



Digital Leadership and Teacher Digital Competence as Keys to Successful Integration of Digital Culture in Education

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ABSTRACT

This study investigates the critical role of digital leadership and teacher digital competence in the successful integration of digital culture in education. Previous research has not sufficiently explored the correlation between digital leadership and teacher competence, particularly in the educational context of Southeast Asia, where these elements have remained understudied. The research was conducted at SMAN 1 Kutacane, Southeast Aceh, Indonesia, analyzing the influence of digital leadership and teachers' digital competence on the integration of digital culture. Using a mixed method, this study combines qualitative and quantitative approaches. Data were collected through surveys of 100 teachers and 50 students and in-depth interviews with 10 teachers. The results of the analysis show that digital leadership has a positive effect on teachers' digital competence, which in turn promotes the effective integration of digital culture in the educational environment. The findings of this study emphasize the importance of digital leadership for educational policymakers and school administrators, suggesting the need for targeted teacher competence development programs. Therefore, the findings are expected to guide the design of effective strategies for integration digital culture.

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INTRODUCTION

Leadership plays a crucial role in guiding organisations through the complex challenges of the digital transformation era. The right leadership style can have a positive impact on an organisation's operational efficiency and effectiveness (Wahid & Zulkifli, 2021). With the increasing complexity and number of changes faced, leaders need more competence to manage these changes and provide a sense of stability and continuity to their employees (Schwarz Müller et al., 2018). One leadership approach that is relevant today is digital leadership (Gleason, 2018), which plays an important role in guiding, supporting and managing human capital in the digital age. It offers important insights for leaders to hone their skills in digital leadership, moving away from traditional approaches (Norouzi et al., 2022).

Data shows that underprivileged schools in Indonesia, especially in rural areas, face difficulties in providing digital access for their students, due to limited infrastructure and funding. However, according to PISA, the digital divide in Indonesian schools compared to other countries is less pronounced (OECD, 2023). These global changes challenge leadership styles in education, especially for school leaders. Leaders in this field need to have a vision of the future to compete in the increasingly competitive world of education. Futuristic thinking requires leaders to be ready for rapid technological developments to improve the quality of leadership in schools (Yusof et al., 2019). This challenge is even more severe for schools with low-competent teacher resources, especially in the aspect of technology (Ismail et al., 2020).

The digital leadership needed is one that is able to adapt to the changing times, utilising innovative ideas and digital strategies to create a school culture that is transparent, relevant, engaging and orientated towards better results. This leadership is not about the use of sophisticated tools, but about a strategic mindset that maximises existing resources to increase effectiveness and readiness for change (Sheninger, 2019).

The implementation of leadership policies that support the integration of technology in education is necessary. Research on digital leadership is becoming an important area of study in educational leadership today. The term 'digital leadership' encompasses the competence and effectiveness of policies that control the integration of digital-based educational services (Arham et al., 2022). Digital leadership includes formulating policies that

enable the integration of technology into the education system and building a dynamic and adaptive learning environment (Zhong, 2017).

The shortage of teacher competencies needs to be addressed through various competency improvement programmes to strengthen the competitiveness of educational institutions. The programme includes planning, strategy and impact of improving teacher competence (Hambali & Luthfi, 2017). This main effort aims to form reliable teachers in the digital world, because the role of teachers is very important for student success (Adawiyah et al., 2017). Developing teachers' competencies in digitalisation requires an integrated programme and not just a short training that integrates technology (Keengwe & Onchwari, 2020).

Digital competence involves confident, critical and responsible use of technology and participation in digital society. The digital competence framework includes 21 skills that fall into five areas: information and data literacy, communication and collaboration, digital content creation, security and problem solving (European Commission, 2020). Teachers' digital competencies are not only basic computer skills, but also the ability to manage information, create content, and use technology to keep students connected (Lázaro-Cantabrana et al., 2019).

Organisational culture also affects the improvement of individual competencies (Popa et al., 2023). In this context, a system is needed that involves synergy between the components of the pesantren (leaders, teachers, and students) (Perawironegoro, 2017). The formation of a comprehensive educational culture requires the cooperation of all components to support optimal student development (Jones & Dexter, 2014). In this case, teachers and the work environment play a role in forming a 'professional community' that supports each other to improve the quality of teaching. Collaboration between school leaders and teachers will strengthen working relationships and impact student achievement (Kilag et al., 2023).

Literature Review

Digital leadership is an approach to leading an organisation or team by using digital technologies and leveraging data to make better decisions, improve efficiency and create competitiveness (Gledson et al., 2024; Lányi et al., 2021). Digital leadership involves implementing digital strategies,

developing technological skills and building an innovative and digitally connected work culture within the education service system being implemented (Yang et al., 2023; Yusof et al., 2019).

Digital leadership is the use of an organisation's digital assets to achieve business goals at both the organisational and individual levels (Wujarso et al., 2023). Digital leadership is defined as the integration of digital technologies such as mobile devices, communication applications and web applications in the leadership practices of school leaders towards sustainable change in the use of technology in schools. In short, digital leadership is a combination of leaders, resources, hardware and technology (Yusof et al., 2019). Digital leadership is a combination of leaders, resources, hardware and technology (Prayuda, 2022).

Digital leadership not only inspires educational change but also seeks to engage learners, teachers and all other stakeholders in the transformation. Digital leadership practices are closely aligned with transformational and transactional leadership styles with an emotional intelligence orientation. The centrality of emotional intelligence in digital and transformational styles focuses on a leader's ability to positively motivate learners, teachers and other staff in the Education sector (Aldawood et al., 2019). Digital leadership in education refers to the integration of a portfolio of technologies, tools and instruments such as: Internet mastery, Social media platforms, Artificial Intelligence, Big Data, and Learning Tools (Antonopoulou et al., 2020).

Digital leaders should drive digital transformation and innovation by applying relevant technologies (Weber et al., 2022). They must be open to change and take risks in adopting digital-based policies. The urgency of digital leadership to address work efficiency issues. Technology exists principally to support organisational performance. In the education system, the interconnectedness between components forms a collaborative work culture (Benoliel & Schechter, 2023; Dimian et al., 2023). In the context of research, when leaders are required to facilitate virtual collaboration, promote knowledge sharing, and encourage effective teamwork in the digital age.

According to the Oxford Concise Dictionary, competence (or competence) denotes 'the ability to do' something or 'capability for a task'. The Macquarie Concise Dictionary defines competence as 'the quality of being competent', where competent means 'well qualified' or 'capable'. Significantly, in both of these dictionary definitions, the main focus is on a competent

person possessing an ability or capabilities, which will enable the satisfactory completion of some task (Hager & Gonczi, 1996).

Competence is an underlying characteristic of a person related to the effectiveness of the individual's performance in his or her job or a basic characteristic that has a causal or cause-and-effect relationship with the criteria that are used as a reference, effective or excellent or superior performance in the workplace or in certain situations (Pianda, 2018). Competence is not only related to a person's success in carrying out his duties, but whether he also manages to work together in a team, so that the goals of the institution are achieved as expected (Musfah, 2012). It can be simply explained that competence is the ability or proficiency that a person has (Rohman, 2020).

Digital-based competence is the confident, critical and responsible use of digital technologies, as well as engagement with digital technologies for learning, in the workplace, and for participating in society. The digital competency framework consists of 21 competencies divided into the following five competency areas: information and data literacy, communication and collaboration, digital content creation (including programming), security, and problem solving (European Commission, 2020).

Digital teacher competence is the ability to link digital-age skills or competencies to their professional practice. Teaching professionals should not only aim to master basic computer applications, but teachers should also manage information, create content, and use technology to keep students connected (Lázaro-Cantabrana et al., 2019). Teachers' digital competence is an essential requirement for the effective application of technology in education. Although several digital competence tools have been designed, customisation to digital education and pedagogical or professional components is still scarce (Tzafilkou et al., 2023).

Digital competence is described as individuals possessing digital competencies such as information and data literacy, communication, security, problem solving, and productivity; possessing pedagogical competencies such as empowering students, guiding students, being a source and conveyor of information, and facilitating learning; possessing personal characteristics such as being open to change and development, being equipped, flexible, valuable, using technology effectively, creative, innovative, and curious (Çebi & Reisoğlu, 2022).

In the context of digital competence, there are seven aspects related to teachers' professional digital competence: 1) technological competence; 2) content knowledge; 3) attitude towards technology use; 4) pedagogical competence; 5) cultural awareness; 6) critical approach; and 7) professional engagement, with technological and pedagogical competence being the most prominent (Skantz-Åberg et al., 2022). A teacher needs new pedagogical competences related to digital literacy competences to create a modern digital education environment (Bayanova et al., 2019; Makarova et al., 2019; Markless, 2009).

Teachers' digital competencies include proficiency in digital technologies and resources, fostering professional collaboration, proficiency in teaching and learning methodologies, mastery of assessment practices, and student empowerment. These competencies include effectively using digital tools, managing, protecting and sharing resources, providing instruction, facilitating collaborative learning, using diverse assessment strategies, providing constructive feedback, and ensuring accessibility and inclusion. Mastery of these skills equips teachers with the tools needed to optimise student learning outcomes and create supportive learning environments (Dias-Trindade et al., 2021).

Digital culture is a new idea embedded in culture and the arts, connecting different aspects of culture, media and information technology. The rise of information and communication technology (ICT) has created human connections through networks and challenged our traditional ways of understanding culture and digital culture (Mohebi, 2019). Digital culture is a corporate culture that supports digital transformation and becomes a catalytic link between the real world and the virtual world (Aisha, 2022)..

The digital era forms a new order in which humans and technology coexist and collaborate. The process of digitalisation requires every human being to be ready to transform digitally, and the Covid-19 pandemic is an escalation of the transformation of digital culture in society, making people's daily activities very dependent on information technology. The Covid-19 pandemic has become the main marker of the creation of cultural changes from conservative to digital culture in the Indonesian digital society. Even so, this digital cultural change that continues to strengthen must be anticipated immediately through a digital literacy strengthening programme (Ayu et al., 2022).

During the Covid-19 pandemic, people's interactions that used to be done face-to-face are now online. This shows that there is a cultural shift in the habit of using technology such as mobile phones, tablets, laptops and computers. Likewise with education, usually school is done at school, students meet with teachers face-to-face and now it is done from home with the teaching and learning process carried out in the form of digital classes, parents and teachers can establish social relationships from online learning ([Afrizal et al., 2020](#)).

RESULT AND DISCUSSION

Digital Leadership

Digital leadership at SMA Negeri 1 Kutacane is realised through a strategic approach that integrates technology into daily school activities. The principal implements a digital transformation strategy that not only involves the use of technological tools, but also supports cultural change in the school. In this context, the school leader acts as a facilitator who provides flexibility for teachers to innovate with technology in teaching and learning activities, as well as communicate through digital platforms such as WhatsApp and Google Drive.

Digital leadership at SMA Negeri 1 Kutacane is operationalized through a strategic framework that integrates technology into the fabric of everyday school activities. Research indicates that effective digital leadership is critical for fostering an environment conducive to educational innovation. The principal's implementation of a digital transformation strategy extends beyond the mere acquisition of technological tools; it also promotes a cultural shift within the school that is essential for the successful integration of digital culture in education. This strategic approach aligns with findings that highlight the importance of leadership in navigating the complexities of digital adoption in educational settings.

The principal serves as a facilitator, providing teachers with the autonomy to innovate and adapt their teaching methodologies through technology. This flexibility is supported by empirical evidence suggesting that teacher agency is a significant factor in enhancing digital competence. By fostering an environment where educators feel empowered to experiment with digital tools, the school cultivates a culture of continuous professional

development. This is particularly important in the context of Southeast Aceh, where access to technology and resources may vary, necessitating adaptive teaching strategies that meet diverse student needs.

The utilization of digital communication platforms such as WhatsApp and Google Drive facilitates enhanced collaboration among educators, which is essential for effective pedagogical practice in a digital age. Research has shown that collaborative planning and resource sharing among teachers can lead to improved instructional outcomes and increased teacher efficacy. By embedding these practices into the school culture, SMA Negeri 1 Kutacane not only enhances teacher digital competence but also establishes a model for other institutions aiming to integrate digital culture successfully. This study highlights the critical interplay between digital leadership and teacher competence as foundational elements for fostering a digitally enriched educational environment.

Decentralisation and Task Delegation

At SMAN 1 Kutacane, the principal's endorsement of decentralization significantly enhanced the integration of digital culture in education. By assigning responsibilities to small teams within each learning group, the principal empowered educators to lead digital-based projects that improved performance efficiency and fostered technology-driven learning communities. Research indicated that such collaborative structures enhanced teacher engagement and innovation, enabling educators to share best practices and collectively address challenges. This decentralized approach facilitated the effective application of technology in teaching, aligning with findings that highlighted the importance of teamwork in educational settings.

The principal's commitment to fostering innovation was evident in the policies that encouraged the use of new technologies in the classroom. By providing teachers with the autonomy to explore and implement digital tools, the principal transformed them from passive implementers into active drivers of digital change. This shift was crucial, as studies showed that teacher agency significantly impacted the successful integration of technology. Policies that facilitated digital skills development and the implementation of systems like Google Classroom and e-report cards not only enhanced teachers' technological competencies but also cultivated a culture of continuous learning and adaptation within the school environment.

Ongoing monitoring and evaluation of digital transformation initiatives were critical to ensuring educational objectives were met. The principal's proactive approach to assessing the effectiveness of digital integration allowed for the identification of areas needing improvement, fostering data-informed decision-making. Research emphasized the role of reflective practice in educational leadership, which reinforced accountability and encouraged a culture of growth among educators. The strategies employed at SMAN 1 Kutacane illustrated the interconnectedness of digital leadership and teacher digital competence, underscoring their significance as foundational elements in the successful integration of digital culture in education.

Teacher Digital Competence

Competence Development through Training and Independent Learning at SMAN 1 Kutacane, significant attention was directed toward enhancing teachers' digital competence through a comprehensive approach that included both online and offline training. This proactive stance aligned with contemporary educational research that emphasized the necessity of continuous professional development in fostering digital literacy among educators. By encouraging teachers to participate in various training sessions, the school not only equipped them with essential skills in managing digital data and content but also promoted the adoption of innovative digital learning platforms. Tools such as Model, Quizizz, and Google Drive became integral to the teaching process, enabling educators to prepare and deliver instructional materials in a digital format. This emphasis on training reflected a broader recognition that teacher competence was foundational to the successful integration of digital culture in education.

In support of this digital learning initiative, teachers at SMAN 1 Kutacane effectively utilized technology to foster collaborative sharing of modules and teaching materials. The central role of Google Drive in this process facilitated seamless information management among teachers, students, and parents, thereby enhancing communication and engagement within the educational community. Research showed that the collaborative use of cloud technology not only increased the effectiveness of teamwork among educators but also led to the exchange of best practices that were critical for professional growth. This collaborative framework was essential for creating a culture of shared

learning, where teachers could learn from each other's experiences and insights, ultimately contributing to a more robust teaching practice.

The development of teachers' digital competence at SMAN 1 Kutacane extended beyond mere technical skills; it encompassed critical areas such as content management and an understanding of digital ethics. Educators were trained to create a safe and inclusive digital learning environment that promoted engagement and interactivity among students. Research indicated that an effective digital learning environment was characterized by its ability to motivate students and foster a sense of belonging. By developing competencies that encouraged students to embrace digital technology in their learning processes, teachers created immersive and relevant educational experiences. This holistic approach not only enhanced the quality of instruction but also prepared students to navigate the complexities of the digital world, thereby equipping them with the skills necessary for success in an increasingly technology-driven society.

Digital Culture

The establishment of a digital culture at SMA Negeri 1 Kutacane was underscored by the implementation of comprehensive digital literacy initiatives that empowered all members of the school community, including both students and teachers, to understand and utilize technology wisely. Research consistently showed that digital literacy was a crucial component of modern education, equipping individuals with the skills necessary to navigate the complexities of the digital landscape. At SMA Negeri 1 Kutacane, the emphasis on digital literacy aimed not only to enhance technical skills but also to foster critical thinking and responsible digital citizenship. This holistic approach recognized that merely providing access to technology was insufficient; educators and students needed to be equipped with the knowledge and ethical frameworks to use digital tools effectively and responsibly.

Through the promotion of digital literacy, teachers and students were expected to engage in collaborative learning experiences that encouraged the sharing of knowledge and the co-creation of content. This collaborative ethos aligned with findings that highlighted the importance of social interaction in learning, particularly in technology-enhanced environments. By leveraging digital tools, such as collaborative platforms and educational applications, the

school fostered an environment where active engagement in technology-based learning activities became the norm. The formation of a robust digital culture at SMA Negeri 1 Kutacane was achieved through the planned and inclusive utilization of digital tools, ensuring that all stakeholders were involved in the process. Research indicated that inclusive practices in technology integration led to greater acceptance and effective use of digital resources among educators and students alike (Ertmer & Ottenbreit-Leftwich, 2010). This comprehensive strategy illustrated how digital leadership and teacher digital competence were essential for the successful integration of digital culture in education, ultimately fostering a learning community that was adaptable, innovative, and equipped for the demands of the 21st century.

The school supports a culture of experimentation by giving teachers the freedom to use and explore digital tools. This is evident in the principal's policy of giving teachers flexibility in choosing digital teaching methods. With this support, teachers can create a more interactive, creative and inspiring learning environment. This commitment includes efforts to create exclusive classes that focus more on technology, where students are guided in using digital devices such as laptops and learning software.

The establishment of a digital culture at SMAN 1 Kutacane was significantly supported by the provision of adequate infrastructure, including robust Wi-Fi connections and access to digital devices. Research had highlighted that effective technological integration in educational settings hinged on the availability of reliable infrastructure. Without such foundational resources, efforts to cultivate a digital culture risked being undermined, as both teachers and students required stable access to technology to engage meaningfully in digital learning experiences. By prioritizing the enhancement of technological infrastructure, SMAN 1 Kutacane demonstrated a commitment to creating a conducive environment for digital education, which was essential for the successful integration of digital culture in schools.

In addition to infrastructure, the school's strategic utilization of digital platforms enhanced communication and collaboration among teachers and staff. This implementation was crucial for fostering a collaborative and digital-ready learning environment, where teachers played a central role in nurturing a positive school culture. Research indicated that effective communication and collaboration among educators were integral to professional development and

improved instructional practices. By utilizing digital tools for communication, teachers could share resources, exchange ideas, and collaborate on lesson planning, thereby reinforcing their collective digital competence. This collaborative framework not only supported teachers in developing their digital skills but also encouraged a culture of continuous improvement and innovation within the school community.

With this conducive environment, both teachers and students were able to develop their digital skills continuously, enhancing their overall educational experience. Studies had shown that a supportive infrastructure paired with collaborative practices led to increased engagement and higher levels of digital literacy among students. By fostering an atmosphere where digital skills could be honed collaboratively, SMAN 1 Kutacane positioned itself as a model for other educational institutions seeking to integrate digital culture effectively. This comprehensive approach underscored the essential roles of digital leadership and teacher digital competence as keys to successfully embedding a digital culture within the educational framework.

With a strong focus on the three points above, SMA Negeri 1 Kutacane is gradually building a school ecosystem supported by innovative digital leadership, strong teacher digital competence, and an inclusive digital culture, all of which contribute to the improvement of learning quality.

CONCLUSION

SMA Negeri 1 Kutacane has built a strong foundation in the digital transformation of education through the implementation of digital leadership, the improvement of teachers' digital competencies and the establishment of an inclusive digital culture. The digital leadership in this school functions not only as a director but also as a facilitator that enables teachers to innovate and utilise technology in the learning process. This collaborative approach through the division of small teams and decentralisation of responsibilities is effective in encouraging the adaptive adoption of technology, strengthening the school's readiness to face the changes of the digital era. The improvement of teachers' digital competence is done through continuous training and the use of digital platforms that support data management, content creation and collaboration, so that teachers not only master technical skills but also have flexibility in teaching methods that are more interactive and relevant to students. In addition, the digital culture emphasises freedom of

experimentation, inclusivity and collaboration, supported by adequate digital infrastructure. This culture not only equips teachers and students with technical skills, but also encourages innovative and collaborative mindsets, thus creating a modern and sustainable learning ecosystem. This overall approach demonstrates SMA Negeri 1 Kutacane's commitment in creating an educational environment that is ready to face future challenges, with a strong foundation in adaptive leadership, professional competence, and a digital culture conducive to the development of quality education.

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