School Management Strategies under Disruptive Change: A Review of School Management Strategies under Disruptive Change

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Abstract

This article aims to present a conceptual and empirical exploration of disruptive change driven by rapid technological advancement, shifting labor market demands, and global crises has fundamentally reshaped educational management worldwide. In Thailand, primary schools face increasing pressure to enhance students' digital competencies while navigating systemic constraints in policy, infrastructure, and human capital. This paper examines school management strategies under disruptive change, focusing on digital competency in Thai primary schools. Drawing upon policy analysis, case-based synthesis, and contemporary literature, the study proposes four strategic domains: (1) adaptive school management under disruptive change; (2) academic administration reform to promote students' digital competencies; (3) teacher capacity enhancement for digital competency development; and (4) flexible and responsive learning support systems. The findings suggest that effective digital competency requires systemic alignment between leadership, curriculum, pedagogy, and support structures.

Keywords: digital competency, disruptive change, school management, primary school, Thailand

Introduction

The 21st century has been characterized by rapid digital transformation, often conceptualized as "disruptive change" (Christensen, 1997, p. 12) In education systems globally, technological innovation has redefined learning environments, competencies, and institutional governance. The COVID-19 pandemic further accelerated digital adoption in schools, exposing structural inequities and management limitations (UNESCO, 2021, p. 18). These transformations have accelerated the transition toward what is often described as

a disruptive society—an environment in which traditional institutional models are continuously challenged by innovation and digital transformation. Within this context, primary education occupies a particularly critical position, as it lays the foundation for learners' lifelong competencies, adaptability, and digital citizenship. Consequently, school management can no longer rely solely on conventional administrative paradigms; instead, it must evolve toward adaptive models capable of responding effectively to continuous change.

Previous international studies have explored the relationship between digital transformation and educational leadership. For example, Dexter (2018) found that effective technology integration in schools depends heavily on leadership vision and organizational support structures. Similarly, Fullan and Langworthy (2014) emphasized that digital innovation in education requires systemic change involving pedagogy, leadership, and institutional culture rather than isolated technological adoption. Research by Harris and Jones (2020) further suggested that school leadership during disruptive contexts, such as the COVID-19 pandemic, plays a pivotal role in enabling adaptive decision-making and maintaining instructional continuity. These studies indicate that leadership and management strategies are key factors in facilitating digital transformation in schools.

In the Thai context, national reforms articulated in the 20-Year National Strategy (2018–2037) and Thailand 4.0 policy emphasize human capital development and digital capability enhancement (Office of the National Economic and Social Development Council [NESDC], 2018, p. 45). However, Effective educational reform requires strong school management and school administration to ensure that policies are translated into practical implementation at the institutional level (Bush, 2011; Hallinger & Heck, 2010). In the Thailand primary schools—particularly those under the Office of the Basic Education Commission (OBEC)—face persistent challenges in digital infrastructure, teacher preparedness, and leadership adaptability. In Thailand, policy initiatives led by the Ministry of Education (MOE) and the Office of the Basic Education Commission have underscored the importance of integrating digital technologies into teaching, learning, and school administration. These efforts align with broader socio-economic agendas aimed at enhancing national competitiveness and human capital development in the digital era. However, policy directives alone do not guarantee meaningful transformation

at the school level. The success of digital initiatives largely depends on how school leaders interpret, adapt, and implement reforms within their specific organizational contexts. Thus, the capacity for adaptive school management becomes a decisive factor in fostering genuine digital competency among primary school students.

Several studies in Thailand have also examined digital competency development and educational management. For instance, Chaiyasong (2019) reported that while Thai schools increasingly adopt digital technologies, many institutions lack systematic management strategies that integrate digital competency into academic administration. Likewise, Sangrà and González-Sanmamed (2016) highlighted that institutional leadership and strategic planning are crucial in supporting sustainable digital learning environments. Furthermore, Thongmak (2021) found that disparities in leadership capacity and resource allocation among primary schools contribute to uneven development of students' digital competencies. Despite these contributions, most existing studies primarily focus on technology integration or teacher digital literacy rather than examining comprehensive school management strategies that link leadership, academic administration, and student digital competency development.

School management strategies and academic administration are integrally interconnected in promoting students' digital competencies toward high-quality and effective outcomes. When schools establish clear management strategies that are coherently aligned with academic operations and grounded in a student-centered orientation, the development of students' digital competencies can be achieved in a sustainable manner and can meaningfully respond to the goals of education in the digital era.

School administration in the digital age requires strategic approaches that are explicit, systematic, and responsive to ongoing societal and technological transformations. In particular, strategies aimed at enhancing student quality through the development of digital competencies are essential, as such competencies constitute fundamental skills for learning and living in the twenty-first century. Scholars in educational administration argue that school management strategy serves as a critical framework guiding the direction, structure, and operational mechanisms of a school's core missions, especially academic administration, which directly influences student quality

Nevertheless, a critical knowledge gap remains in the literature. Existing research has largely addressed digital competency from the perspectives of technology adoption, teacher readiness, or policy frameworks, while comparatively limited attention has been given to how school management strategies operate in practice under conditions of disruptive change, particularly in primary school contexts. Moreover, there is insufficient empirical evidence explaining how school leaders strategically align academic administration, organizational culture, and digital competency development among students in rapidly changing educational environments. Therefore, investigating school management strategies within primary schools facing disruptive change is essential to deepen understanding of how leadership practices can effectively support the development of students' digital competencies. This study seeks to address this gap by examining the management strategies employed by primary schools to promote digital competency under conditions of educational disruption.

Effective school management strategies must therefore be cohesively linked with academic administration. This integration begins with the formulation of a clear academic vision and policy explicitly focused on advancing students' digital competencies. When school leaders successfully translate this vision into concrete academic action plans, curriculum development, instructional design, and assessment practices can proceed in a unified and coherent direction. In this regard, strategic management that systematically connects policy formulation with classroom-level implementation constitutes a decisive factor in achieving tangible and sustainable improvements in student quality.

Disruptive Change and Educational Leadership

Disruptive innovation theory posits that transformative change requires organizations to adapt structurally and culturally (Christensen, 1997, p. 102). In educational settings, adaptive leadership involves flexibility, distributed decision-making, and responsiveness to uncertainty (Fullan, 2014, p. 27). Digital transformation demands systemic integration rather than isolated technology adoption.

Disruptive change in education refers to systemic transformations driven by technological innovation, globalization, and shifting socio-economic demands that fundamentally alter organizational structures and pedagogical paradigms. Drawing on the

theory of disruptive innovation, Christensen (1997, p. 12) argues that disruption occurs when new technologies redefine value propositions and challenge established institutional models. In educational contexts, such disruption extends beyond technological adoption to encompass leadership practices, governance systems, curriculum structures, and stakeholder engagement.

The scope of disruptive change in educational leadership therefore includes:

1) Organizational Transformation – restructuring governance, decision-making processes, and institutional culture to foster agility and innovation (Fullan, 2014, p. 27).

2) Digital Ecosystem Integration – embedding digital technologies into curriculum, assessment, communication, and administrative systems.

3) Human Capital Development – strengthening teachers' and leaders' digital competencies to ensure sustainable transformation.

4) Equity and Access Considerations – addressing the digital divide to ensure inclusive participation in digitally enhanced learning environments (UNESCO, 2021, p. 18).

Transformative leadership in the digital era requires adaptive, visionary, and collaborative approaches. Heifetz and Linsky (2002, p. 35) emphasize that adaptive leadership involves mobilizing stakeholders to confront complex challenges that lack predetermined solutions. In the context of digital transformation, school leaders must foster a culture of experimentation, distributed responsibility, and continuous learning.
Strategy formation under disruptive change must bridge macro-level policy direction and micro-level classroom practice. Mintzberg (1994, p. 23) posits that effective strategy combines deliberate planning with emergent adaptation. In education, this implies aligning national or institutional digital policies with context-sensitive implementation.

To enhance students' digital competencies, strategic formulation should encompass:

1) Curriculum Integration – embedding digital literacy, computational thinking, and ethical technology use across disciplines.

2) Pedagogical Innovation – promoting inquiry-based, project-based, and blended learning models that cultivate higher-order digital skills.

3) Assessment Reform – implementing authentic and performance-based assessment methods to evaluate digital competency development.

4) Infrastructure and Resource Alignment – ensuring technological tools and connectivity support pedagogical objectives.

In conclusion, Disruptive change in education entails systemic transformation driven by technological innovation, globalization, and evolving socio-economic demands that reshape organizational and pedagogical structures. Digital transformation requires not only technology adoption but also structural and cultural adaptation, including agile governance and distributed leadership. educational leadership must integrate digital ecosystems across curriculum, assessment, and management while ensuring human capacity development and equity of access.

Transformative leadership in the digital era is adaptive, collaborative, and oriented toward continuous learning and shared responsibility. and strategic alignment between policy and classroom practice—through curriculum reform, pedagogical innovation, authentic assessment, and infrastructure support—is essential for sustainable enhancement of students' digital competencies.

Digital Competencies in Primary Schools

Digital competencies encompass technical, cognitive, and socio-emotional skills required for effective participation in a digital society (European Commission, 2018, p. 8). Students' digital competencies at the primary education level, grounded in the conceptual frameworks of the Office of the Basic Education Commission (2021), Ferrari (2013), UNESCO (2018), ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) (2019), UNICEF (2020), and Vuorikari et al. (2022), encompass six interrelated domains. These include: (1) information and data literacy; (2) communication and collaboration through digital technologies; (3) digital content creation and creative technology use; (4) digital safety and ethics; and (5) problem-solving and foundational computational thinking. Collectively, these competencies reflect a holistic framework for equipping primary students with the essential knowledge, skills, and dispositions required for effective participation in the digital age.

The key elements are as follows:

First, information and data literacy refers to the ability to access, select, analyze, and critically evaluate the credibility of information obtained from various digital

sources in an appropriate manner. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) (2019: 22) and UNESCO (2018: 18) emphasize that information literacy constitutes a fundamental foundation for learning in the digital era and plays a crucial role in mitigating the risks associated with misinformation and inaccurate content.

Second, digital communication and collaboration involve the ability to use digital tools to communicate, exchange ideas, and work collaboratively with others in ways that are contextually appropriate and respectful. Ferrari (2013: 7) and UNICEF (2020: 29) note that this competency fosters social skills, teamwork, and constructive participation in digital society.

Third, digital content creation and creative use of technology refer to the ability to employ digital technologies to produce simple forms of content—such as text, images, audio, or multimedia—while considering appropriateness and copyright regulations. Vuorikari et al. (2022: 12) and the Office of the Basic Education Commission (2021: 18) indicate that this competency supports the development of learners' creativity and expressive potential in alignment with their individual capacities.

Fourth, digital safety and ethics encompass the ability to use technology safely, respect one's own rights and those of others, and recognize the ethical implications of digital media use. UNESCO (2018: 24) and UNICEF (2020: 35) underscore the importance of this competency in protecting children in online environments and fostering responsible digital citizenship.

Fifth, problem-solving and foundational computational thinking refer to the ability to apply systematic thinking processes, experimentation, and basic problem-solving strategies using digital tools. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) (2019: 26) highlights that this competency strengthens logical reasoning skills and provides a foundation for more advanced learning in science and technology.

School Management Strategies to Promoting Digital competency in Primary Schools

Based on cross-analysis data synthesis and predictive validation procedures, the findings indicate that the effective development of digital competencies requires systemic alignment among leadership, curriculum, pedagogy, and institutional support structures. The analysis reveals that school management strategies aimed at promoting digital

competency consist of four interrelated components: (1) adaptive school management under disruptive change; (2) reform of academic administration to enhance students' digital competencies; (3) teacher capacity enhancement for digital competency development; and (4) the establishment of flexible and responsive learning support systems. Collectively, these strategic dimensions function as an integrated framework to ensure coherent, sustainable, and contextually responsive digital transformation in schools.

Each strategy encompasses the following key elements:

1. Adaptive School Management under Disruptive Change

Adaptive school management under disruptive change refers to a strategic and responsive approach to educational leadership that enables schools to navigate rapid technological advancement, shifting societal expectations, and increasing complexity in learning environments. In an era characterized by uncertainty and continuous transformation, school management can no longer rely on rigid structures or traditional administrative routines. Instead, it requires flexible governance systems, proactive decision-making, and a culture that encourages innovation and collaborative problem-solving. Adaptive management emphasizes the alignment of vision, policy, and practice, ensuring that organizational structures, academic processes, and resource allocation remain responsive to emerging challenges and opportunities. By fostering agility, shared leadership, and continuous improvement, adaptive school management strengthens institutional resilience and positions schools to sustain quality education while effectively preparing students for participation in a dynamic digital society.

Adaptive school management is central to enhancing digital competencies: Key elements include:

1) Strategic Vision and Digital Policy Alignment

School leaders must articulate a digital vision aligned with national policy frameworks such as Thailand 4.0 (NESDC, 2018, p. 52). Vision-setting enables coherence between curriculum, resource allocation, and assessment systems.

2) Distributed Leadership and Agile Governance

Distributed leadership fosters collaborative problem-solving and innovation (Fullan, 2014, p. 56). In Thai primary schools, forming digital task forces and professional learning communities enhances responsiveness to emerging technological demands.

3) Data-Driven Decision Making

Digital competency requires systematic monitoring of infrastructure usage, student competency progression, and teacher development. Data analytics inform strategic planning and resource prioritization.

2. Reforming Academic Administration to Promote Digital Competencies

Reforming academic administration to promote digital competencies requires a comprehensive and systematic transformation of curriculum design, instructional management, assessment practices, and resource allocation to ensure coherence and relevance in the digital era. Academic administration must move beyond traditional content delivery models toward an integrated framework in which digital competencies are embedded across subject areas and grade levels. This involves aligning curriculum standards with digital literacy, computational thinking, ethical technology use, and creative problem-solving skills, while encouraging interdisciplinary and project-based learning approaches. In addition, assessment systems should be redesigned to incorporate authentic, performance-based evaluations that capture students' ability to apply digital skills in real-world contexts. Effective reform also necessitates strategic planning in the allocation of technological infrastructure, learning platforms, and instructional resources to support pedagogical innovation. By establishing clear academic policies, monitoring implementation processes, and ensuring alignment between institutional goals and classroom practices, academic administration can serve as a driving force in systematically enhancing students' digital competencies and preparing them for meaningful participation in a rapidly evolving digital society.

Reforming Academic Administration to Promote Digital Competencies: Key elements include:

1) Curriculum Integration and Interdisciplinary Design

Academic administration must ensure digital competencies are embedded across subject domains rather than confined to ICT classes. Project-based and inquiry-based approaches strengthen higher-order digital skills.

2) Assessment Reform

Traditional examination systems often emphasize rote learning. Reform toward performance-based and digital portfolio assessments enables authentic evaluation of digital competencies (European Commission, 2018, p. 32).

3) Resource Allocation and Infrastructure Planning

Effective academic management prioritizes equitable distribution of digital tools and reliable internet access, particularly in rural Thai schools. Budget planning must align with pedagogical objectives rather than hardware acquisition alone.

3. Enhancing Teachers' Capacity for Digital Competency Development

Enhancing teachers' capacity for digital competency development is a critical dimension of sustainable educational transformation in the digital era. As key agents of instructional change, teachers must possess not only technical proficiency in using digital tools but also the pedagogical knowledge required to integrate technology meaningfully into teaching and learning processes. Capacity enhancement therefore involves continuous professional development that strengthens digital literacy, instructional design skills, classroom management in technology-rich environments, and the ability to facilitate student-centered, inquiry-based learning. Beyond formal training programs, supportive mechanisms such as mentoring systems, professional learning communities, peer collaboration, and reflective practice play an essential role in fostering confidence and innovation among teachers. School leadership must also create enabling conditions, including access to appropriate technological resources, time for collaborative planning, and a culture that encourages experimentation and continuous improvement. By systematically investing in teacher capacity building, schools can ensure that digital technologies are used not merely as supplementary tools but as transformative instruments for developing students' digital competencies in meaningful and sustainable ways.

Enhancing Teachers' Capacity for Digital Competency Development: Key elements include:

1) Professional Development Systems

Continuous professional development (CPD) is critical for digital pedagogy integration. Structured training programs combined with mentoring systems increase teacher confidence and instructional innovation (UNESCO, 2021, p. 41).

2) Digital Pedagogical Transformation

Teachers must shift from knowledge transmitters to facilitators of collaborative and technology-enhanced learning. Blended learning models and flipped classrooms support student-centered instruction.

3) Professional Learning Communities (PLCs)

PLCs enable peer coaching and shared reflection, reinforcing sustainable digital integration. In Thai schools, PLCs supported by OBEC policies have shown potential in scaling innovation at the school level.

4. Flexible and Responsive Learning Support Systems

Flexible and responsive learning support systems constitute a vital foundation for advancing digital competency development in contemporary education. In rapidly changing technological and social contexts, schools must establish support structures that are adaptable, student-centered, and capable of responding to diverse learning needs. Such systems integrate digital platforms, learning management systems, and interactive tools that facilitate personalized learning, real-time feedback, and continuous access to educational resources. Flexibility also involves designing hybrid and blended learning models that ensure continuity of instruction during disruptions while accommodating different learning styles and paces. Responsive support systems further encompass academic guidance, technical assistance, and inclusive measures that address equity and access, particularly for disadvantaged learners. By aligning technological infrastructure, instructional support, and learner services within a coherent framework, schools can create dynamic learning environments that not only sustain educational quality but also empower students to develop and apply digital competencies effectively in a rapidly evolving digital society.

Flexible and Responsive Learning Support Systems: Key elements include:

1) Learning Management Systems and Hybrid Models

Modern learning support systems include cloud-based platforms, learning management systems (LMS), and adaptive digital content. Hybrid models ensure continuity during crises and support differentiated instruction.

2) Community and Stakeholder Engagement

Collaboration with parents, local communities, and private-sector partners enhances digital competency. Public–private partnerships contribute technological expertise and funding support.

3) Equity and Inclusion Mechanisms

Responsive systems address digital divides by providing device loan programs and targeted support for disadvantaged learners. Equity-focused policies are essential for sustainable digital transformation.

Discussion

The case of Thai primary schools illustrates that digital competency is not merely technological but organizational. Adaptive management under disruptive change requires systemic alignment across leadership, curriculum, teacher capacity, and learning support systems.

Four strategic pillars emerge:

1) Adaptive leadership and governance reform

Adaptive leadership and governance reform emerge as foundational mechanisms in advancing digital competency development in primary schools under conditions of disruptive change. The findings of this study align with the broader literature indicating that digital transformation in education is not primarily a technological issue, but a leadership and governance challenge requiring systemic adaptation. Disruptive innovation theory suggests that organizations must undergo structural and cultural transformation to remain relevant in rapidly changing environments (Christensen, 1997, p. 102). In the context of primary education, this implies that school leaders must move beyond traditional bureaucratic models toward more agile and learning-oriented governance structures.

The results of the present case study reinforce the argument that adaptive leadership—characterized by flexibility, shared decision-making, and responsiveness to

uncertainty—is critical in steering digital reform. Fullan (2014, p. 27) emphasizes that effective school leadership in complex environments requires the capacity to mobilize collective efficacy and align institutional vision with instructional improvement. Similarly, Heifetz and Linsky (2002, p. 35) argue that adaptive leadership involves engaging stakeholders in addressing challenges for which no predetermined technical solutions exist, a condition that closely reflects digital transformation in primary education.

Governance reform, as observed in the participating schools, involved decentralizing decision-making processes, establishing digital task forces, and promoting professional learning communities to support innovation. This approach is consistent with research indicating that distributed leadership structures enhance organizational resilience and accelerate instructional change (Spillane, 2006, p. 12). By redistributing leadership roles, schools were able to integrate digital initiatives into curriculum planning, teacher development, and student assessment more coherently. These findings extend previous studies by demonstrating how distributed leadership structures operate in practice within primary school contexts facing digital disruption. While earlier research has emphasized the theoretical benefits of distributed leadership (Spillane, 2006), the present study provides empirical insight into how such governance arrangements enable the integration of digital competency development across multiple academic functions

Furthermore, the findings correspond with Organisation for Economic Co-operation and Development (OECD) (2019, p. 168), which highlights that system-level coherence—linking leadership, policy direction, and classroom practice—is essential for improving student competencies in the digital age. Adaptive governance enables schools to translate national digital education policies into context-sensitive strategies at the school level. In this respect, leadership serves as a mediating force between macro-level reform agendas and micro-level pedagogical implementation. Synthesizing these theoretical perspectives with the results of the present study suggests that adaptive leadership operates as the strategic driver that aligns institutional structures, professional collaboration, and digital learning goals.

In the Thai primary school context examined in this study, adaptive leadership contributed to clearer strategic direction, improved stakeholder collaboration, and more systematic integration of digital competencies across academic functions.

Governance reform was not limited to administrative restructuring but extended to cultural transformation, fostering openness to experimentation, data-informed decision-making, and continuous professional learning.

Taken together, the discussion suggests that adaptive leadership and governance reform are not peripheral components but central drivers of digital competency development. Sustainable digital transformation in primary education depends on leaders' capacity to cultivate institutional agility, align strategic vision with instructional practice, and build collaborative governance systems that can respond proactively to ongoing disruption.

2) Academic administration transformation

Academic administration transformation constitutes a central mechanism in advancing students' digital competencies under conditions of disruptive change. The findings of this study indicate that the effectiveness of digital competency development in primary schools depends largely on the extent to which academic management systems are strategically redesigned to align curriculum, pedagogy, assessment, and resource allocation with digital learning goals. This perspective is consistent with the view that sustainable educational reform requires coherence between leadership direction and instructional core processes (Fullan, 2014, p. 54). Without systematic transformation in academic administration, digital initiatives risk remaining fragmented or technology-centered rather than learning-centered.

The results further support the argument that curriculum integration is fundamental to digital transformation. Rather than confining digital skills to isolated ICT subjects, schools in this case study embedded digital competencies across disciplines through interdisciplinary projects and inquiry-based learning models. This approach aligns with the European Commission's DigComp framework, which emphasizes the cross-curricular integration of digital competence as a key condition for meaningful student development (European Commission, 2018, p. 32). Similarly, ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) (2019, p. 174) highlights that education systems demonstrating higher levels of digital readiness are those that integrate digital literacy into mainstream curriculum standards rather than treating it as an ancillary skill. The transition toward digital portfolios and performance-based assessments observed in the

study reflects contemporary assessment theories emphasizing authentic evaluation of higher-order competencies. By aligning assessment practices with digital learning outcomes, the participating schools created stronger coherence between curriculum design and student competency development.

Assessment reform also emerged as a significant dimension of academic administration transformation. The participating schools gradually shifted from predominantly summative, paper-based examinations toward performance-based and digital portfolio assessments. Research suggests that authentic assessment practices better capture higher-order digital skills, including problem-solving, creativity, and collaborative competence (Redecker, 2017, p. 21). By aligning assessment methods with digital learning outcomes, schools reinforced instructional coherence and strengthened students' applied competencies.

In addition, strategic resource alignment played a critical role. The findings indicate that academic administration was most effective when technological infrastructure investments were guided by pedagogical priorities rather than hardware acquisition alone. This observation corresponds with UNESCO (2021, p. 41), which stresses that digital transformation efforts must prioritize instructional improvement and teacher support over mere technological expansion. When academic planning, budgeting, and monitoring systems were integrated, schools demonstrated greater consistency in implementing digital initiatives.

Within the context of Thai primary education, the transformation of academic administration served as a bridge between policy aspirations for digital advancement and classroom-level practice. By clarifying academic vision, redesigning curriculum structures, reforming assessment systems, and aligning resources with pedagogical innovation, schools were able to create systemic conditions conducive to sustained digital competency development.

Overall, the discussion underscores that academic administration transformation is not a peripheral adjustment but a structural reconfiguration of the instructional core. Effective digital competency development requires academic systems that are coherent, integrated, and strategically aligned with the demands of disruptive

change, thereby ensuring that digital learning becomes embedded in everyday teaching and learning practices rather than remaining an isolated reform initiative.

3) Teacher professional capacity enhancement

Teacher professional capacity enhancement represents a decisive factor in advancing students' digital competencies within the framework of school management strategies under disruptive change. The findings of this study indicate that digital transformation in primary schools cannot be sustained without systematic investment in teachers' digital knowledge, pedagogical skills, and adaptive mindsets. This conclusion is consistent with prior research emphasizing that teachers are the central mediators between technological innovation and student learning outcomes (ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD), 2019, p. 186). Even when infrastructure and policy frameworks are well established, limited teacher capacity can significantly constrain the impact of digital reform initiatives.

The case study demonstrates that effective schools adopted continuous professional development (CPD) models that integrated technical training with pedagogical application. Rather than focusing solely on operational skills, professional learning activities emphasized instructional design, student-centered methodologies, and the integration of digital tools into inquiry-based and collaborative learning. This approach aligns with the European Framework for the Digital Competence of Educators (DigCompEdu), which highlights the importance of linking technological proficiency with pedagogical transformation (Redecker, 2017, p. 16). Similarly, UNESCO (2021, p. 43) underscores that teacher development programs must foster reflective practice and innovation to ensure meaningful digital integration. This integrated approach reflects contemporary theories of teacher professional learning that emphasize the relationship between technological knowledge, pedagogy, and content knowledge—often conceptualized through the Technological Pedagogical Content Knowledge (TPACK) framework.

Furthermore, the findings reveal that professional learning communities (PLCs) and peer collaboration mechanisms significantly strengthened teachers' confidence and instructional experimentation. Distributed and collaborative professional cultures enabled teachers to share best practices, address contextual challenges, and co-develop digital learning materials. This observation is supported by research suggesting that

collective efficacy and collaborative professionalism are critical drivers of sustainable school improvement (Fullan, 2014, p. 78). When teacher development is embedded within organizational learning structures, digital competency initiatives become more coherent and resilient.

The study also highlights the importance of leadership support in cultivating teacher capacity. School leaders who provided mentoring systems, allocated time for collaborative planning, and encouraged risk-taking created environments conducive to innovation. Spillane (2006, p. 13) argues that leadership practice is distributed across formal and informal actors within schools, reinforcing the notion that teacher empowerment enhances reform effectiveness. In the context of digital transformation, such distributed capacity-building fosters adaptive responses to rapidly evolving technological demands.

Within Thai primary schools, enhancing teacher professional capacity functioned as a bridging mechanism between strategic vision and classroom implementation. Teachers who demonstrated higher levels of digital pedagogical competence were more capable of integrating curriculum reform, authentic assessment, and differentiated instruction into daily practice. Consequently, students experienced more meaningful engagement with digital tools, leading to improved digital competency development.

Overall, the discussion affirms that teacher professional capacity enhancement is not merely supportive but foundational to digital transformation. Sustainable advancement of students' digital competencies depends on coherent professional development systems, collaborative learning cultures, and leadership practices that empower teachers as active agents of change in navigating disruptive educational environments.

4) Flexible and inclusive learning ecosystems

Flexible and inclusive learning ecosystems constitute a critical dimension of school management strategies aimed at enhancing digital competency under conditions of disruptive change. The findings of this study indicate that digital readiness in primary schools is significantly strengthened when learning environments are designed to be adaptable, technology-enabled, and responsive to diverse student needs. This perspective aligns with UNESCO's vision of education systems as dynamic ecosystems in which digital

technologies, institutional structures, and human actors interact to support equitable and lifelong learning (UNESCO, 2021, p. 19). Rather than viewing technology as a standalone intervention, schools that adopt an ecosystem approach integrate digital platforms, pedagogical practices, support services, and community partnerships into a coherent and mutually reinforcing framework.

The results further demonstrate that flexibility in learning delivery—through blended, hybrid, and platform-based models—enhances instructional continuity and personalization. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) (2019, p. 170) notes that digitally mature systems are characterized by their capacity to adapt learning pathways to individual learner profiles while maintaining academic standards. In the primary school context examined, flexible scheduling, digital learning management systems, and interactive content allowed students to engage with materials at differentiated paces, thereby supporting varied learning styles and readiness levels. Such adaptability is particularly important in periods of disruption, where traditional face-to-face instruction may be interrupted. The case study illustrates that targeted support mechanisms—such as device access programs, technical assistance, and parental engagement—play a crucial role in reducing inequalities associated with the digital divide

Inclusivity also emerged as a foundational principle of effective digital ecosystems. The study found that schools which implemented targeted support mechanisms—such as device loan programs, technical assistance, and parental engagement initiatives—were better able to mitigate inequities associated with the digital divide. Research by UNICEF (2020, p. 35) emphasizes that equitable access to digital resources is essential for safeguarding children's rights and ensuring meaningful participation in digital learning environments. Similarly, UNESCO (2018, p. 24) underscores the importance of inclusive digital policies that address disparities in connectivity, digital literacy, and socio-economic status.

Moreover, the ecosystem perspective highlights the interconnectedness of leadership, infrastructure, teacher capacity, and student engagement. Fullan (2014, p. 89) argues that sustainable educational change occurs when systemic alignment reinforces instructional improvement at scale. In this study, flexible and inclusive learning ecosystems

functioned as enabling structures that translated strategic leadership and academic reform into accessible and supportive learning experiences for students. When technological infrastructure, instructional design, and student support services operated cohesively, digital competency development became embedded in everyday practice rather than treated as an isolated initiative.

In the Thai primary school context, the establishment of flexible and inclusive learning ecosystems strengthened institutional resilience and promoted broader participation in digitally mediated learning. By ensuring adaptability, accessibility, and coordinated support, schools were able to create environments that not only sustained educational quality during disruption but also advanced students' digital competencies in an equitable and sustainable manner. Overall, the findings affirm that flexible and inclusive ecosystems are indispensable to effective school management strategies in the digital age, serving as the structural foundation for inclusive and future-oriented learning transformation.

Conclusion

The twenty-first century is characterized by rapid digital transformation that has profoundly reshaped educational systems worldwide. Technological innovation has altered learning environments, required competencies, and institutional governance structures, while the COVID-19 pandemic further accelerated digital adoption and exposed structural inequities and limitations in traditional school management models. Within this context, primary education holds a crucial role in laying the foundation for lifelong learning, adaptability, and responsible digital citizenship. Consequently, school administration must move beyond conventional bureaucratic approaches and adopt adaptive management models capable of responding to continuous technological and societal change.

In Thailand, national reform agendas, including the 20-Year National Strategy and the Thailand 4.0 policy, emphasize the development of human capital and digital capabilities. Despite these strategic directions, many primary schools—particularly those under the Office of the Basic Education Commission—continue to face significant challenges related to digital infrastructure, teacher preparedness, and leadership

adaptability. Policy initiatives by educational authorities have encouraged the integration of digital technologies into teaching, learning, and school administration; however, the effectiveness of these reforms ultimately depends on how school leaders interpret and implement them within specific institutional contexts.

Scholarly perspectives on disruptive innovation highlight that meaningful digital transformation requires not only technological adoption but also structural and cultural adaptation within educational organizations. Effective leadership in such environments involves adaptive, collaborative, and distributed governance capable of mobilizing stakeholders and fostering innovation. Strategic alignment between policy direction and classroom implementation therefore becomes essential. In particular, strategies that integrate curriculum reform, pedagogical innovation, assessment transformation, and infrastructure development are critical to strengthening students' digital competencies.

Digital competencies in primary education encompass a broad set of technical, cognitive, and socio-emotional skills required for effective participation in digital society. These include information and data literacy, digital communication and collaboration, digital content creation, digital safety and ethical awareness, and problem-solving supported by foundational computational thinking. Together, these competencies form a holistic framework that enables young learners to engage critically, creatively, and responsibly with digital technologies.

The analysis further indicates that promoting digital competency requires coherent school management strategies that align leadership, academic administration, teacher capacity, and learning support systems. Four strategic dimensions emerge as particularly significant: adaptive school management under disruptive change, transformation of academic administration to integrate digital competencies across the curriculum, systematic enhancement of teachers' professional capacity in digital pedagogy, and the establishment of flexible and inclusive learning ecosystems. When these elements operate in an integrated and coordinated manner, schools are better positioned to translate national policy aspirations into sustainable classroom practices.

Overall, the findings suggest that digital competency development in primary education is not merely a technological issue but a systemic organizational challenge. Sustainable digital transformation depends on adaptive leadership, coherent academic

governance, empowered teachers, and supportive learning environments that ensure equitable access and meaningful participation. Through strategic alignment across these dimensions, schools can effectively prepare students with the competencies necessary to thrive in an increasingly complex and digitally mediated world

Digital competency in Thai primary schools under disruptive change necessitates integrated school management strategies. Adaptive leadership, curriculum reform, teacher capacity building, and responsive learning systems must function synergistically. Policymakers and school leaders should prioritize systemic coherence and sustainable innovation to ensure that digital competencies become foundational outcomes of primary education in Thailand.

Future studies would contribute to a deeper understanding of effective digital education reform and provide practical guidance for policymakers and school leaders seeking to strengthen digital readiness in primary education.

References

Bush, T. (2011). *Theories of educational leadership and management* (4th ed.). Sage Publications.

Chaiyasong, S. (2019). Digital technology integration in Thai schools: Challenges for educational management and policy implementation. *International Journal of Educational Technology in Higher Education,* 16(1), 1–15. https://doi.org/10.1186/ s41239-019-0148-2

Christensen, C. M. (1997). *The innovator's dilemma.* Boston, MA: Harvard Business School Press, p.

Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail.* Harvard Business School Press.

Dexter, S. (2018). The role of leadership for information technology in education: Systems of practices. *Educational Administration Quarterly,* 54(3), 426–462. https://doi.org/ 10.1177/ 0013161X18769000

European Commission. (2018). *DigComp into action: Get inspired, make it happen (A user guide to the European Digital Competence Framework).* Publications Office of the European Union.

Fullan, M. (2014). *The principal: Three keys to maximizing impact.* Jossey-Bass.

Fullan, M., & Langworthy, M. (2014). *A rich seam: How new pedagogies find deep learning.* Pearson.

Hallinger, P., & Heck, R. H. (2010). Collaborative leadership and school improvement: Understanding the impact on school capacity and student learning. *School Leadership & Management,* 30(2), 95–110. https://doi.org/10.1080/13632431003663214

Harris, A., & Jones, M. (2020). COVID-19—School leadership in disruptive times. *School Leadership & Management,* 40(4), 243–247. https://doi.org/10.1080/13632434.2020.1811479

Heifetz, R., & Linsky, M. (2002). *Leadership on the line: Staying alive through the dangers of leadership.* Harvard Business School Press.

Mintzberg, H. (1994). *The rise and fall of strategic planning.* Free Press.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD). (2019*). OECD skills outlook 2019: Thriving in a digital world. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) Publishing.* https://doi.org/10.1787/df80bc12-en

Redecker, C. (2017). *European framework for the digital competence of educators: DigCompEdu.* Publications Office of the European Union. https://doi.org/10.2760/159770

Sangrà, A., & González-Sanmamed, M. (2016). Supporting digital learning environments through institutional leadership and strategic planning. *International Review of Research in Open and Distributed Learning,* 17(4), 17–34. https://doi.org/10.19173/irrodl.v17i4.255

Spillane, J. P. (2006). *Distributed leadership.* Jossey-Bass.

Thongmak, M. (2021). Digital literacy development in Thai primary schools: The role of leadership and resource allocation. *Education and Information Technologies,* 26(6), 6893–6912. https://doi.org/10.1007/s10639-021-10534-6

UNESCO. (2018). *A global framework of reference on digital literacy skills for indicator 4.4.2.* UNESCO Institute for Statistics.

UNESCO. (2021). *Reimagining our futures together: A new social contract for education.* UNESCO Publishing.

UNICEF. (2020). *Digital literacy for children: Exploring definitions and frameworks.* UNICEF Office of Global Insight and Policy.

Vuorikari, R., Kluzer, S., & Punie, Y. (2022). *DigComp 2.2: The digital competence framework for citizens – With new examples of knowledge, skills and attitudes.* Publications Office of the European Union. https://doi.org/10.2760/115376