and bivariate models, while more complex mediated and moderated models remain less common (Hallinger et al., 2025). Emerging research demonstrates that AI integration can mediate the relationship between digital instructional leadership and AI-supported pedagogy, but broader organisational pathways remain insufficiently examined (Hsieh et al., 2026). This limitation supports the development of an integrated framework examining how instructional leadership influences educational transformation through AI-driven leadership competencies and school AI readiness.

Table 2: *Research Gap Analysis*

Existing Literature	Main Focus	Limitation	Gap Addressed by This Study
Instructional Leadership Literature	Teaching, learning, school effectiveness	Developed largely in pre-AI contexts	Extends instructional leadership into AI-enabled educational environments
AI in Education Literature	Teaching and learning applications	Limited focus on school leadership	Examines leadership mechanisms influencing AI integration
AI Readiness Literature	Technology adoption and organisational preparedness	Limited attention to instructional leadership	Investigates leadership influence on AI readiness
Digital Leadership Literature	Technology management and innovation	Weak integration with instructional leadership theory	Integrates leadership and technology perspectives
Malaysian Educational Research	Educational digitalisation initiatives	Limited AI leadership frameworks	Proposes a contextualised Malaysian leadership model

Theoretical Foundations

The proposed framework is grounded in three complementary theoretical perspectives: Instructional Leadership Theory, the Technology Acceptance Model (TAM) and Diffusion of

Innovations (DOI) Theory. Instructional Leadership Theory provides a leadership-level explanation of how school leaders establish direction, improve instructional conditions, develop professional capacity and create an organisational climate conducive to innovation. TAM explains the individual-level cognitive mechanisms influencing teachers' and school personnel's acceptance of AI technologies, whereas DOI Theory explains how AI-related innovations are communicated, adopted, implemented and institutionalised within the school as a social system. The integration of these perspectives therefore provides a multilevel explanation of how instructional leadership influences AI acceptance, school AI readiness, and educational transformation (Davis, 1989; Hallinger et al., 1985; Rogers, 2003).

Instructional Leadership Theory

The instructional leadership perspective, operationalised through the model developed by Hallinger and Murphy (1985), remains one of the most influential frameworks in educational leadership research. The model emphasises school leaders' direct and indirect involvement in strengthening teaching and learning through three major dimensions: defining the school mission, managing the instructional programme and promoting a positive school learning climate. These dimensions encompass leadership practices such as framing and communicating school goals, coordinating and supervising instruction, monitoring student progress, supporting teachers' professional development, protecting instructional time and maintaining high academic expectations (Hallinger et al., 1985). The continuing importance of this model is supported by contemporary evidence. A systematic review of 791 PIMRS-related publications from 65 countries demonstrates the extensive international application of the instructional leadership framework and identifies student achievement, school performance, teacher attitudes, school climate and instructional practice as major areas of investigation (Hallinger et al., 2025a). A subsequent meta-analysis involving 68 quantitative studies found a moderate and statistically significant relationship between principal instructional leadership and teacher attitudes, including trust, self-efficacy, collective efficacy, organisational commitment and job satisfaction (Hallinger et al., 2025b). Within the context of AI, instructional leadership provides an important foundation for explaining how school leaders can influence organisational change and educational innovation. Although the original model was developed before the emergence of contemporary AI technologies, its emphasis on strategic direction, instructional improvement, professional learning, resource alignment and capacity building remains highly relevant. Empirical evidence indicates that digital instructional leadership and school leaders' digital mindsets are associated with the implementation of AI across instructional, organisational and managerial levels of schools (Pietsch et al., 2025).

Nevertheless, AI-enabled educational environments introduce responsibilities that are not explicitly addressed in the original model. These include strategic AI planning, data-informed leadership, algorithmic transparency, data privacy, human oversight, ethical and equitable AI governance, stakeholder engagement and the development of AI-related professional competencies. Contemporary scholarship therefore argues that school leadership frameworks must be extended to guide the ethical, equitable, pedagogically meaningful and organisationally sustainable implementation of AI (Adams et al., 2025; DeMatthews et al., 2026). Accordingly, the present study conceptualises instructional leadership as the foundational leadership capability that enables school leaders to develop AI-driven Instructional Leadership Competencies (AILC), cultivate school AI readiness and facilitate educational transformation. The proposed framework does not replace established instructional leadership theory; instead, it extends its mission-oriented, instructional and capacity-building functions to address the emerging technological, ethical and organisational demands of AI-enabled schooling.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) developed by Davis (1989) is one of the most influential theoretical models for explaining individuals' acceptance and use of technology. TAM proposes that perceived usefulness and perceived ease of use are central cognitive beliefs influencing users' attitudes, behavioural intentions, and subsequent technology-use behaviour. Perceived usefulness refers to the degree to which an individual believes that using a particular technology will improve task performance, whereas perceived ease of use refers to the degree to which the technology is perceived as requiring minimal effort (Davis, 1989). TAM has been widely applied to explain the acceptance of AI technologies. A systematic review of AI-acceptance research found that extended versions of TAM were among the most frequently employed theoretical approaches. Perceived usefulness, performance expectancy, attitude, trust and effort expectancy were consistently associated with behavioural intentions and AI-use behaviour (Kelly et al., 2023). More recently, a meta-analysis of 27 AI-in-education studies involving more than 12,000 participants confirmed strong and statistically significant relationships among perceived ease of use, perceived usefulness and behavioural intention. The findings provide contemporary evidence supporting the applicability of TAM within AI-enabled educational environments (Xue et al., 2026).

Nevertheless, acceptance of AI may involve factors that extend beyond the original TAM constructs. Because AI systems can generate content, make predictions, process personal data and influence educational decisions, users' acceptance may also depend on trust, perceived risk, transparency, ethical concerns, professional competence and institutional support (Kelly et al., 2023). Research involving K-12 teachers further indicates that AI integration is facilitated by perceptions of efficiency, adaptability and pedagogical value but constrained by technical difficulties, curriculum misalignment, ethical concerns and insufficient organisational support (Filiz et al., 2025). School leaders can influence these acceptance conditions by articulating a clear AI vision, communicating the pedagogical value of AI, providing professional development, ensuring access to appropriate resources, establishing ethical guidelines and creating opportunities for supported experimentation (Filiz et al., 2025; Pietsch et al., 2025). Within the proposed framework, TAM therefore explains the individual-level mechanism through which instructional leadership and AI-driven leadership competencies shape teachers' and school personnel's perceptions of AI. Importantly, TAM should not be interpreted as a complete theory of organisational AI readiness because its principal unit of explanation is the individual user. Instead, it explains how leadership-generated organisational conditions influence perceived usefulness, perceived ease of use, trust, attitudes and behavioural intentions. These individual acceptance mechanisms subsequently contribute to collective readiness for school-wide AI implementation.

Diffusion of Innovations Theory (DOI)

Diffusion of Innovations Theory was first introduced by Rogers (1962) and subsequently refined across later editions of his seminal work (Rogers, 2003). The theory explains how an innovation is communicated through particular channels over time among members of a social system. It identifies four principal elements of diffusion: the innovation, communication channels, time and the social system. Rogers (2003) further identifies five perceived attributes that influence the rate of innovation adoption: relative advantage, compatibility, complexity, trialability and observability. Within AI-enabled education, relative advantage concerns whether teachers and leaders perceive AI as improving instruction, assessment, decision-making, or administrative efficiency. Compatibility refers to the alignment of AI applications with educational values, curricula, professional practices and institutional priorities. Complexity concerns the perceived difficulty associated with understanding and using AI. Trialability reflects opportunities to experiment with AI on a limited and supported basis, whereas observability concerns the visibility of AI-related outcomes and benefits to other members of the school community (Rogers, 2003). DOI Theory is particularly relevant because AI implementation represents both a technological and organisational innovation. Its adoption depends not only on the characteristics of the technology but also on communication, professional networks, institutional norms, leadership practices, opportunities for experimentation and the visibility of successful implementation. School leaders can consequently function as change agents by communicating an AI vision, modelling responsible use, supporting early adopters, reducing implementation uncertainty and disseminating effective practices throughout the organisation.

Recent empirical evidence supports the applicability of DOI Theory to AI integration in schools. In a study involving 842 K-12 teachers, Hsieh et al. (2026) found that digital instructional leadership significantly predicted teachers' AI integration. AI integration, in turn, significantly predicted AI-supported pedagogy and fully mediated the relationship between digital instructional leadership and AI pedagogy. However, trust in AI did not significantly moderate the relationship between AI integration and AI pedagogy. These findings indicate that leadership may influence AI-supported pedagogical transformation primarily by facilitating the adoption and integration process rather than through an immediate direct effect on classroom pedagogy. DOI Theory therefore provides the organisational and social system explanation that complements TAM. Whereas TAM explains why individual teachers or staff members may accept AI, DOI Theory explains how that acceptance develops into broader organisational adoption, implementation, routinisation and educational transformation. Together with instructional leadership, these theories support the proposition that school leaders influence educational transformation by developing AI-driven leadership competencies, creating conditions for individual acceptance and facilitating the school-wide diffusion of AI innovation.

Table 3: *Theoretical Integration and Contribution of the Proposed Framework*

Existing Theory	Limitation	Contribution of the Present Study
Instructional Leadership Theory	Developed largely before the AI era	Extends instructional leadership into AI-enabled educational environments

Existing Theory	Limitation	Contribution of the Present Study
Technology Acceptance Model (TAM)	Focuses on technology adoption behaviour	Integrates leadership influences on organisational AI adoption
Diffusion of Innovation Theory	Focuses on innovation diffusion processes	Explains AI integration through leadership-driven organisational readiness
AI Readiness Literature	Emphasizes technology and infrastructure	Positions readiness as a multidimensional organisational capability
Educational Transformation Literature	Limited integration with AI leadership	Explains transformation through leadership-readiness mechanisms

Development of the MADANI AI-Driven Instructional Leadership Framework

The proposed conceptual framework integrates Instructional Leadership Theory, TAM and DOI theory to explain how school leaders facilitate educational transformation through AI readiness. The framework proposes that instructional leadership serves as the primary antecedent influencing the development of AI-driven Instructional Leadership Competencies (AILC). These competencies subsequently enhance organisational AI readiness, which enables schools to successfully implement AI technologies and achieve educational transformation.

Recent literature suggests that leadership effectiveness in AI-enabled educational environments depends on leaders' ability to establish strategic visions, foster innovation cultures, support teacher development, promote ethical AI implementation and facilitate organisational learning processes. Schools led by leaders possessing such competencies demonstrate higher levels of AI adoption, organisational readiness and educational innovation. Building upon these findings, the present study introduces AILC as a new theoretical construct that bridges traditional instructional leadership and organisational AI readiness.

AI-Driven Instructional Leadership Competencies (AILC)

School leaders must formulate and communicate a clear vision for AI integration aligned with educational goals and school improvement priorities. Strategic visioning enables organizations to align technological innovation with institutional objectives and stakeholder expectations.

i) **Data-Informed Decision-Making**
AI technologies generate extensive educational data that can support evidence-based decision-making. Educational leaders must possess the capability to interpret, evaluate and use AI-generated insights for school improvement purposes.

ii) **AI-Pedagogical Leadership**
School leaders must guide teachers in integrating AI into instructional practices while ensuring alignment with pedagogical objectives and educational quality standards. Digital instructional leadership has been shown to positively influence AI integration and pedagogical innovation among teachers.

iii) **Human-Centred Ethical Leadership**
Ethical leadership is increasingly important in AI-enabled educational environments due to concerns regarding privacy, fairness, accountability, transparency, and algorithmic bias. Educational leaders must ensure responsible AI implementation that prioritises human well-being and educational equity.

iv) **Capacity Building and Change Management**
Successful AI adoption depends on teachers' readiness and organisational learning capabilities. School leaders must therefore facilitate professional development, organisational learning and change management processes that support sustainable AI implementation.

Table 4: *AI-Driven Instructional Leadership Competencies and Proposed Indicators*

Competency Dimension	Description	Proposed Indicators
Strategic AI Visioning	Ability to formulate and communicate a strategic vision for AI integration.	AI strategic planning, vision communication, innovation culture, stakeholder alignment.
Data-Informed Decision-Making	Ability to use AI-generated data for school improvement.	Learning analytics, predictive analytics, data interpretation, evidence-based planning.
AI-Pedagogical Leadership	Ability to guide teachers in AI-supported teaching and learning.	AI-enhanced pedagogy, instructional innovation, professional learning communities, teacher support.
Human-Centred Ethical Leadership	Ability to ensure ethical, responsible, and equitable AI implementation.	Data privacy, transparency, accountability, fairness, inclusion.
Capacity Building and Change Management	Ability to develop organisational readiness and manage innovation.	Professional development, AI literacy, organisational learning, change management.

Malaysian Contextualisation Through Malaysia MADANI

Building upon the proposed conceptual framework, this study introduces the MADANI AI-Driven Instructional Leadership Framework (MADANI-AILF) as a contextually grounded leadership model for Malaysian schools. The framework is anchored in the six core values of Malaysia MADANI: sustainability, prosperity, innovation, respect, trust and compassion. Collectively, these values constitute an integrated and humanising policy orientation intended to guide national development amid complex social, economic and technological change (Prime Minister's Office of Malaysia, 2023). Within this context, AI implementation in schools should not be driven solely by technological efficiency or operational productivity. It should also prioritise ethical responsibility, human well-being, social inclusion, equitable access, trustworthiness and sustainable educational development (MOE, 2023; MOSTI, 2024). Collectively, the proposed AILC are expected to strengthen school AI readiness by aligning strategic direction, technological resources, professional capability, organisational culture and governance mechanisms. Organisational AI readiness is not merely a technological condition but a multidimensional capability involving leadership commitment, strategic alignment, knowledge, resources, data and organisational culture (Johnk et al., 2021). Enhanced readiness is subsequently expected to facilitate sustainable educational transformation and school effectiveness. Accordingly, the MADANI-AILF positions school leaders as strategic architects of transformation who balance technological innovation with human-centred educational values. This orientation is consistent with Malaysia's aspiration to develop digitally fluent, ethically responsible, inclusive and future-ready educational institutions (MOE, 2026a; MOE, 2026b; Teh et al., 2026).

The emergence of AI has prompted a paradigm shift in educational leadership research. Although established leadership theories continue to provide valuable explanations of school improvement, contemporary educational environments increasingly require leadership models capable of addressing technological transformation, organisational adaptability, data-informed decision-making, ethical governance, equity and innovation management (Fullan et al., 2024; Renta-Davids et al., 2025). Recent systematic evidence indicates that school leaders must navigate not only the potential benefits of AI, such as improved decision-making and administrative efficiency, but also challenges involving AI literacy, professional development, data privacy, fairness, misinformation, access disparities and the limitations of algorithmic judgement (Bellibas et al., 2026). Consequently, scholars have called for leadership perspectives that connect established educational leadership practices with AI-related competencies and organisational capabilities (DeMatthews et al., 2026; Sposato, 2025).

The MADANI-AILF responds to this theoretical need by extending the established instructional leadership model into AI-enabled educational environments. Conventional instructional leadership primarily focuses on defining the school mission, managing the instructional programme and promoting a positive school learning climate (Hallinger et al., 1985). These dimensions remain

highly relevant because they enable leaders to establish educational goals, supervise instruction, monitor learning, support teacher development and cultivate conditions conducive to continuous improvement (Hallinger et al., 2025). Nevertheless, AI-enabled schools require additional leadership competencies involving strategic AI vision, data-informed leadership, AI-supported instructional innovation, ethical and equitable governance, professional capacity building and stakeholder engagement (Berkovich, 2025; DeMatthews et al., 2026; Sposato, 2025). The proposed framework therefore retains the pedagogical foundations of instructional leadership while expanding its theoretical scope to address AI-specific organisational and ethical requirements.

The MADANI-AILF occupies a distinctive position within contemporary educational leadership research for three principal reasons. First, it bridges two research domains that have frequently been examined separately: instructional leadership and organisational AI readiness. Existing studies have generally focused either on the adoption and application of AI by educational leaders or on the organisational conditions required for technological implementation, producing fragmented explanations of how leadership develops school-wide preparedness for AI-enabled transformation (Bellibas et al., 2026; Renta-Davids et al., 2025). The proposed framework integrates these perspectives by conceptualising AI readiness as a strategic organisational capability developed through leadership practices, organisational learning, professional capacity, and institutional support (Johnk et al., 2021; Pietsch et al., 2025). Second, the framework introduces AI-Driven Instructional Leadership Competencies (AILC) as a multidimensional leadership construct. Although recent frameworks acknowledge strategic vision, instructional innovation, equity, ethical governance, stakeholder engagement and professional development as important AI leadership domains, these competencies have not yet been systematically embedded within established instructional leadership theory (DeMatthews et al., 2026; Sposato, 2025). Empirical research on AI-assisted instructional leadership also remains emergent and predominantly exploratory (Berkovich, 2025). The proposed competency construct therefore provides a theoretical mechanism explaining how instructional leadership may contribute to AI readiness and, subsequently, sustainable educational transformation. Third, the framework contributes a contextually grounded Malaysian perspective through the integration of Malaysia MADANI values. Bibliometric evidence indicates that the international literature on ethical AI in educational leadership remains disproportionately influenced by western perspectives, highlighting the need for culturally responsive frameworks developed within non-Western educational and sociopolitical contexts (Polat et al., 2025). In contrast, the MADANI-AILF integrates technological advancement with sustainability, prosperity, innovation, respect, trust, compassion, inclusion and human well-being (Prime Minister's Office of Malaysia, 2023). These values are further aligned with Malaysia's educational and AI governance priorities, which emphasise digital inclusion, human benefit, fairness, transparency, accountability, privacy, safety and responsible innovation (MOE, 2023; MOSTI, 2024). Consequently, the MADANI-AILF contributes to the growing international discourse on AI-enabled educational leadership by explaining how instructional leadership may develop organisational AI readiness, support responsible technological innovation and facilitate sustainable educational transformation while preserving culturally grounded and human-centred educational values. It also provides a framework consistent with Malaysia's ongoing efforts to develop AI-ready citizens, strengthen digital fluency, address the digital divide and prepare schools for the ethical integration of AI (MOE, 2026a; MOE, 2026b; Teh et al., 2026).

Hypotheses (H) and Conceptual Model (Figure 1)

Based on the theoretical integration and empirical evidence discussed above, the following hypotheses are proposed:

- **H1:** Instructional leadership positively influences AI-driven Instructional Leadership Competencies (AILC). This relationship reflects the role of goal clarity, professional learning and collaborative culture in developing AI-related leadership capability.
- **H2:** AI-driven Instructional Leadership Competencies (AILC) competencies positively influence AI Readiness. Leaders with these competencies are better positioned to prepare schools technologically, organisationally, culturally and ethically for AI adoption.
- **H3:** AI Readiness positively influences educational transformation. Organisations demonstrating higher levels of AI readiness are more likely to achieve successful technology integration, innovation and sustainable educational improvement.
- **H4:** AI-driven Instructional Leadership Competencies (AILC) positively influence educational transformation. Leadership competencies related to AI visioning, innovation, ethical governance and organisational learning directly contribute to educational transformation initiatives.
- **H5:** AI Readiness mediates the relationship between AI-driven Instructional Leadership Competencies (AILC) and educational transformation. The effectiveness of leadership competencies is expected to operate through organisational readiness

mechanisms that facilitate successful AI adoption.

H6: Instructional Leadership indirectly influences educational transformation through AI-driven Instructional Leadership Competencies (AILC) and AI Readiness. This hypothesis reflects the sequential mediation process proposed by the conceptual framework, whereby leadership influences transformation through competency development and organisational readiness.

Figure 1: *MADANI AI-Driven Instructional Leadership Framework (AILF)*

Discussion and Implications

The rapid advancement of Artificial Intelligence (AI) is reshaping the landscape of educational leadership, requiring school leaders to extend their traditional instructional leadership roles beyond instructional supervision and curriculum management (Fullan et al., 2024; Renta-Davids et al., 2025; Sposato, 2025). Evidence synthesised from recent literature suggests that effective AI integration within schools is not solely dependent on technological infrastructure but is also significantly influenced by leadership capacity, organisational readiness, professional competence and institutional culture (Johnk et al., 2021; Pietsch et al., 2025). Consequently, educational transformation in the AI era necessitates a reconceptualisation of instructional leadership that incorporates competencies related to technological innovation, data-informed decision-making, ethical governance, organisational learning and sustainable change management (DeMatthews et al., 2026; OECD, 2023; Sposato, 2025). The proposed framework contributes to this emerging discourse by positioning instructional leadership as the foundational leadership construct that influences educational transformation through the development of AI-Driven Instructional Leadership Competencies (AILC) and organisational AI readiness. Instructional leadership continues to serve as a central mechanism through which school leaders establish a shared vision, improve instructional practices, foster teacher professional development, promote organisational learning and cultivate supportive school cultures (Hallinger et al., 2025; Hallinger et al., 1985). Recent empirical research further demonstrates that digital instructional leadership and school leaders' digital mindsets are associated with the implementation of AI across instructional, managerial and organisational functions (Berkovich, 2025; Pietsch et al., 2025). Nevertheless, these established leadership functions must be expanded to address the technological, pedagogical, ethical and organisational demands of AI-enabled educational environments (Adams et al., 2025; DeMatthews et al., 2026).

One of the most significant theoretical contributions of the framework is the introduction of AILC as a proposed multidimensional construct. Established instructional leadership literature has traditionally emphasised instructional supervision, curriculum coordination, monitoring of student progress, teacher professional development and the cultivation of a positive school learning climate (Hallinger et al., 2025; Hallinger et al., 1985). Although these dimensions remain relevant, contemporary educational environments require additional competencies that enable school leaders to guide AI integration and digital transformation effectively. The five proposed competencies; Strategic AI Visioning, Data-Informed Decision-Making, AI-Pedagogical Leadership, Human-Centred Ethical Leadership, and Capacity Building and Change Management synthesise leadership capabilities that are increasingly emphasised in the emerging literature on AI-enabled educational leadership (Adams et al., 2025; DeMatthews et al., 2026; Renta-Davids et al., 2025; Sposato, 2025). The AILC construct therefore represents a theoretical extension of instructional leadership intended to preserve its pedagogical foundations while incorporating the competencies required for responsible and sustainable AI integration.

The framework further proposes that AI readiness functions as a critical organisational capability mediating the relationship between AILC and educational transformation. This proposition is consistent with contemporary organisational research demonstrating that technological innovation alone does not guarantee successful or sustainable transformation. Instead, organisations must possess an appropriate alignment of strategy, leadership commitment, technological resources, data capacity, professional knowledge, organisational culture, governance arrangements and change-management capability (Johnk et al., 2021; OECD, 2023). In school settings, AI readiness should therefore be understood as a dynamic and continuously developing organisational capability rather than a static condition defined merely by the availability of hardware and software. Schools with higher levels of AI readiness are expected to demonstrate stronger capacities for responsible experimentation, instructional improvement, organisational innovation, and sustainable institutional development (OECD, 2026; Pietsch et al., 2025). Nevertheless, the proposed mediating role of AI readiness remains a theoretical proposition that requires systematic empirical testing. Furthermore, the framework highlights the importance of balancing technological advancement with human-centred educational values. Although

AI technologies offer significant opportunities to enhance administrative efficiency, instructional planning, educational analytics, personalisation and organisational decision-making, their use must remain subject to professional judgement, human oversight, pedagogical purposes and ethical responsibility (Miao et al., 2023; OECD, 2026). Educational leadership must ensure that AI functions as a tool for augmenting human capability and educational quality rather than replacing teacher agency, professional expertise, interpersonal relationships, or accountable decision-making. The inclusion of Human-Centred Ethical Leadership within the proposed framework reflects growing concerns regarding algorithmic bias, data privacy, transparency, accountability, misinformation, human agency and educational equity (DeMatthews et al., 2026; Miao et al., 2024; Miao et al., 2023). Accordingly, school leaders must establish clear governance arrangements, protect the rights and well-being of teachers and students, critically evaluate AI-generated outputs and ensure equitable access to the educational benefits of AI.

The proposed framework also aligns with contemporary educational reform agendas that emphasise innovation, sustainability, digital transformation, equity and lifelong learning. Current international policy frameworks advocate a system-wide approach in which technologies, infrastructure, professional competencies, governance mechanisms, institutional actors and educational objectives are coherently aligned (Miao et al., 2024; OECD, 2023, 2026). In particular, the framework supports efforts to develop future-ready schools capable of responding effectively to technological disruption while maintaining strong commitments to educational quality, inclusivity, sustainability and holistic human development. From a practical perspective, the framework implies that education systems should move beyond providing school leaders with short-term technical training on particular AI applications. Leadership-development programmes should incorporate strategic AI planning, AI-supported pedagogy, data literacy, ethical governance, organisational change, stakeholder engagement and professional capacity building (DeMatthews et al., 2026; Miao et al., 2024). Schools should also conduct multidimensional AI-readiness assessments before implementing AI at scale, establish appropriate governance and accountability mechanisms, provide sustained professional learning and adopt phased implementation strategies that allow responsible experimentation and evaluation (Johnk et al., 2021; OECD, 2023; Pietsch et al., 2025). These measures would enable school leaders to translate AI-related innovation into meaningful, equitable and sustainable educational transformation.

Theoretical Contributions

Extending Instructional Leadership Theory

The first theoretical contribution involves extending the established instructional leadership perspective into the era of Artificial Intelligence (AI). The instructional leadership model developed by Hallinger and Murphy (1985) remains highly influential, particularly through its emphasis on defining the school mission, managing the instructional programme and promoting a positive school learning climate. Its continuing relevance is demonstrated by the extensive application of the Principal Instructional Management Rating Scale (PIMRS) across diverse educational systems and research contexts (Hallinger et al., 2025). Nevertheless, the original model was developed in educational contexts that preceded contemporary AI technologies and, consequently, did not explicitly address the technological, ethical, data-related and organisational demands associated with AI-enabled schooling. The proposed framework extends not replaces the established instructional leadership model by incorporating AI-related leadership capabilities required to guide digital transformation and organisational innovation. These capabilities include strategic AI visioning, data-informed decision-making, AI-supported pedagogical leadership, ethical and equitable governance, professional capacity building and organisational change management. Recent scholarship similarly demonstrates that school leaders require expanded competencies to manage the pedagogical, organisational, strategic and ethical implications of AI adoption (Adams et al., 2025; DeMatthews et al., 2026; Pietsch et al., 2025). The framework therefore broadens the theoretical scope of instructional leadership while preserving its fundamental commitment to improving teaching, learning, teacher development and school effectiveness.

Integrating Leadership and Technology Adoption Perspectives

The second theoretical contribution involves integrating Instructional Leadership Theory, the Technology Acceptance Model (TAM) and Diffusion of Innovations (DOI) Theory within a unified, multilevel conceptual framework. Existing research on AI in educational leadership remains relatively fragmented, with studies frequently focusing either on leadership practices, individual technology acceptance, or organisational adoption processes rather than examining their interrelationships within a single explanatory framework (Renta-Davids et al., 2025; Sposato, 2025). Within the proposed framework, instructional leadership provides a leadership level explanation of how school leaders establish direction, develop professional capacity, allocate resources and cultivate an organisational climate that supports innovation. TAM explains the individual level cognitive mechanisms through which teachers and other school personnel evaluate AI technologies, particularly in terms of perceived

usefulness, perceived ease of use, attitudes and behavioural intentions (Davis, 1989; Xue et al., 2026). DOI Theory subsequently provides a social-system and organisational explanation of how AI-related innovations are communicated, adopted, implemented and institutionalised within schools (Rogers, 2003). Recent empirical evidence demonstrates that digital instructional leadership can influence AI-supported pedagogy indirectly by facilitating teachers' AI integration, thereby supporting the relevance of innovation-diffusion processes in school settings (Hsieh et al., 2026). The integration of these perspectives provides a multilevel theoretical explanation of how leadership practices shape individual AI acceptance, organisational AI Readiness and broader educational transformation. It also bridges the conceptual gap between leadership behaviour and technology-adoption outcomes by positioning competency development, professional learning, organisational support and innovation diffusion as interconnected mechanisms.

Introducing AI-Driven Instructional Leadership Competencies (AILC)

The third theoretical contribution is the introduction of AI-Driven Instructional Leadership Competencies (AILC) as a proposed multidimensional leadership construct. Established instructional leadership research has primarily concentrated on school mission, instructional supervision, curriculum coordination, monitoring student progress, teacher professional development and school learning climate (Hallinger et al., 2025; Hallinger et al., 1985). Although these functions remain indispensable, AI-enabled educational environments generate additional leadership responsibilities related to AI strategy, data use, algorithmic accountability, pedagogical evaluation, ethical governance, human oversight, equity and organisational change. Within the boundaries of the literature synthesised in this study, AILC is proposed as a novel construct comprising five interrelated competencies: Strategic AI Visioning, Data-Informed Decision-Making, AI-Pedagogical Leadership, Human-Centred Ethical Leadership and Capacity Building and Change Management. These competencies synthesise leadership capabilities increasingly emphasised in emerging AI leadership frameworks and reviews (Adams et al., 2025; DeMatthews et al., 2026; Renta-Davids et al., 2025; Sposato, 2025). The theoretical significance of AILC lies in its positioning of AI-related capabilities within the established pedagogical orientation of instructional leadership. Rather than treating AI leadership as a purely technical or administrative responsibility, the construct connects AI strategy and governance directly with teaching quality, teacher learning, student well-being and school improvement. AILC therefore provides a theoretical foundation for future studies examining the competencies required for effective leadership in AI-enabled educational environments. However, because it is a proposed construct, its dimensional structure, discriminant validity and predictive relationships with AI Readiness and educational transformation must be evaluated through systematic empirical investigation.

Positioning AI Readiness as a Strategic Organisational Capability

The fourth theoretical contribution involves conceptualising AI Readiness as a strategic and dynamic organisational capability rather than merely a technological condition. Organisational readiness for AI extends beyond access to hardware, software, connectivity and technical infrastructure. It also encompasses strategic alignment, leadership commitment, data availability and quality, professional knowledge, organisational culture, governance arrangements, ethical safeguards, resource allocation and change-management capacity (Hansen et al., 2024; Johnk et al., 2021). This multidimensional conceptualisation is particularly relevant to schools because educational institutions must integrate AI within established pedagogical, professional, legal, ethical and organisational structures. The presence of AI technology alone does not ensure its effective, equitable, or sustainable use. Instead, schools must possess the collective capacity to evaluate AI applications, prepare teachers, protect data, manage risks, establish accountability, support pedagogical experimentation and continuously learn from implementation experiences (OECD, 2026; Pietsch et al., 2025). Accordingly, the framework positions AI Readiness as the proposed mediating organisational capability through which AILC contributes to educational transformation. School leaders develop AI-related competencies that strengthen the technological, organisational, human-resource, data and governance conditions required for AI implementation. These readiness conditions are subsequently expected to facilitate responsible innovation, instructional improvement and sustainable educational transformation. Nevertheless, this mediating relationship remains a theoretical proposition that requires empirical testing rather than an established causal conclusion.

Practical Implications

Implications for School Leaders

School leaders should systematically develop competencies in strategic AI planning, data literacy, AI-supported pedagogical improvement, ethical governance, stakeholder engagement and organisational change management. Leadership development programmes should therefore incorporate AI-related knowledge, skills and ethical judgement as core components of professional preparation rather than treating them as supplementary technical competencies (Adams et al., 2025; DeMatthews et al., 2026; Sposato, 2025).

School leaders should also assess their institutions' AI Readiness before implementing AI initiatives at scale. Such assessments should examine infrastructure, data quality, staff competency, organisational culture, governance mechanisms, resource availability and stakeholder confidence (Hansen et al., 2024; Johnk et al., 2021). Furthermore, leaders should establish clear purposes for AI adoption, ensure that selected technologies support pedagogical goals, provide opportunities for responsible experimentation and maintain human oversight over decisions that affect teachers and students. Evidence showing that school leaders' digital mindsets and leadership approaches influence AI implementation reinforces the importance of leadership preparation in facilitating school level transformation (Pietsch et al., 2025).

Implications for Teachers

Teachers require continuous professional learning opportunities that enhance AI literacy, pedagogical competence, critical evaluation, ethical awareness and confidence in using AI. Professional development should move beyond procedural training on particular AI applications and enable teachers to understand how AI systems operate, evaluate the accuracy and appropriateness of AI-generated outputs, protect student data, recognise algorithmic bias and design pedagogically meaningful AI-supported learning experiences (Miao et al., 2024; OECD, 2025). School leaders should create collaborative professional-learning environments that provide teachers with protected time, appropriate resources, peer support and opportunities to experiment with AI in low-risk settings. Research indicates that teachers' AI integration is shaped not only by perceptions of efficiency and pedagogical value but also by technical challenges, ethical concerns, curriculum compatibility, professional confidence and organisational support (Filiz et al., 2025). Collaborative learning communities can consequently help teachers exchange effective practices, critically evaluate AI applications and develop responsible approaches to AI-supported pedagogy. Such organisational support is important because leadership may influence AI pedagogy indirectly through teachers' actual integration of AI into instructional practices (Hsieh et al., 2026).

Implications for Educational Policymakers

Educational policymakers should develop comprehensive AI governance frameworks, professional competency standards, implementation guidelines and accountability mechanisms that support responsible AI adoption in schools. These frameworks should address data privacy, cybersecurity, transparency, explainability, algorithmic fairness, human oversight, intellectual property, procurement standards, accessibility and mechanisms for reporting AI-related risks or harms (Miao et al., 2023; MOSTI, 2024). National education policies should also recognise leadership preparation, teacher professional development, equitable infrastructure and organisational AI Readiness as essential components of successful AI integration. Malaysia Digital Education Policy already emphasises the development of digitally fluent educators and education leaders, the strengthening of digital infrastructure and the reduction of the digital divide (MOE, 2023). These priorities should be extended through explicit AI-related professional standards, readiness indicators, implementation support and evaluation mechanisms. Policymakers should therefore avoid evaluating AI initiatives solely according to technology acquisition or usage rates and should instead assess their pedagogical value, ethical integrity, inclusiveness, sustainability and contribution to educational quality (OECD, 2026).

Implications for Teacher Education Institutions

Teacher education institutions and educational-leadership preparation programmes should systematically incorporate AI-related competencies into curriculum design, assessment, practicum experiences and professional learning. Programmes for prospective teachers should include human-centred AI principles, AI ethics, foundational AI knowledge, AI-supported pedagogy, critical evaluation of AI-generated content and the use of AI for continuing professional development (Miao et al., 2024). Existing research on AI literacy in teacher education indicates that the field remains conceptually diverse and requires more coherent integration of technical, pedagogical, critical and ethical dimensions (Sperling et al., 2024). Leadership preparation programmes should similarly equip future school leaders with competencies in strategic AI planning, data-informed decision-making, ethical governance, organisational readiness assessment, professional capacity building and change management (DeMatthews et al., 2026; Sposato, 2025). These competencies should be developed through authentic activities such as evaluating AI tools, analysing ethical dilemmas, designing school AI strategies, conducting readiness assessments and developing professional learning plans. This approach would enable future teachers and educational leaders to guide AI-enabled educational transformation while safeguarding human agency, professional judgement, educational equity and student well-being.

Limitations and Future Research

Despite its theoretical contributions, this study has several limitations. First, as a conceptual paper, the proposed framework has not yet been empirically validated. Accordingly, the hypothesised relationships among instructional leadership, AI-Driven Instructional Leadership Competencies (AILC), AI Readiness, and educational transformation should be interpreted as testable

theoretical propositions rather than established causal relationships. This limitation is particularly important because empirical research on AI-enabled educational leadership remains emergent, fragmented and frequently confined to particular institutional or national contexts (DeMatthews et al., 2026; Pietsch et al., 2025; Renta-Davids et al., 2025). Second, the framework was developed primarily through the synthesis of contemporary literature. Although such synthesis facilitates theoretical integration, the resulting framework may reflect the conceptual, methodological and geographical emphases of the existing evidence base. Organisational AI readiness is inherently context and purpose-specific, meaning that its relevant dimensions and indicators may vary according to institutional capacity, technological maturity, policy conditions, organisational culture and the intended purposes of AI adoption (Johnk et al., 2021). The framework may therefore require contextual and cultural adaptation before being applied across different educational systems, school types, geographical settings and sociocultural environments.

Future research should empirically examine the proposed framework through complementary quantitative, qualitative and mixed-method research designs. Qualitative studies could initially explore how school leaders, teachers, policymakers and other stakeholders interpret the proposed competencies and readiness dimensions in practice. Quantitative studies could subsequently test the measurement and structural properties of the framework, whereas mixed-method designs could provide a more comprehensive explanation of how leadership practices, organisational conditions and contextual factors interact during AI implementation (DeMatthews et al., 2026; Johnk et al., 2021). Covariance-based Structural Equation Modelling (CB-SEM) and Partial Least Squares Structural Equation Modelling (PLS-SEM) may be employed to examine the proposed direct, indirect and sequential mediation relationships. However, the selection between these approaches should be guided by the research objective, construct specification, theoretical development, measurement maturity, data characteristics and intended emphasis on explanation or prediction rather than treating the methods as interchangeable (Hair et al., 2022; Kline, 2023). Longitudinal and intervention-based studies are also required to examine how the proposed relationships develop over time and to provide stronger evidence concerning temporal ordering and organisational change. The timing, number and spacing of measurement occasions should be theoretically justified and aligned with the expected processes of leadership and institutional transformation (Hopwood et al., 2022).

Researchers may additionally investigate the relative and combined influence of the five AILC domains on AI Readiness and educational transformation. Such studies could determine whether particular competencies exert stronger effects at different stages of AI adoption or under different organisational conditions. Comparative studies across educational levels, urban and rural settings, geographical regions, school performance profiles and national contexts would further clarify the generalisability and boundary conditions of the framework (Renta-Davids et al., 2025; Sposato, 2025). Before comparing scores or structural relationships across groups or countries, researchers should establish appropriate levels of measurement invariance to ensure that the constructs have comparable meanings across the populations examined (Lacko et al., 2022).

A coherent empirical research programme may proceed through the following five stages. These stages are presented as a future research agenda rather than as methodological procedures completed in the present study:

i) **Instrument development and validation:** Generate an initial pool of items for the five AILC domains, undertake expert review and cognitive interviewing, refine the items through pilot testing and establish content, construct, convergent, discriminant and criterion-related validity. Exploratory factor analysis should be followed by confirmatory factor analysis, preferably using independent development and validation samples where feasible. Reliability should also be evaluated using appropriate internal consistency and composite-reliability indicators (DeVellis et al., 2022; Kline, 2023).

ii) **Empirical model testing:** Test the direct, indirect and sequential mediation relationships among instructional leadership, AILC, AI Readiness and educational transformation. CB-SEM may be prioritised when the objective is rigorous theory testing with sufficiently mature reflective measures, whereas PLS-SEM may be appropriate when the research emphasises prediction, composite measurement, model development, or complex relationships involving emerging constructs. Indirect effects should be evaluated using bootstrapped confidence intervals and alternative theoretically plausible models should be compared where appropriate (Hair et al., 2022; Kline, 2023).

iii) **National validation:** Evaluate the framework across Malaysian primary and secondary schools, urban and rural

settings, geographical regions and schools with different demographic and performance profiles. National studies should employ appropriately stratified samples and, where feasible, collect multi-informant data from school leaders, teachers and students. Researchers should also account for the nested structure of educational data and examine whether the measurement and structural models remain invariant across relevant school and respondent groups (Lacko et al., 2022; MOE, 2023).

iv) **Cross-national comparison:** Examine the cultural, institutional and policy contingencies of the framework through comparative research involving Malaysia and other ASEAN education systems. Instruments should undergo systematic translation, cultural adaptation and measurement invariance testing before latent means or structural relationships are compared. Comparative qualitative evidence may also be incorporated to explain how national policies, cultural values, governance arrangements and resource conditions influence the meaning and operation of AI leadership and organisational readiness (Johnk et al., 2021; Lacko et al., 2022; Renta-Davids et al., 2025).

v) **Longitudinal and intervention evaluation:** Employ multiwave longitudinal, quasi-experimental, or intervention-based designs to investigate how leadership-development initiatives influence AILC, AI Readiness, teacher and student AI literacy, organisational innovation, school effectiveness, and educational sustainability over time. Measurement intervals should correspond with theoretically meaningful stages of competency development, AI adoption and organisational transformation. Such studies would help distinguish short-term implementation effects from sustained institutional change and provide stronger evidence regarding the temporal processes proposed by the framework (Hopwood et al., 2022; Miao et al., 2024; Sposato, 2025).

Conclusion

The rapid advancement and increasing accessibility of Artificial Intelligence (AI) have created unprecedented opportunities and challenges for educational institutions worldwide. As schools increasingly explore and adopt AI technologies to enhance teaching, learning, administration, data analysis and decision-making, educational leadership must evolve to address the pedagogical, organisational, technological and ethical complexities associated with this transformation (Fullan et al., 2024; OECD, 2026; Sposato, 2025). Traditional leadership approaches remain relevant but require adaptation to ensure that schools are adequately prepared to navigate AI-enabled educational environments responsibly and effectively. Consequently, understanding how instructional leadership can facilitate organisational AI Readiness and educational transformation has become an increasingly important area of scholarly inquiry (DeMatthews et al., 2026; Renta-Davids et al., 2025).

This conceptual paper has proposed a comprehensive framework that integrates instructional leadership, AI-Driven Instructional Leadership Competencies (AILC), AI Readiness, and educational transformation. The framework draws upon Instructional Leadership Theory by Hallinger and Murphy (1985), the Technology Acceptance Model (TAM) by Davis (1989) and Diffusion of Innovations Theory by Rogers (1962). Instructional Leadership Theory explains how school leaders establish direction, manage instructional programmes, develop teachers, and promote a positive school learning climate. The Technology Acceptance Model (TAM) explains how individual perceptions of usefulness and ease of use influence technology acceptance, whereas Diffusion of Innovations (DOI) Theory explains how technological innovations are communicated, adopted, implemented and institutionalised within an organisational system. By integrating these perspectives, the proposed framework theorises that instructional leadership contributes to educational transformation indirectly through the development of AILC and the strengthening of organisational AI Readiness. Emerging empirical evidence concerning school leaders' digital mindsets and AI-related leadership practices supports the importance of leadership in shaping school-level AI implementation (Pietsch et al., 2025).

A major theoretical contribution of this study is the introduction of AILC as a proposed multidimensional construct. The framework identifies five competencies that are increasingly important for contemporary school leaders: Strategic AI Visioning, Data-Informed Decision-Making, AI-Pedagogical Leadership, Human-Centred Ethical Leadership and Capacity Building and Change Management. These domains synthesise the strategic, pedagogical, data-related, ethical and organisational capabilities increasingly emphasised in emerging research on AI-enabled educational leadership (Adams et al., 2025; DeMatthews et al., 2026; Renta-Davids et al., 2025; Sposato, 2025). Collectively, these competencies provide a theoretical explanation of how school leaders may guide AI adoption, align technological initiatives

with educational purposes, foster organisational learning, develop professional capacity and sustainable educational innovation. Nevertheless, because AILC is introduced as a proposed construct, its dimensional structure, validity, reliability and predictive relationships require systematic empirical examination.

The study further conceptualises AI Readiness as a multidimensional and dynamic organisational capability encompassing technological readiness, organisational readiness, human-resource readiness, data readiness and ethical-governance readiness. Rather than viewing AI implementation as a purely technological initiative, the framework emphasises that successful AI adoption depends on the alignment of leadership capacity, technological infrastructure, data quality, professional competence, organisational culture, governance arrangements and change management capability (Johnk et al., 2021; OECD, 2026). This perspective positions leadership as a catalyst that enables schools to translate technological resources into pedagogically meaningful, ethically responsible and sustainable educational practices. From a broader theoretical perspective, the study extends the scope of instructional leadership research by incorporating AI-related leadership capabilities into an established educational leadership framework. The integration of Instructional Leadership Theory, Technology Acceptance Model (TAM) and Diffusion of Innovations (DOI) Theory provides a multilevel explanation of how school leaders may influence individual technology acceptance, organisational preparedness, innovation diffusion and educational transformation. Furthermore, the introduction of AILC contributes to the emerging body of knowledge on educational leadership in the era of AI and provides a theoretical foundation for future instrument development, construct validation and structural-model testing.

From a practical perspective, the proposed framework provides guidance for school leaders, policymakers, teacher educators and educational institutions. School leaders may use the framework to assess their preparedness for AI integration and identify competency areas requiring further professional development. Policymakers may employ it as a conceptual basis for developing AI-related educational policies, leadership standards, readiness indicators, governance mechanisms and professional learning initiatives. Teacher education institutions and leadership preparation programmes may similarly integrate strategic AI planning, AI-supported pedagogy, data literacy, ethical governance, human oversight and organisational change management into their curricula (DeMatthews et al., 2026; Miao et al., 2024). Such initiatives should move beyond short-term technical training and focus on developing the professional judgement and organisational capacity required for responsible AI adoption. An additional contribution of this study is the introduction of the MADANI AI-Driven Instructional Leadership Framework (MADANI-AILF), which contextualises AI-enabled educational leadership within the aspirations and six core values of Malaysia MADANI: sustainability, prosperity, innovation, respect, trust and compassion (Prime Minister's Office of Malaysia, 2023). The framework emphasises that technological innovation should be balanced with ethical responsibility, inclusivity, sustainability, human agency, trust, equity and well-being (Miao et al., 2023). This human-centred orientation is consistent with Malaysia's continuing development of digital education policies, infrastructure, professional competencies and AI-related educational initiatives (MOE, 2023; Teh et al., 2026). MADANI-AILF therefore offers a culturally relevant and future-oriented conceptual model designed to support Malaysia's educational transformation agenda while ensuring that technological progress remains grounded in educational values and human development.

In conclusion, the successful integration of AI within educational institutions requires more than technological investment. It demands visionary and pedagogically grounded leadership, multidimensional organisational readiness, ethical governance, equitable access, professional capacity development and continuous institutional learning. The proposed framework provides a comprehensive theoretical explanation of how instructional leadership may evolve to address the demands of AI-enabled educational environments. By integrating leadership, competency, readiness and transformation perspectives, the study establishes a foundation for future empirical research and professional practice aimed at developing sustainable, inclusive, human-centred and innovation-driven educational systems capable of thriving in the era of Artificial Intelligence (Miao et al., 2023; OECD, 2026).

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