



School Principals' Strategies for Fostering a Data Driven Decision Making Culture through Digital Dashboards

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ABSTRACT

Digital transformation in education management requires schools to make data-driven decisions, but the use of digital dashboards has not always shaped a data-driven decision-making culture. This study aims to analyze the principal's strategy in building a data-driven decision-making culture through a digital dashboard in the process of planning, evaluation, collaboration, and quality improvement. The research used a qualitative approach with a case study design in five schools, involving 30 informants, consisting of principals, vice principals, teachers, operators, and quality assurance teams. Data were collected through interviews, observations, and documentation, and then analyzed thematically using NVivo 14. The results show five main strategies: the establishment of data as the basis for decisions, dashboard integration, strengthening data literacy, reflection forums, and managing technical-cultural-ethical barriers. These findings confirm that the success of dashboards is determined by reflective and collaborative leadership.

INTRODUCTION

The digital transformation in education management has changed the way schools plan programs, evaluate quality, and make strategic decisions. At the global level, schools are no longer relying enough on intuition, personal experience, or overdue administrative reports, but are required to use accurate, integrated, and easy-to-read data to improve learning services. In the Indonesian context, this urgency is even stronger after the government has developed various education data platforms, including Education Report Cards, which provide an overview of the quality of education at the national, provincial, district/city, and education unit levels. The Indonesian Education Report even provides data in PDF and Excel formats and contains data for 2022–2024 that can be used as a basis for analysis and planning for improving school quality.

Theoretically, data-driven decision-making departs from the view that effective managerial decisions must be built through the process of problem identification, information gathering, alternative analysis, and selection of the most rational actions according to the organizational context. In education management, school principals play the role of learning leaders as well as organizational managers who must be able to convert data into operational knowledge. Laila, Ramli, and Bahrani (2025) emphasized that data-based management analytics allows school principals to develop more accurate, measurable, and evidence-based policies, while data literacy is an important competency in educational leadership. This is in line with Lee (2024) who shows that principals' data literacy includes the ability to use data to build a data-driven culture, improve schools, and reflect on leadership practices.

However, the reality in schools shows that the availability of digital data has not always been followed by the formation of a data-driven decision-making culture. Many schools already have access to data on attendance, learning outcomes, assessments, teacher performance, school programs, and budgets, but they are often only used to meet administrative reporting obligations. Susanto, Rajagukguk, Tambun, and Sartika (2025) found that the implementation of data-based decision-making systems in elementary schools still faces obstacles in data literacy, technological infrastructure, data protection regulations, and low collaboration between school residents in the data analysis process. On the other hand, Musakirawati et al. (2023) show that the use of the Education Report platform has supported data-driven planning, but its effectiveness is highly dependent on the capacity of schools to read indicators, set priorities, and translate data into real programs.

A number of previous studies have addressed data-driven decision-making in education, but it still leaves a scientific gap. Nurzen (2022) emphasizes the importance of data in educational planning for the success of school principals, but has not specifically discussed the use of digital dashboards as an instrument for shaping data culture. Anwar and Dasilva (2025) and Hayanti and Wisda (2025) examine the leadership of school principals in data-driven planning through Education Report Cards, but the focus is still on planning practices and leadership effectiveness, not on cultural strategies to familiarize teachers and staff with using dashboards collaboratively. At the international level, Karademir

et al. (2024) prove that learning dashboards can support learning analysis, while Rääk and Eisenschmidt (2025) assert that the sustainability of evidence-based school improvement depends on collaborative routines and a culture of data use. Thus, there has not been much research that specifically links principals' strategies, the use of digital dashboards, and the formation of a data-driven decision-making culture in school management.

Based on these gaps, the research entitled "School Principals' Strategies for Fostering a Data Driven Decision Making Culture through Digital Dashboards" aims to analyze the strategies of school principals in building a data-driven decision-making culture through the use of digital dashboards. Specifically, this study is directed to understand how school principals develop data literacy of school citizens, integrate dashboards in the planning and evaluation cycle, build evidence-based collaboration, and overcome technical, cultural, and ethical barriers in the use of school data. With this focus, this research not only places the dashboard as a data visualization technology, but also as a medium for leadership, organizational communication, learning reflection, and school quality control.

The theoretical contribution of this research lies in the development of education management studies, especially in the integration between principal leadership theory, data literacy, management information systems, and evidence-based organizational culture. This research is expected to expand the understanding that the success of data-driven decision-making is not only determined by the availability of data, but also by leadership strategies that are able to turn data into collective practices in schools. Practically, the results of this research can be a reference for school principals, supervisors, education offices, and digital platform developers to design a dashboard mechanism that is easier to understand, participatory, safe, and relevant to the needs of improving the quality of educational units.

LITERATURE REVIEW

Data-Driven Decision Making in Education Management

The concept of data-driven decision making in education management starts from the assumption that school decisions need to be made based on empirical evidence, not mere intuition, administrative habits, or subjective considerations of the principal. In a recent study, Brazauskienė (2025) distinguishes three approaches that are often used in overlap, namely data-driven decision making that places data as the main basis for decisions, data-based decision making that emphasizes the systematic process of data collection and analysis, and data-informed decision making that combines data with professional experience, school context, and ethical considerations. This distinction is important because the culture of data-driven decision-making in schools should not be understood as mechanical adherence to numbers, but rather as a reflective process of reading problems, prioritizing them, formulating interventions, and evaluating their impact on an ongoing basis. In the context of school management, Hakim (2025) emphasized that learning analytics can strengthen policy planning, teacher performance evaluation, and the effectiveness of managerial decisions, although its implementation still depends

on data literacy, infrastructure readiness, and student data protection.

Principals' Leadership as a Driver of Data Culture

School principals are strategically positioned as key actors connecting data, technology, policy, and learning practices. Timan, Mustiningsih, and Imron (2022) explained that the digital leadership of school principals consists of the dimensions of visionary leadership, digital era learning culture, superior professional practices, systemic improvement, and digital citizenship. These five dimensions affect teacher performance and student competence, so that digital leadership is not only related to the use of technological devices, but also to the ability to build a collective orientation towards quality. These findings are reinforced by Kasim and Surya (2025), who show that the digital leadership of school principals is related to the integration of teacher technology in primary schools. This means that in the context of digital dashboards, school principals do not only provide access to data, but need to be facilitators of data interpretation, priority directors, and shapers of evidence-based reflection habits among teachers and education staff.

Digital Dashboards as Data Visualization and Sensemaking Infrastructure

Digital dashboards can be understood as a visualization device that integrates various school data, such as attendance, learning outcomes, assessment results, teacher performance, school climate, budget, and other quality indicators, so that they can be read quickly by school principals and school residents. Alonzo, Quimno, Townend, and Oo (2024) show that ICT-based data systems can support teacher decision-making, but their adoption is influenced by data characteristics, leadership support, individual disposition, and the socio-cultural context of the school. This means that the dashboard is not just a technical system, but a sensemaking room that helps school residents interpret problem patterns and determine actions. In the framework of Brazauskienė (2025), the dashboard is more appropriately positioned as a data-based and data-informed decision-making tool, because the data displayed needs to be read along with the learning context, teacher experience, and student needs.

Education Report Card and ARKAS as a Local Context of the Education Dashboard in Indonesia

In the Indonesian context, the practice of data-driven decision making in schools is largely related to the use of Education Report cards and school budget planning applications. Astuti, Azainil, and Warman (2025) found that the Education Report Card has been used in the stages of identification, reflection, and improvement, but its implementation still faces obstacles to understanding human resources, time constraints, limited facilities, and budgets. Andini, Mas'udah, Rosyidina, and Nurkolis (2025) also emphasized that the Education Report Card opens up opportunities for the preparation of RKS, RKT, and RKAS that are more targeted, participatory, transparent, and accountable. Meanwhile, Dwikawati and Prasajo (2025) show that school principals, BOS treasurers, and teachers use Education Report cards as a reference in the preparation of data-based planning on ARKAS. Thus, the education dashboard in Indonesia needs to be understood as a data ecosystem that connects quality evaluation, program planning, and school budgeting.

Data Culture as a Collaborative Process, Not Just Administrative Compliance

The data-driven decision-making culture is not only formed because schools have digital platforms, but because of organizational routines that encourage teachers, principals, and staff to read, discuss, and act on data. Lee, Camburn, and Sebastian (2025) show that the effectiveness of data use by school leaders is strongly influenced by the context of the school, specifically the relationship of mutual trust among staff. This finding is relevant to the condition of Indonesia, because Astuti et al. (2025) found that the main problem with the use of Education Report Cards is not only data access, but also the low concern and understanding of school residents towards data. Therefore, the principal's strategy needs to be directed towards the establishment of a data review forum, indicator-based reflection meetings, the involvement of teachers in the root of the problem analysis, and the preparation of mutually agreed interventions.

Data Literacy, Ethics, and Infrastructure Readiness as Key Challenges

Recent literature shows that the main challenges in using education dashboards lie in data literacy, digital infrastructure readiness, and ethical data governance. Hakim (2025) emphasized that the implementation of learning analytics in schools faces obstacles in the form of limited educator data literacy, technological infrastructure, as well as ethical issues and student data protection. Hidayah, Sofiyanti, Inayah, and Muniati (2025) also show that the use of Education Report cards still requires teacher training strategies, strengthening policies, and optimizing facilities and infrastructure so that data can be translated into quality improvement programs. At the international level, Alonzo et al. (2024) stated that the success of ICT-based data systems is influenced by system design, data quality, leadership, and the social context of schools. Thus, the principal's strategy must include data literacy training, simplification of dashboard visualization, privacy protection, division of data analysis roles, and ongoing mentoring.

Conceptual Synthesis: School Principals' Strategies in Cultivating Dashboards

Based on the study, the principal's strategy in fostering a data-driven decision-making culture through digital dashboards can be formulated in four layers. First, the layer of visionary leadership, namely the ability of school principals to set data as a basis for quality improvement, not just an obligation to report. Second, the organizational capacity layer, namely strengthening teacher data literacy, forming a data team, and developing an indicator-based reflection forum. Third, the system integration layer, namely the use of dashboards to connect Education Report Cards, ARKAS, assessment data, attendance data, and evaluation of school programs. Fourth, the layer of ethics and sustainability, namely ensuring that data is used fairly, contextually, safely, and does not reduce students to mere numbers. Thus, digital dashboards become strategic management instruments that strengthen accountability, transparency, collaboration, and organizational learning in schools.

METHODOLOGY

Types of Research

This study uses a qualitative approach with a case study design. This approach was chosen because the research aims to deeply understand the principal's strategy in building a data-driven decision-making culture through the use of digital dashboards. The focus of the research is not directed to test the influence between variables statistically, but to explore the processes, leadership practices, collaboration dynamics, and obstacles experienced by schools in using digital data as a basis for decision-making. The design of the case study is considered relevant because the use of educational dashboards, such as Education Report Cards, ARKAS, e-report cards, and school information systems, is a contextual phenomenon influenced by organizational culture, data literacy, and the leadership of school principals. The use of a qualitative approach is also in line with previous research that places interviews, observations, and documentation as the main techniques to understand the use of Education Report Cards in data-based planning in schools (Handayani et al., 2025; Hidayah et al., 2025).

Research participants

This research was conducted on five schools that have utilized digital dashboards in the process of planning, evaluation, decision-making, and improving school quality. The selection of the location was carried out purposively with criteria: the school has used at least two digital data platforms for the past year, has active access to the Education Report Card, and involves school residents in the process of reflection and data-based planning. The research participants consisted of 5 principals, 5 deputy principals or curriculum coordinators, 10 teachers, 5 school operators, and 5 members of the school quality assurance team. The selection of participants was carried out using purposive sampling techniques because they had first-hand experience in the use of school digital data

Research Instruments

The main instrument in this qualitative research is the researcher himself as a key instrument, assisted by semi-structured interview guidelines, observation sheets, and documentation guidelines. The interview was used to explore the principal's strategy in building a culture of data use, how the dashboard is used in school meetings, forms of teacher involvement, and technical and cultural barriers that arise. Observations are made on meeting activities, evaluation forums, or school data reading processes if possible. Documentation includes RKS/RKAS, Education Report Card results, meeting minutes, program evaluation reports, and screenshots of relevant dashboards. The interview grid was developed from a study on principals' digital leadership, data-driven planning, and learning analytics in school management. Digital leadership of school principals is important because research by Mustiningsih et al. (2024) shows the need to improve the skills of school principals in supporting the acceleration of education digitalization.

Data Collection Procedure

The data collection procedure is carried out in stages. The first stage is a preliminary study to identify schools that have used digital dashboards in school management. The second stage is the preparation and validation of interview guidelines, observations, and documentation through input from education management experts and school practitioners. The third stage is the collection of field data through in-depth interviews with school principals, teachers, operators, and quality assurance teams. The fourth stage is observation of the practice of using data in school activities, such as evaluation meetings, program preparation, or discussion of the results of the Education Report. The fifth stage is the collection of supporting documents to strengthen the results of interviews and observations. This procedure is used so that the data obtained comes not only from informant statements, but also from real practices and documents that show how the dashboard is used in school decision-making.

Data Analysis Techniques

Data was analyzed using thematic analysis with stages of data reduction, data presentation, conclusion drawn, and verification. The analysis process begins with the transcription of the interview results, repeated reading, initial code, grouping of the code into categories, and the preparation of the main theme. The themes analyzed included the principal's strategy, dashboard utilization, teacher data literacy, school community collaboration, barriers to data use, and the formation of a data-driven decision-making culture. Analysis is assisted using NVivo 14 to facilitate the process of coding, grouping themes, and tracing patterns between informants. The validity of the data is maintained through source triangulation, technical triangulation, member checking, and trail auditing. Source triangulation is carried out by comparing information from school principals, teachers, operators, vice principals, and quality assurance teams. The triangulation technique was carried out by comparing the results of interviews, observations, and documentation. Member checking is carried out by reconfirming the summary of findings to several informants, while trail audit is carried out by keeping records of the data collection, coding, and interpretation process

RESEARCH RESULT

The results of the study show that the principal's strategy in building *a data-driven decision-making* culture through *digital dashboards* is not only related to the use of technology, but also to the formation of organizational habits in reading, discussing, and following up on data. Data was obtained from interviews, limited observations, and documentation at five schools that have used Education Report Cards, ARKAS, e-report cards, digital attendance systems, and school assessment dashboards. In general, five main themes were found, namely: determination of data as the basis for decisions, integration of dashboards in school planning, strengthening data literacy, establishment of collaborative reflection forums, and obstacles to dashboard implementation.

Data as the Basis for Setting School Priorities

The first findings show that principals are starting to put data as the primary basis in determining the priorities of school programs. In schools where

the use of dashboards is more mature, the principal no longer compiles programs based on the previous year's habits, but begins the planning process by reading the indicators on the Education Report, assessment achievements, attendance data, and evaluation of previous programs. The data is used to select the most pressing issues, determine the relevant programs, and lay the groundwork for arguments in school meetings.

One of the principals said:

"Now every program must have a reason from the data. If literacy is low, we first look at the indicators, then determine what program is most suitable." KS-01, interview, April 12, 2026

The same thing was conveyed by the deputy principal:

"In the past, meetings were often based on the proposals of each field. Now we start from the dashboard first, so it's clearer which one to prioritize." WK-02, interview, April 15, 2026

Teachers also feel the change:

"If previously the school program felt routine, now we are asked to look at the data first. So the proposed activities are not only based on estimates." G-03, interview, April 18, 2026

These findings suggest that dashboards are starting to function as a priority steering tool, rather than just an administrative document. Data is the basis for strengthening the objectivity of school decisions.

Dashboard as a Liaison for Evaluation, Planning, and Budget

The second finding shows that *digital dashboards* are used to link school quality evaluation with planning and budgeting. Education Report Card is used to identify key problems, while ARKAS and RKAS are used to translate those problems into programs and budget allocations. In schools that are more active in using dashboards, the process of preparing programs becomes more directed because each activity is associated with indicators that need to be improved.

A principal explained:

"We use the Education Report Card to see the root of the problem, then we match it with the RKAS. So the budget is not only spent on routine activities, but is directed to the needs that arise from the data." KS-03, interview, April 20, 2026

A member of the school's quality assurance team added:

"The data from the dashboard helps us explain why certain programs need to be included in the work plan. So the decision is easier to be accounted for." TPM-02, interview, April 22, 2026

School operators also emphasized that dashboard data is starting to be needed in the managerial process, not just reporting:

"Previously, data was only requested during the report. Now the principal often asks for recaps for meeting materials and program preparation." OP-01, interview, April 16, 2026

These findings show that dashboards have an integrative function. Data is not only seen as separate information, but is beginning to be used to connect problems, programs, budgets, and school evaluations.

Strengthening Data Literacy of Teachers and School Residents

The third finding shows that data literacy is an important factor in the successful use of dashboards. Some teachers initially did not understand the terms, indicators, and how to read the data on the dashboard. Therefore, school principals form small teams, involve school operators, and provide informal assistance so that teachers can understand data more simply.

A teacher said:

"At first, we were confused to read the indicators on the Education Report Card. After it was explained in the meeting, we began to understand the relationship with learning in the classroom." G-05, interview, April 25, 2026

Another principal explained the strategy used:

"I don't ask all teachers to immediately understand all the data. We start with the indicators that are closest to the teacher's work, such as literacy, numeracy, and student attendance." KS-04, interview, April 27, 2026

School operators also play a role in translating technical data:

"Teachers usually don't have difficulty if the data has been summarized. The challenge is how to make that data readable and not too technical." OP-03, interview, April 29, 2026

These findings show that data literacy is not formed automatically after schools have dashboards. School principals need to create a mentoring process so that teachers are able to read data, understand the meaning of indicators, and relate them to learning practices.

Data Reflection Forum as a Collaborative Cultural Formation

The fourth finding shows that a *data-driven decision-making culture* begins to take shape when dashboards are discussed in a shared reflection forum. The forum can be in the form of monthly meetings, curriculum meetings, quality assurance team meetings, or special discussions after the results of the Education Report have been analyzed. In this forum, data is not only submitted by the principal, but also read and interpreted together by teachers and school teams.

One of the vice-principals stated:

"The meeting is now more focused. We look at the data first, then discuss the causes. So the discussion doesn't widen to things that have no basis." WK-04, interview, May 3, 2026

Another teacher said:

"If the data is discussed together, we don't feel blamed. Instead, we can see where the problem is and what needs to be fixed." G-07, interview, May 5, 2026

The principal also emphasized the importance of a reflective atmosphere:

"I always emphasize that data is not about finding out who is at fault. The data is used to see which parts we need to fix together." KS-02, interview, May 6, 2026

These findings show that data reflection forums become a bridge between dashboards as digital tools and school culture as a collective practice. Dashboards become more meaningful when they are used to build dialogue, not just to read numbers.

Technical, Cultural, and Ethical Barriers to the Use of Dashboards

The fifth finding shows that the use of dashboards still faces technical, cultural, and ethical obstacles. Technical barriers include limited internet networks, data spread across multiple platforms, and reliance on school operators. Cultural barriers can be seen from some teachers who still view the dashboard as an additional administrative burden. Meanwhile, ethical barriers are related to how schools use data so as not to cause negative labeling of teachers, students, or certain classes.

A school operator said:

"Sometimes data is in many applications, so it takes time to unify. Not all teachers are also used to opening their own dashboards." OP-04, interview, May 8, 2026

Teachers conveyed obstacles in terms of work culture:

"Some teachers still feel that the data is the business of the operator or the principal. In fact, the data is also related to learning." G-09, interview, May 10, 2026

Members of the quality assurance team emphasize the ethical aspect:

"Data must be submitted carefully. Otherwise, teachers can feel compared. So what's important is how the data is used for improvement, not to blame." TPM-04, interview, May 12, 2026

These findings show that the success of dashboards is not only determined by the availability of the system, but also by the readiness of human resources, the school's work culture, and the ethics of data use.

Summary of Key Findings

Overall, the results of the study found that principals build a *data-driven decision-making* culture through five main strategies: establishing data as the basis for decisions, integrating dashboards with school planning, improving teachers' data literacy, establishing data-driven reflection forums, and managing implementation barriers gradually.

Table 1. Summary of the main findings of the study

Theme Findings	Form of Field Findings	Main Meaning
Data as a basis for decisions	School programs begin to be compiled based on dashboard indicators	Results become more objective and targeted
Dashboard integration	Education report cards are associated with RKAS, e-report cards, attendance, and assessments	Data helps connect evaluations, programs, and budgets
Data literacy	Teachers need assistance to read indicators	Data culture depends on the interpretation ability of school citizens
Reflection forum	Data discussed in school team meetings and discussions	Dashboards become a space for collaboration and organizational learning
Implementation barriers	Technical constraints, cultural resistance, and data use ethics	Dashboards require communicative and adaptive leadership

The results of this study are different from some previous studies that placed dashboards or Education Report cards as administrative planning tools. In this study, dashboards were found to function not only as a source of information, but also as a media for principals' leadership in shaping data-based organizational culture. Thus, the success of *digital dashboards* does not lie in the technology alone, but in the ability of school principals to build collective habits to read, discuss, and follow up on data on an ongoing basis.

DISCUSSION

The results of the study show that the strategy of school principals in building a data-driven decision-making culture through digital dashboards does not only depend on the availability of digital platforms, but especially on the ability of school principals to turn data into routine, collaborative, and meaningful managerial practices. These findings show that dashboards, such as Education Report Cards, ARKAS, e-report cards, digital presence, and assessment data, function more broadly than just reporting tools. Dashboards are a leadership tool that helps schools set priorities, connect evaluations with planning, and build habits of evidence-based reflection. This finding is in line with Hidayah et al. (2025) who stated that data-based planning through Education Report Cards can be a strategy to improve school quality if data is used to read problems, formulate programs, and determine follow-up improvements.

The first findings show that school principals are starting to put data as the basis for the legitimacy of decisions. This is important because in many school management practices, decisions are often made based on the previous year's program routine, administrative pressures, or the dominant opinion in meetings. When the principal asks for each program to be accompanied by a data base, there is a change in decision-making patterns from experience-based decisions to evidence-based decisions. In the context of education management theory, this

change shows that school principals carry out a strategic leadership function, which is to direct school resources based on relevant information, not just carry out routine activities. These findings are supported by Laila et al. (2025) who show that data-driven management analytics helps school principals make more accurate, objective, measurable, and evidence-based decisions.

The second finding shows that the dashboard is the link between evaluation, planning, and budgeting. The Education Report Card is used to read quality problems, while ARKAS and RKAS are used to translate these problems into programs and budget allocations. This strengthens the research of Dwikawati and Prasojo (2025) which found that school principals, BOS treasurers, and teachers use Education Report cards as a reference in the preparation of data-based planning on the RKAS/ARKAS application. Thus, an important contribution of this research lies in the explanation that dashboards not only generate information, but also build a more systematic management flow: problems are identified through data, discussed in school forums, translated into programs, then linked to budgets and evaluations.

The third finding is related to the data literacy of teachers and school residents. This study shows that teachers are not always able to immediately understand the indicators on the dashboard. They need mentoring, simplification of data displays, explanations of terms, and examples of the relationship between data and learning practices. These findings expand on the study of Lee (2024) who explains that the data literacy of school principals includes not only the ability to read data, but also the ability to build a data culture, direct school improvement, and reflect on leadership practices. In the context of this study, effective school principals are not only dashboard users, but also data translators for school residents. He helps teachers understand that the numbers on the dashboard are not just administrative indicators, but information that is directly related to learning, student attendance, literacy-numeracy achievements, and the quality of school programs.

The fourth finding shows that data reflection forums are an important factor in the formation of a data-driven decision-making culture. Dashboards become meaningful when data does not stop at the principal or operator, but is discussed together by teachers, vice principals, and the quality assurance team. These findings are in line with Lee et al. (2025) who stated that the effectiveness of data-driven decision-making by school leaders is influenced by the school context, including the relationship of mutual trust between staff. In this study, the reflection forum helped transform data from a control tool into an organizational learning tool. When principals emphasize that data is used to improve the program, rather than looking for individual faults, teachers become more open to talking about learning weaknesses and finding solutions together.

The fifth finding shows that the digital leadership of school principals is a major supporting factor for the success of the dashboard. Digitally oriented principals not only encourage the use of apps, but also build communication, build data teams, organize reflection forums, and ensure program follow-up. These findings are in line with Mustiningsih et al. (2024) who emphasized the importance of improving the digital leadership skills of school principals in

accelerating the digitalization of education. The same thing is also seen in the research of Kasim and Surya (2025) which found that the digital leadership of school principals plays an important role in supporting the integration of technology by teachers, even though they still face obstacles to digital competence and infrastructure. Thus, the success of the dashboard cannot be separated from the capacity of the principal as a digital leader as well as a learning leader.

However, this study also shows that the use of dashboards is not completely free of obstacles. Technical barriers arise in the form of limited internet networks, data spread across multiple platforms, and reliance on school operators. Cultural barriers arise when some teachers still view the dashboard as an additional administrative job, not as a tool to improve the quality of learning. Ethical barriers arise in the way schools present data so as not to cause negative labeling of certain teachers, students, or classes. These findings support Alonzo et al. (2024) who show that the use of ICT-based data systems in teacher decision-making is influenced by data characteristics, system design, leadership support, individual disposition, and the social context of the school. This means that dashboards do not automatically produce data culture if they are not supported by human readiness, organizational structure, and healthy communication.

When compared to previous research, the results of this study have a common point as well as differences. These findings are in line with Handayani et al. (2025) who show that Education Report cards help schools identify recommendations for improvement, design strategic programs, and manage resources effectively. These findings also support Susanto et al. (2025) who emphasize the importance of optimizing data-driven decision-making systems in primary school strategic management. However, this research is different because it does not only see the dashboard as a planning tool or information system, but also as a medium for forming organizational culture. In other words, the contribution of this research lies in the emphasis that data culture is formed through social processes: the principal directs, the teacher discusses, the operator translates the technical data, and the quality team ensures the follow-up of the program.

Theoretically, this research strengthens the integration between the concepts of digital leadership, data literacy, evidence-based management, and school organizational culture. This research shows that the culture of data-driven decision making cannot be reduced to the technical ability to read numbers, but is a collective practice that requires leadership, trust, collaboration, and reflection. Practically, this study implies that schools need to establish a routine mechanism for reading dashboards, such as monthly reflection meetings, data analysis teams, summary of priority indicators, and the direct linkage between data, programs, and budgets. In this way, the dashboard can become a more lively quality control tool and does not stop as an administrative document.

The factors that support the results of this study are the commitment of the principal, the involvement of the quality assurance team, the support of school operators, and the availability of digital platforms that can be accessed by schools. Meanwhile, the factors that hinder are uneven data literacy, limited

digital infrastructure, an administrative work culture, and the lack of clear ethical standards in the use of internal school data. The difference in the level of maturity of data culture between schools can be explained by variations in leadership capacity and the intensity of the reflection forums. Schools that have active principals, data teams, and regular evaluation forums tend to be more mature in using dashboards. On the other hand, schools that still place dashboards as an operator's business tend to not be able to turn data into collective decisions.

The limitation of this study lies in the limited number of locations, namely five schools, so the findings cannot be generalized to all educational units. In addition, this study uses a qualitative approach, so that the results are stronger in explaining the process, meaning, and dynamics of using dashboards, but have not measured the relationship between variables statistically. The research data is also highly dependent on interviews, limited observations, and school documents, so the possibility of informant perception bias still needs to be considered. Therefore, follow-up research is recommended using a mixed method design or quantitative survey with a broader sample to examine the relationship between principals' digital leadership, teacher data literacy, dashboard usage intensity, and data-driven decision-making culture. Advanced research can also develop a model of school data culture maturity as well as an instrument for evaluating school readiness in using dashboards in an ethical, collaborative, and sustainable manner.

Thus, the results of this study provide an understanding that the principal's strategy is a key factor in changing the dashboard from a technological tool to a school management culture. The new dashboard has strategic value if school principals are able to build data awareness, strengthen teacher literacy, create space for reflection, integrate data with planning-budgets, and maintain ethical use of data. Consequently, digital transformation in education management is not enough to provide a platform, but must be accompanied by a transformation of leadership, organizational culture, and the capacity of school residents to use data as the basis for quality improvement.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that the strategy of school principals in building a data-driven decision-making culture through digital dashboards is not only determined by the availability of digital platforms, but especially by the ability of school principals to transform data into collective, reflective, and sustainable managerial practices. The findings of the study show that school principals play a key role in establishing data as the basis for decision-making, integrating dashboards with school planning and budgeting, strengthening teachers' data literacy, forming data-based reflection forums, and managing technical, cultural, and ethical barriers in data use. Dashboards such as Education Report Cards, ARKAS, e-report cards, digital presence, and assessment data not only function as administrative reporting tools, but also as instruments for leadership, organizational communication, quality evaluation, and school collective learning.

Based on the findings, schools are advised not to place digital dashboards

solely as an administrative obligation, but as part of an evidence-based quality management system. School principals need to form a school data team, hold regular reflection forums, simplify the display of data so that it is easy for teachers to understand, and ensure that each school program has a clear data base. Teachers and education staff also need to receive data literacy training to be able to read indicators, interpret dashboard results, and relate them to learning improvements. In addition, the education office and digital platform developers need to provide technical assistance, simpler system integration, and ethical guidelines for the use of data so that the dashboard can be used in a participatory, safe, and sustainable manner. Follow-up research is suggested using a broader school scope or mixed method approach to examine the relationship between principals' digital leadership, teacher data literacy, dashboard usage intensity, and data-driven decision-making culture.

ADVANCED RESEARCH

Further research is suggested to expand the scope of the location and level of education so that the findings regarding the principal's strategy in building a data-driven decision-making culture through digital dashboards can be compared more comprehensively. In addition, subsequent research can use a mixed method or quantitative approach to examine the relationship between principals' digital leadership, teachers' data literacy, dashboard use intensity, and the maturity of data-driven decision-making culture. It is also important to develop a model for evaluating school readiness in the ethical, collaborative, and sustainable use of dashboards.

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