DIGITAL TRANSFORMATION OF EDUCATION IN INDONESIA: A CONCEPTUAL FRAMEWORK FOR EVALUATION

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Abstract

Advances in information and communication technology have driven significant changes in Indonesia's education ecosystem. Various school digitalization initiatives, including the provision of digital devices, learning platforms, and the development of educational information systems, have been launched to support the direction of digital transformation of education. However, these programs are not accompanied by an evaluation framework capable of comprehensively assessing their contribution to the educational transformation process. This research aims to develop a conceptual framework for the evaluation of educational digital transformation that is comprehensive, systematic, and contextual through a study of the implementation of the school digitalization program in Indonesia. The research approach uses the Systematic Literature Review (SLR) method, following the PRISMA framework and the PICO (Population, Intervention, Control, and Outcome) formulation structure. The literature was collected from reputable databases, including Scopus, Google Scholar, and SINTA, which yielded 212 initial articles. After selection, 33 relevant articles remained. The results of the synthesis show that five main dimensions contribute to the evaluation of digital transformation of education, namely: (1) digital infrastructure, (2) learning content and platforms, (3) digital competence, (4) institutional support, and (5) the effectiveness of digital learning. Based on these findings, an evaluation conceptual framework was prepared to support policy formulation and planning for the development of digital schools in a more targeted and sustainable manner.

INTRDUCTION

The development of information and communication technology has driven significant changes in various sectors of life, including the education sector (Bond et al., 2018; Roll & Ifenthaler, 2021; Selwyn, 2018). In this digital era, education is not only required to adapt to new learning methods but also to manage educational units, access learning resources, and utilize data in increasingly complex educational information systems (OECD, 2023). Digitization of education is not just the use of technological devices, but part of a systemic transformation process that demands the integration of pedagogy, technology, and cultural change in learning in a sustainable manner (UNESCO, 2023).

In Indonesia, various programs have been launched to support the direction of digital transformation of education, such as the School Digitalization Program (Kemendikbud, 2019) and the provision of digital learning platforms. Nonetheless, the literature shows that many of these initiatives still focus on device fulfilment and technology access, while systemic evaluations of their impact on school digital transformation have not been widely done (UNESCO, 2023; Zagona et al., 2022). Existing evaluations are still administrative, such as calculating the distribution of devices or technical training of teachers, without assessing how these technologies change learning practices or school governance (Aldunate & Nussbaum, 2013).

To comprehensively understand the effectiveness of digital transformation, the evaluation needs to include the input, process, output, and outcome dimensions. The process

dimension assesses how technology is integrated into school learning and management (Ifenthaler & Schweinbenz, 2013; Ruloff & Petko, 2025). The output dimension includes increasing the capacity of educators, students' digital competence, and the quality of digital facilities and infrastructure (Scherer et al., 2017; Voogt et al., 2013). Meanwhile, outcomes are related to changes in school culture, learning quality, equal access, and digital literacy of the education community at large (OECD, 2019; Redecker, 2017). Evaluation of digitalization without considering outcomes often fails to capture the true meaning of the digital transformation of education.

Various frameworks have been developed globally to assess the integration of technology in learning, such as SAMR (Puentedura, 2013), TPACK (Mishra & Koehler, 2006), and DigCompEdu (Redecker, 2017; Vuorikari et al., 2022). This framework provides important guidance but focuses more on the integration of technology at the teacher and learning levels, so it is not yet able to describe the digital transformation of schools as an educational organization as a whole (Lindfors & Hilmola, 2015; Petko et al., 2018).

Other countries have developed institutional school digital maturity evaluation frameworks, such as the Digital Schools of Distinction Framework in Ireland or the Digital Maturity Framework in Croatia, which assess aspects of leadership, digital culture, infrastructure, pedagogy, and competencies (Reɗep et al., 2017). Estonia also uses the Digital Mirror instrument to evaluate the digital maturity of schools through the dimensions of Teaching–Learning, Change Management, and Infrastructure and Services (Pata et al., 2022). These frameworks demonstrate the importance of evaluating digital transformation that is systemic, not just technical.

In Indonesia's highly diverse context, challenges such as infrastructure gaps, uneven digital literacy, and school institutional capacity require a contextual and comprehensive evaluation of digitalization (Martínez-Bravo et al., 2022; UNICEF, 2021). An evaluation approach that focuses too much on devices, internet connections, or technical training risks ignoring the dimensions of school culture, digital leadership, and the long-term impact on the quality of learning. Therefore, an evaluation framework for education digital transformation that is systemic, measurable, and relevant to Indonesia's conditions is needed to ensure that various digitalization initiatives truly drive sustainable educational change.

METHODS

This study uses a qualitative research approach, utilizing a systematic literature review method, which was chosen for its ability to provide a comprehensive mapping of the presented themes. To ensure a systematic, objective, and replicable process, this study uses the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework. The PRISMA framework is used as a reporting tool to describe the stages of research systematically. (Malhotra, 2024) To formulate the research questions, PICO (Population, Intervention, Control, and Outcome) (Schiavenato & Chu, 2021) was used with the details of P (Schools in Indonesia), I (Implementation of digital school program frameworks), C (Schools without structured digital program evaluation), and O (Identification of the need for a more comprehensive evaluation approach).

Eligibility Criteria

Eligibility is an important manual process that allows researchers to minimize the shortcomings created by the database. This study reviews all study designs that evaluate the implementation of digital school programs in Indonesia. Studies that meet these criteria

include quantitative, qualitative, and mixed methods that assess aspects of digital transformation in the context of secondary education.

Search Strategy

The search and collection of literature were carried out using several scientific databases, including Scopus, Google Scholar, and SINTA. Keywords related to the evaluation of digital school programs, high school, and digital transformation in education are used, without language restrictions. The following keywords were used in searches across all databases: 'Evaluation Digital School Programs' AND 'Senior High School' AND 'Digital Transformation in Education'.

Study Selection

Initial search results from the entire database showed 212 articles. The data obtained is then filtered to identify duplicate articles. There is no time limit in searching for data sources, so data that does not meet the criteria is immediately deleted.

During the screening process, 173 articles were identified and filtered to eliminate irrelevant articles, narrowing the selection to 128 that met the criteria. Of the 128 articles, 81 were accessible and 47 were inaccessible. Furthermore, the obtained articles are narrowed further by removing those that are irrelevant to digital education in high school, do not explain the evaluation of digital school programs, or use improper methods. This process resulted in 33 articles included in the literature and ready for analysis.

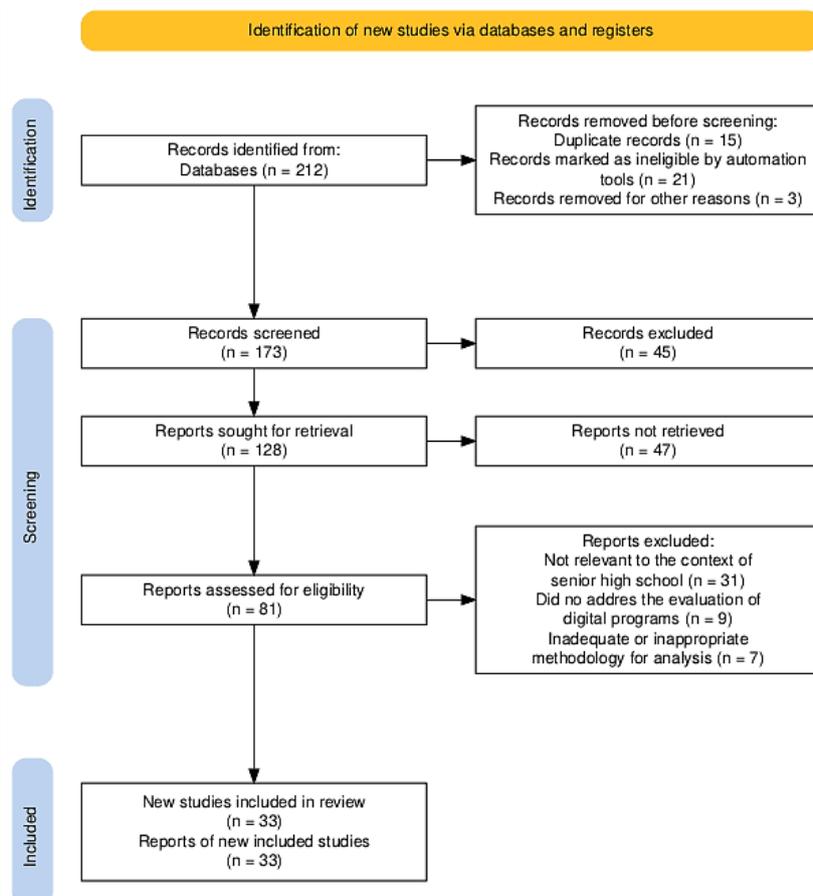UTo clarify the data selection process, shown in Figure 1 below:

Figure 1. Selected article flow based on PRISMA

Data Extraction

Articles that meet the criteria at the end will be further analyzed, and relevant information will be extracted to assess how well the evaluation approach can measure the success of a digital school program comprehensively. The primary focus of this data extraction is to identify the limitations of current evaluation approaches and to explore the evidence supporting the need to develop new, more comprehensive, and contextual methods for measuring digital transformation in secondary schools.

Data Analysis

Studies can be synthesized quantitatively, qualitatively, or a combination of both. Quantitative synthesis can only be applied to studies that use a quantitative approach, whereas qualitative synthesis can be applied to both quantitative and qualitative studies.

Quantitative synthesis

Quantitative synthesis in a systematic literature review is known as meta-analysis, a synthesis technique that focuses on the comprehensive evaluation of the digital school framework. When conducting quantitative synthesis, several key considerations should be taken into account, including significant variations in effect sizes, potential selective publication bias, reporting bias, and the impact of small sample sizes (Morton et al., 2018).

Qualitative synthesis

Rousseau et al (2008) qualitative synthesis is the process of analyzing data by interpreting and explaining its meaning. This approach is typically used in research that seeks to understand socially constructed experiences, perspectives, or meanings. This is often attributed to methods such as phenomenology or social constructionism, which focus on gaining a deep understanding rather than relying on numbers.

Data demonstrations

Researchers need to ensure that the systematic literature review (SLR) process is conducted transparently and that the data presented supports the conclusions drawn. The use of search strings should accommodate a variety of coding symbols to ensure a more comprehensive article search process (Peters et al., 2015). In addition, all inclusion and exclusion criteria must be clearly explained and supported by valid reasons. Flowcharts can be used to describe the SLR process systematically, from start to finish (Shaffril et al., 2019). Some commonly used flowcharts are PRISMA diagrams and customized diagrams. A table containing the search string and the inclusion and exclusion criteria can also be displayed. One of the key elements of an SLR is the table of findings, which provides a concise explanation and facilitates the reader's understanding of the research results.

RESULT AND DISCUSSION

RESULT

Based on the method used in this study, the PICO (Population, Intervention, Comparison, Outcome) structure is used to formulate research questions. Each aspect is described as follows:

P (Population): Schools in Indonesia

The dynamics of educational transformation in the digital era are accompanied by the rapid growth of information and communication technology (Niswatin & Zainiyati, 2021). In Indonesia, the annual increase in internet users seems to be a catalyst for digital acceleration in various fundamental sectors, including education. Based on a survey conducted by the

Ministry of Communication and Information Technology (Kominfo) and the Kata Insight Centre data in 2020-2022, there has been an increase in digital literacy in Indonesia, with an increase in the Indonesian Digital Society Index (IMDI) from 37.80 in 2022 to 43.18 in 2023 and 43.34 in 2024 (Ministry of Communication and Digital, 2024; Ministry of Communication and Informatics, 2022). This phenomenon has triggered new and more complex opportunities and challenges for teachers and students (Setiyono et al., 2025). Educational institutions are required to continue to adapt to dynamic changes. Ease of access to knowledge, student engagement, ease of achievement of learning goals in the classroom, and increased learning effectiveness (Bilyalova et al., 2020) suggest that digitalization no longer plays a complementary role in conventional learning systems but has also become a new principle that can change patterns of interaction in the classroom (Putri & Ahmadi, 2023).

The implementation of this transformation has not received full support from all components involved. In some cases, schools' readiness to welcome digital transformation remains weak (Milawati & Sholeh, 2020), characterized by a lack of digital competence among students, low confidence, resistance to change, and a negative response to new technologies (Timotheou et al., 2023). Rasimin et al (2024) stated that the fundamental challenges in digital transformation in education include low technological literacy among teachers, poorly managed independent learning by students, and lack of support from educational institutions themselves, especially in terms of technological infrastructure. Modern education places students in dynamic, individual-centered learning, while teachers act as mediators, supporters, and guides. In line with this, digitalization does not stop at the use of hardware and software in the learning process, but also includes adjusting learning methods, improving teachers' digital skills, and using other technology-based learning systems (Setiyono et al., 2025). This then changed the management system in schools to be based on the principle of digitalization.

Schools can develop digitalization measurably and systematically if leaders have a clear vision and goals and set measurable indicators from classroom learning to the institutional ecosystem as a whole (Cui, 2025). For example, they must be able to manage change, maintain motivation, emphasize the importance of digital skills to strengthen teacher-student communication and cooperation, and create an effective collaborative learning environment (Karakose et al., 2021; Timotheou, Miliou, Dimitriadis, Sara, et al., 2023). While digitalization offers a wide range of benefits, the lack of support as well as measurable planning and implementation can lead to confusion that ultimately increases school management stress levels (Lee et al., 2023). This challenge is often exacerbated by workload, which acts as a moderation factor. As workloads increase, teachers and staff find it more difficult to cope with the added pressures of technology adoption and change, making them more vulnerable to mental health issues such as burnout, anxiety, stress (Zhang, 2023) and unable to design clear and scalable digitization systems.

I (Intervention): Implementation of the digital school program framework.

The digital school measurement framework has been implemented at various levels, one of which is the Framework for Digitally Mature Schools (FDMS) which has been validated to comprehensively assess the digital maturity of schools in supporting digital transformation (Balaban, Redjep, & Calopa, 2018; Redjep et al., 2021). This framework was developed to evaluate the digital maturity of primary and secondary schools. FDMS has five evaluation domains, namely planning, management and leadership; ICT in learning and teaching; digital

competency development; ICT culture; and ICT infrastructure (Redjep et al., 2021). Like other frameworks, the Digital Adult School Framework (PMK) also has its own advantages and disadvantages. The advantage of the Framework for Digitally Mature Schools (PMK) lies in its data-driven, flexible, and comprehensive approach, which can improve learning effectiveness and foster a continuous improvement orientation. However, there is a disadvantage to consider: this framework is not explicitly designed for implementation in Indonesia, as it was developed in Europe. Teachers' unpreparedness for digitalization and failure to consider social and economic challenges contribute to educational inequality in Indonesia (Hrustek et al., 2023; Redjep et al., 2021).

Several studies have described the design of the digitalization system in schools (Ilomäki & Lakkala, 2019), one of which is through the study of an Innovative framework (IDI school model) to evaluate practices carried out using digital technology. The six key elements in it are the existence of a clear vision, leadership, community teaching practices, pedagogical practices, knowledge practices at the school level, and digital resources (Ilomäki & Lakkala, 2019). Research conducted on three primary schools in Finland, measuring six key elements of the IDI framework, successfully demonstrated the validity of the Innovative Digital School Model (IDI) as a practical framework for identifying innovative practices, areas for development, and significant differences between schools in the use of digital technologies. The application of this model clearly highlights the substantial variation in the level of technological advancement between schools. One school is showing leadership, another is lagging, and another is in the middle, where development has not been entirely focused on technology as a key driver. These findings also underscore the important role of school leadership in shaping the direction of progress, regardless of the similarities in the city's curriculum, regulations, and resources. There is an interesting difference between teacher and student surveys regarding the use of technology in the classroom. In addition, there is a contradiction between observations and surveys of pedagogical practices, suggesting that the use of technology by the majority of teachers may be more functional than supporting knowledge creation. Socioeconomic backgrounds do not uniquely show a significant influence on outcomes, emphasizing the homogeneity of an education system where the same resources are provided to all schools. Ultimately, this study unequivocally establishes the importance of mixed methods for the holistic investigation of school practices, as the combination of qualitative and quantitative data provides a more comprehensive picture than using either alone.

Furthermore, the Digital Learning for Education (D-LIFE) Implementation Framework proposed by Haynes & Shelton (2018) offers an assessment of the capacity of digital education in schools. Their research found that essential criteria for digital learning focus on policymakers, education leaders, and administrators to guide the implementation of educational technologies (Haynes & Shelton, 2018). In addition, the DigCompOrg framework consists of seven key dimensions that include elements of digitalization in educational organizations, including leadership, collaboration, infrastructure, educator development, digital curriculum and content, digital evaluation and assessment, and student digital competencies. Thus, this framework can help schools effectively adopt digital technologies to improve teaching, student skills, evaluation, access to technology, and collaboration in education (Fernández-Miravete & Prendes-Espinosa, 2022). In general, the results of the study show that the level of teachers' digital competence is acceptable for the four stages of education analyzed. However, this level must be higher to achieve inclusive and quality

education. ICT integration policies in an inclusive context should be a top priority for any policy. However, this involves not only the presence of ICT in the classroom but also the development of competencies to design, modify, and use ICT to meet students' needs. In this case, a personalized training plan, based on a reference model, can be a way to develop teaching competence. Similarly, TMOOC has also been shown to be highly effective for competency development through the benefits of enriched tasks (Harris, 2021). This may be another potential way to develop teachers' digital competencies.

C (Control): Schools without structured digital program evaluation.

Learning the context of digital schools in Indonesia is very important and relevant to the learning needs of the 21st century. Although the government through the Ministry of Education continues to encourage digital transformation, most of its implementation has not been accompanied by structured and systematic evaluation at the education unit level. There is also no standard structure to measure the success of a digital school program. The absence of a measure of success is relevant, as many schools, especially in rural areas, remain focused on technical aspects such as procuring equipment and securing internet access to continue providing education amid rapid technological advancements. As a result, they still ignore the evaluation process, which includes the effectiveness of digital pedagogy, because the focus of the problem is different. With uneven readiness, most digital schools have not developed clear indicators for evaluation. In addition, the optimization of teachers' abilities has not been maximized, because it is not equipped with the data literacy needed to analyze digital-based learning outcomes. This condition makes it difficult to measure the success of digital school programs in Indonesia because of these inhibiting factors.

So far, the evaluation of digital schools has been conducted in part and still uses the evaluation model commonly used in digital school maturity programs. A study at SDN 03 Pakan Kurai (Febriani et al., 2024) on the evaluation of digital school programs shows that the application of CIPP evaluation is able to map the effectiveness of using platforms such as Google Classroom, Zoom, and Chromebooks. However, it also shows that most implementations have not been thoroughly evaluated as part of the school's digital program. The above conditions show that the evaluation of digital school programs in Indonesia is still weak in the components of pedagogy and learning outcomes (products), teacher data literacy, and continuous feedback mechanisms (processes). As revealed in a study in primary schools using CIPP evaluations, the input and process dimensions tend to be 'adequate' compared to the context and product dimensions, which are 'good'. Therefore, a new assessment paradigm based on a measurable, adaptive, and relevant evaluation model is needed. Therefore, an assessment approach is needed to transform the Digital School ecosystem in Indonesia, moving beyond technical implementation to focus on quality and results.

O (Outcome): Identify the need for a more comprehensive evaluation approach.

To formulate a comprehensive evaluation approach and a relevant framework to assess the maturity level of digital school programs in Indonesia, a strong theoretical foundation is needed. Therefore, the review of previous studies serves as the basis for scientific and academic considerations. One of the key references is the report on the transition roadmap from conventional to digital learning, compiled by UNICEF (2021), which identifies several important dimensions to assess digital learning achievement in Indonesia. These dimensions include: (a) digital platforms and content, (b) access to the internet,

infrastructure, and hardware, and (c) the use of digital devices in teaching and learning activities.

In line with the findings of UNICEF (2021), Sailer et al (2021) developed an evaluative framework that highlights several key dimensions of digital learning in schools, including basic skills, teaching skills, and their utilization in the school environment. Furthermore, Voogt et al (2013) also identified several key components to ensure effective technology integration in schools. These components include infrastructure development, teacher professional development, institutional support, formulation of ICT-based curriculum changes, content development and management, continuous evaluation and research, and partnerships between the public and private sectors. In addition, previous theoretical supports, such as Josua et al (2025), Resta et al (2018), and Tilya (2008), among others, were also included to adjust the indicators to Indonesia's specific conditions and background.

DISCUSSION

By adapting these findings to the context and characteristics of the Indonesian education system, these dimensions can be synthesized and mapped further in the following table as a basis for a contextual and applicable evaluative framework.

Table 1. Conceptual Dimensions dan Indicators for
Digital Transformation of Education in Indonesia

Dimensions	Indicators
Digital Infrastructure (Pata et al., 2022; Tilya, 2008; UNICEF, 2021)	Availability of ICT devices (UNICEF, 2021)
	Internet access (UNICEF, 2021)
	Regional gaps (Pata et al., 2022; Tilya, 2008)
Content & Digital Platform (Balaban, Redjep, & Čalopa, 2018; Josua et al., 2025; Resta et al., 2018; UNICEF, 2021	Quality of learning content (Josua et al., 2025)
	Availability of digital resources (UNICEF, 2021)
	Utilisation of local context in learning (Resta et al., 2018)
	Teacher involvement in content production/curation (UNICEF, 2021)
Digital Skills (Balaban, Redjep, & Calopa, 2018; Knezek & Christensen, 2008; Pata et al., 2022; Voogt et al., 2013)	Teachers' digital literacy (Balaban, Redjep, & Calopa, 2018; Knezek & Christensen, 2008)
	Digital pedagogical skills (Knezek & Christensen, 2008; Pata et al., 2022)
	Student participation (Voogt et al., 2013)
Social & Institutional Support (Law et al., 2010; Pelgrum, 2009)	School policy support (Pelgrum, 2009)
	Collaboration with the community (Law et al., 2010)
Learning Effectiveness & Sustainability (Kozma, 2008; Pata et al., 2022; Pelgrum, 2009; Voogt et al., 2013)	Impact on learning outcomes (Kozma, 2008)
	Continuity of digital programs (Voogt et al., 2013)
	Evaluation and monitoring (Pata et al., 2022; Pelgrum, 2009)

According to Tilya (2008), for developing countries, implementing policies that support the availability of adequate basic infrastructure in schools is a crucial aspect in supporting the transformation of digital-based education. The infrastructure in question includes not only hardware, software, and internet networks, but also physical and environmental support, including the availability of electricity, basic communication services (such as telephone lines), asset protection through insurance, and safe and functional school buildings. Furthermore, UNICEF (2021) highlighted in its report the unequal access to services in several

regions of Indonesia. In line with this, infrastructure policies should emphasize the principle of equality (Pata et al., 2022), ensuring that all educational units have equitable access to hardware and software, the key tools for digital learning. In the context of limited access, especially in disadvantaged areas or 3T, the use of mobile device-based technology is a strategic alternative to address the gap in device distribution and connectivity. Therefore, to assess the success of digital school maturity in Indonesia, this must be considered as a dimension and an assessment indicator.

The dimension of digital content and platforms refers to the quality, relevance, availability, and usefulness of digital-based learning content, as well as the technology platform used in the learning process. Evaluations in this dimension include the extent to which the available content supports learning objectives, is relatively accessible, culturally and linguistically relevant, and how the platforms used facilitate interactivity and learning effectiveness (Josua et al., 2025). According to Balaban et al (2018), one of the key aspects of digital equity is access to meaningful, high-quality, and culturally relevant learning content. This is especially important in developing countries, where most digital content is still in foreign languages and has not been contextualized. In Indonesia, this is also a challenge, especially in the 3T area, which faces language barriers, a shortage of teachers who can adapt digital content, and low independent content production capacity. Furthermore, UNICEF (2021) The report states that although various digital platforms have been developed, such as Teachers' Rooms, Learning Houses, Sharing Teachers, etc. The use of digital content remains limited to one-way exercises and learning videos. An evaluation of digital platforms in Indonesia shows that content is often not adapted to local contexts, learners' needs, or principles of active pedagogy.

Digital skills are one of the main pillars in building a mature digital school ecosystem. Digital Adult School Framework in Croatia (Balaban et al., 2018) The ICT competence of teachers and students is a key indicator for determining the level of digital maturity of schools, ranging from the basic stage (technical fundamentals) to the advanced stage (creative and innovative use). This dimension includes not only the ability to use devices but also the practical and reflective integration of technology into everyday learning. In Indonesia, similar challenges are still faced, albeit in a more complex context. National studies and reports (UNICEF, 2021) This shows that many teachers only utilize technology to the extent that they use PowerPoint and WhatsApp groups. Teacher training still focuses on technical mastery rather than pedagogical use, and the digital skills gap between regions and school levels remains very high. In this regard, the technology adoption model developed by Knezek and Christensen (2008) has become particularly relevant. Their model explains that skill mastery, positive attitudes, and access are fundamental elements of the technology adoption process for teachers. In the early stages, digital competence is essential to develop confidence and mental readiness to utilize technology regularly in the classroom. This model can help Indonesia gradually measure the readiness of each teacher and school.

The dimensions of social and institutional support in digital school evaluation refer to the extent to which the school's internal and external environments support successful, systematic, and sustainable technology integration. Based on the findings of Pelgrum (2009) in an international study, the success of ICT utilization in education is not only determined by the availability of infrastructure, but also by the quality of institutional support, such as school leadership, a shared vision of digital learning, and a collaborative culture that facilitates teachers to share good practices. It highlights professional training that focuses on

pedagogical aspects, the existence of a community of practice, and institutional incentives play an important role in driving meaningful ICT adoption. In the Indonesian context, the report reveals that many teachers have not received adequate support, both in the form of pedagogically relevant training and through internal school policies that encourage digital collaboration and innovation. In addition, the school's leadership in building a digital culture and in encouraging external collaboration with communities, campuses, and technology providers remains limited. Therefore, this dimension needs to be evaluated to ensure that digital transformation is not only technically oriented but also supported by strong and learning-oriented social and institutional structures.

The dimension of learning effectiveness and sustainability in digital school evaluation refers to the extent to which the use of technology actually improves learning quality and is sustainable over the long term. Voogt et al (2013) emphasize that effective ICT integration is not only about providing tools, but also about transforming the teaching and learning process to encourage collaboration, critical thinking, and active learning. However, in Indonesia, this transformation still faces significant challenges. Data from UNICEF (2021) show that most teachers still use ICT to deliver material in one direction, while learning that leverages technology to increase student participation, use formative assessments, or engage in collaborative projects remains very limited. Kozma (2008) states that the effectiveness of ICT policies can only be achieved if technology is used to reform the learning process, rather than simply replacing the whiteboard with the screen. This idea implies that digitalization in education should not be limited to replacing traditional tools with digital tools. This should include broader transformations, such as improving teachers' digital and pedagogical competencies (Machmud et al., 2021), strengthening instructional leadership (Timotheou et al., 2023), and improving school infrastructure and facilities to support meaningful technology integration (Pata et al., 2022). It also involves establishing mechanisms to continuously evaluate progress and monitor the extent to which digital tools have contributed to improving teaching quality, student engagement, and learning outcomes. This is particularly relevant in the Indonesian context, where many digitalization policies (such as the School Digitalization Program and Smart Classroom initiatives) have not been fully accompanied by pedagogical transformation at the school level. Pelgrum (2009) added that an important indicator of the effectiveness of ICT integration is the creation of fundamental changes in student learning behavior and improved learning outcomes. Meanwhile, a study by Pata et al (2022) in Estonia, shows that schools that have successfully implemented sustainable digitalization are those that simultaneously develop three key elements: digital learning strategies, supporting infrastructure, and data-driven change management. In Indonesia, many schools are still focused on providing tools and connections without a system for continuous evaluation and reflection to assess their impact on learning outcomes. Therefore, evaluating these dimensions is important to ensure that investment in the digitalization of education in Indonesia actually results in more effective learning that is adaptive to the changing times and sustainable in the long term.

By having their own assessment framework specifically designed for the Indonesian context, schools in Indonesia will be able to conduct digital maturity evaluations that are more relevant to the geographic, social, and national educational infrastructure. This framework allows for a more accurate assessment of the challenges and potential faced by schools in different regions, while supporting the formulation of policies and improvement programs that are aligned with local needs and national education development priorities.

CONCLUSION

Based on the explanation above, the results of this study confirm the importance of developing a digital school evaluation framework that aligns with the characteristics of education in Indonesia. The framework should accommodate the diversity of the national education system through a comprehensive, contextual evaluation approach. This includes aspects of leadership, digital culture, and teachers' role in encouraging learning innovation. Training programs for teachers and principals should also focus on developing digital literacy and evaluative skills, in addition to technical skills for using devices. Based on the literature review, five main dimensions were identified in the evaluation framework: digital infrastructure, digital content and platforms, digital skills, social support, and the effectiveness and sustainability of learning. These five dimensions consist of 15 indicators that can be used as a reference to develop a more adaptive assessment framework. This framework can be the basis for the preparation of national evaluation indicators that are flexible and can be adjusted to the level of readiness and availability of resources in each school. Thus, digital school programs in Indonesia are not only a formal administrative requirement but also have a significant impact on the quality of learning and students' readiness to face the challenges of the 21st century.

Declarations
Author Contribution Statement
The first author is in charge of collecting data, developing ideas, and writing articles.
The second and third authors are in charge of directing the concept, thought, and preparation of this article.

Data Availability Statement
All data used in this study are sourced from Google Scholar and Scopus with open access status.

Declaration of Interests Statement
There is no conflict of interest in this study.

AI Use Statement
[1] During the preparation of this manuscript, the authors used [**Grammarly**] solely for language editing (grammar, clarity, and readability). The authors reviewed, revised, and verified the final text and take full responsibility for the content of the publication.

[2] The authors used [**ChatGPT version 5.2**] to support initial drafting and/or structuring of parts of the manuscript. All AI-assisted outputs were critically reviewed, rewritten where necessary, and verified against the study data and cited sources. The authors remain fully accountable for the accuracy, originality, and integrity of the manuscript.

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