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Enabling Data-Based Decision Making in Education: A Systematic Review of Leadership, Culture, and Capacity Challenges

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ABSTRACT

Data-Based Decision Making (DBDM) has become an important strategy in modern education reform that emphasizes the use of empirical information to improve the quality of learning processes and outcomes. This literature reviews 30 international scientific articles that explore various aspects of DBDM implementation in schools, including the role of leadership, data team collaboration, instrument validity, information technology integration, and application in the context of inclusive education. Thematic analysis shows that the success of DBDM implementation is largely determined by the capacity of school leadership in building a data-driven culture, teachers' ability to interpret and use data, and systemic support through technology and ongoing training. Studies highlight the importance of transformational leadership and collaborative data team structures. Meanwhile, the development of instruments such as the has proven valid in measuring school readiness and capability to implement DBDM. The identified barriers include limited data literacy, inadequate infrastructure, and cultural resistance to evaluative practices. Thus, this literature confirms that DBDM requires comprehensive support in terms of policy, resources, and strengthening individual capacity to be implemented sustainably and have an impact on improving the quality of education.

1. INTRODUCTION

The world of education has now undergone a fundamental change towards evidence-based or data-based governance. Decision-making using data has become mainstream in global education reform, from the school level to national policy (Mandinach, 2012;Young et al., 2018). In Indonesia, this approach has been implemented through the Merdeka Belajar policy by launching the Education Report platform, which encourages data integration in planning and decision-making or policies both at the school level and at the local government level in this case, the District/City and Provincial Education Offices. One approach that has received increasing attention in the last two decades is Data-Based Decision Making (DBDM). DBDM is a systematic process of using various types of data, both student academic data, learning process data, and school social context data, to support more rational, objective decision-making that has an impact on improving the quality of education. Data that is communicated effectively enables leaders to prioritize policies and decisions objectively (Ellis, 2004).

Investigating the development and optimization of educational data warehouse to manage large datasets effectively is essential. This can support more sophisticated data analysis and decision-making processes. Research should focus on integrating significant data concepts into the curriculum to prepare students for a data-driven environment and improve their data literacy ((Baig et al., 2020).Improving educator's data literacy and providing professional development opportunities to use data effectively in decision-making processes is essential (Mandinach, 2012). Data-driven planning should provide equitable benefits to all students,

ensuring that use of data-driven technologies disanvantages no group. Engaging all stakeholders, including students, educators, and policymakers is essential to ensure a shared understanding of ethical practises(Brooker et al., 2019). Educators should be trainers in data literacy and ethical considerations to ensure responsible use of data (Mandinach & Schildkamp, 2021).

Data literacy and leadership are key factors in driving or inhibiting effective data use. However, more research is needed to understand how to optimize enabling factors and overcome barriers so that data can truly drive continuous improvement in schools (Schildkamp, 2019). By leveraging information on a large scale, educational institutions can improve control, planning, and decision-making processes so that operations are more optimal and student needs are better accommodated. Data science is applied in learning through adaptive technology to create unique learning experiences and enhance creativity and student performance (Shafique, 2025).

The DBDM concept emphasizes not only the availability of data but also the ability of educational actors especially principals, teachers, and policymakers to interpret, utilize, and integrate data into the decision-making process. DBDM is often used to identify learning problems, design pedagogical intervention, evaluate program effectiveness, and adapt school policies to student needs. This makes DBDM to be a transformative and potential approach in directing continuous improvement in the education system. The lack of practical and real-world scenarios in data science education, which hinders the development of decision-making skills among students (Selvakumar et al., 2024). Data-driven decision making (DBDM) and research informed teaching practises (RITP) are key to teacher and school improvement (Brown et al., 2017). The results of the study showed the importance of improving the school system's ability in data literacy and numeracy, as well as the transformational role of senior and middle leaders in building a collaborative, data driven culture in the school environment (Fernandes, 2021).

Various studies have shown that the success of implementing DBDM is highly dependent on several key factors, such as the capacity of the principal, the data literacy of teachers, infrastructure and technology support and collaborative culture in decision making. Principals play a central role in creating a school ecosystem that supports data-driven practise, including ensuring relevant data availability, training teachers, and building effective data teams. Conversely, failure in implementing DBDM id often associated with a lack of understanding of data function, resistance to change, and higher teacher workload without adequate technology support.

DBDM has also evolved in the context of its application. Initially focused on measuring academic outcomes, this approach has been expanded to include monitoring school climate, evaluating individual student needs (including student with special needs), and assessing dimensions of leadership and organizational culture. Even in some studies, such as that conducted by Parham et al (2018), the DBDM model is associated with decision-making strategies outside the education sector, such as the military MDMP (Military Decision-Making Process) model, which was then adapted to the school context to support visual and collaborative decisions.

Meanwhile, a study by Doğan & Demirbolat (2021) emphasized the importance of developing valid and reliable instrument to measure school capacity in implementing DBDM. Scales such as the DDDMS (Data-Driven Decision-Making Scale) effectively evaluate crucial dimensions such as technology support, data culture, and organizational readiness. The findings mark a shift from a conceptual approach to a systematic quantification and measurement effort in educational decision-making.

Another important issue in DBDM practise is the collaborative role of the data team. Many schools have forms data teams consisting of principals, teachers, counsellors, and IT staff to analyse student data and design solutions based on actual needs. Schildkamp (2019) showed

that healthy data team dynamics, supported by open communication and clear role divisions, can increase the effectiveness of learning interventions and accelerate the achievement of learning goals. This collaboration becomes increasingly important in a complex and dynamic education system.

The implementation of DBDM also faces significant challenges in the context of inclusive education. Wilcox et al. (2021) stated that although DBDM is promising in supporting students with special need, the use of data in this context is till minimal. Lack of data literacy among teachers, the unavailability of inclusive information systems, and minimal specific training are the main obstacles to utilizing DBDM for inclusive education. This requires a special approach that is more adaptive and humanistic in implementing DBDM principles. On the other hand, the development of information technology provides excellent opportunities for DBDM to grow and transform. Educational data management systems, analytical dashboards and big data integration have enriched the forms and sources of data available to schools. However, without adequate data literacy and an organizational culture that supports the use of data, these technological advances will not immediately have a positive impact. Therefore, recent literature has widely recommended the importance of ongoing training and organizational culture change as the foundations for the success of DBDM.

This literature review aims to provide a comprehensive understanding of how DBDM is implemented in various educational context, what important findings previous research has contributed, and what challenges and recommendations need to be considered to increase its effectiveness. Reviewing 30 scientific articles, this study aims to compile a critical synthesis that can enrich academic discourse while providing practical insights for education stakeholders in designing more effective, inclusive, and sustainable data-based strategies.

2. Methods

This study uses a systematic literature review approach to evaluate and synthesize previous research results related to the implementation and influence of Data-Based Decision Making (DBDM) in the context of education. The databases used are Scopus, Google Scholar, ERIC, DOAJ, JSTOR, and Sage Journals. The keywords used are data-based planning in education, data-driven planning in education, data-based decision making in education. Inclusion criteria include journal articles and scientific conferences in the period 2015 to 2025 that discuss data-based decision making in Education. Exclusion criteria are articles that discuss data-based decision making but not in the field of Education. Data analysis employs a thematic approach where selected articles are categorized based on the central theme in data-based decision-making. Narrative synthesis is utilized to group relevant research findings and highlight key insights.

3. Results and Discussion

3.1. Results

The analysis of the 30 articles reviewed in this study revealed several key findings, which were organized into five broad themes: (1) the role of leadership in Data-Driven Decision Making (DDDM), (2) the development and validity of DDDM instruments, (3) collaboration and the capacity of data teams, (4) the application of DDDM in inclusive education, and (5) the barriers and challenges to implementing DDDM. These five themes highlight the dynamics of DDDM implementation across various educational contexts and identify strategic opportunities and challenges for enhancing the practice implementation. These five themes describe the dynamics of DBDM implementation in various educational contexts and reveal strategic opportunities and challenges for strengthening the practice.

Table 1. Summary of Article Review Results Table

No	Author Name and Year of Publication	Research Focus or Theme	Research methods	Method of collecting data	Modelling and educational data warehouse	Research result	Implications	Recommendation
1	Baig et al., (2020)	State of the art big data in education	Systematic Literature Review (SLR)	Analysis of 40 primary studies	modelling, cluster analysis, cloud & Hadoop warehouse	Four main themes: student behaviour & performance, modelling, education system improvement, and curriculum integration.	Big data needs to be integrated in learning & educational decision making.	Further research, open source LMS integration, and development of an ethics & policy-based framework are needed.
2	Bondar et al. (2023)	DDDM in higher education in Ukraine during the war	Survey & case studies	Online survey, document analysis	Yes, LMS & national information system	DBDM plays an important role in ensuring the sustainability of the quality of higher education amidst the war through online surveys and national systems.	Data systems are critical to responding to education in times of crisis	Need for national platform & strengthening of digital competency
3	(Brown et al., 2017)	Using data for teacher learning and school improvement	Qualitative survey and analysis	Teacher questionnaire, school documentation study	Assessment system, student reporting	The teacher data team encourages increased reflection and learning interventions.	Collaboration within data teams supports ongoing instructional change.	Facilitate the formation and training of data teams based on instructional goals.
4	Chen et al. (2020)	Big data for smart education	Editorial (literature analysis)	Literature analysis	Yes, LMS & learning analytics	Educational Big Data enables personalization and evidence-based policy, but challenges in infrastructure, privacy, and competence remain large.	Institutions need strategies and policies for effective EBD	Strengthen infrastructure & training of educators
5	(Dübbers & Schmidt-Daffy (2021)	Teacher motivation towards DBDM	Randomized controlled experiment	Motivation & knowledge questionnaire	Not explicitly	The relevance reflection intervention increased teachers' autonomous motivation and DBDM use intentions, although it did not increase statistical knowledge.	The important relevance in teacher education regarding DBDM	Use relevance reflection to strengthen teacher motivation
6	Dodman et al (2019)	Equivalence audit as a critical	Mixed longitudinal study	Equality audit, interview	No	Equity audits encourage teachers to	Teacher training needs to include	Integrate CDDDM into

		DDDM tool				increase their awareness of structural inequalities and increase their agency for change.	equity & critical data use	teacher training & practice
7	Doğan & Demirbolat, (2021)	Validity and reliability of data-based decision-making scales in schools	Instrument development	Survey, exploratory factor analysis (EFA)	Four factors: technology infrastructure, data usage culture, data usage purposes, and data literacy.	The DDDMS scale is valid and reliable for measuring the effectiveness of DBDM in schools.	The instrument can be used for policy evaluation and data literacy training .	Use DDDMS to map data-driven decision-making capacity in schools.
8	Elgendy et al. (2022)	Data-driven decision making theory (DECAS)	Theory development by problematisation methodology	Interdisciplinary literature	DECAS model: Decision - making process, decision, data, analytic	DECAS combines classical decision making with big data & analytics; the importance of human-machine collaboration.	DECAS theory strengthens the epistemological basis for data-driven decision practice and research.	Use DECAS to guide interactions between human decision makers and data analytics systems.
9	Gehrmann et al., (2017)	Data-driven regional education planning in Germany	Case studies and theoretical reflections	monitoring, statistical data reports	monitoring, city/district education reports	Education reports strengthen public discourse and local decision-making; there is still a gap between data and action.	The importance of synergy between local governments and statistical institutions in data- driven governance.	Strengthen regional data analysis capacity & encourage stakeholder participation in data interpretation.
10	Hamid & Cui (2024)	Data analysis skills in learning leadership	Qualitative descriptive	Interviews and documentation	Teachers' academic grades & digital skills data	The principal's ability to analyse data has an impact on improving student learning outcomes and digital literacy.	Principals must master data literacy and be able to use it in academic supervision.	Intensive data analysis training for principals.
11	Hegestedt et al., (2023)	Data-driven school improvement in Sweden	Mixed-methods, national program	Survey, observation, document analysis	Four categories of data: input, process, output, context	Didactic, democracy, assessment, and mental health issues were selected to be addressed with DBDM.	literacy is a major challenge; PLC can help improve it.	Building teacher capacity through project-based data literacy training and communities of practice.
12	(Hubbard et al., 2013)	Implementation of DBDM in the context of US school reform	One-year qualitative case study	Teacher interviews, teacher team meeting observations	Benchmark data district, math & language test results	Data use is limited to language and mathematics; multiple reform initiatives reduce teacher motivation and capacity.	The organizational context and burden of reform influence the effectiveness of DBDM.	Integrate reform and data use in a holistic approach based on teacher capacity.

13	Jiang et al., (2022)	Data-driven personal learning path planning in MOOCs	driven algorithm developme nt	Learning log, cognitive diagnostic assessment	Dynamic knowledge difficulty & mastery status model	Algorithms improve learning efficiency, retention, and effective behaviour.	Learning status-based PLP is effective for large-scale online learning.	Implement PLP dynamic model on LMS for data-driven online courses.
14	Little et al., (2019)	DDDM in early childhood education (Pre -K)	Mixed methods	Interviews, surveys, policy analysis	Child development data, formative assessment, LMS	Pre -K is data-rich, but its use varies widely and is inconsistent across grades.	The need for training and simplification of data systems for Pre -K teachers.	Integration of information systems and data practice training in early childhood education.
15	Manly (2024)	Prescriptiv e analytics and student success	Action study	Focus group discussion	Yes, through an institutional data warehouse system.	Prescriptive analytics helps direct individual academic support; stakeholders support the use of data-driven systems.	Prescriptive analytics can be embedded in institutional planning	Integration of analytics in learning support systems
16	Mandina ch & Gummer (2013)	Implement ation of data literacy in education	Systemic analysis	Literature study, policy analysis	data warehouse, integration with education systems	Education requires a systemic approach to improving educator data literacy, including the roles of universities, certification bodies, and training providers.	literacy should be part of the teacher training curriculum and teacher evaluation system.	Build a comprehensive data literacy training system and make training mandatory for pre-service and in-service teachers.
17	Mandina ch (2012)	Developm ent of pedagogic al data literacy	Conceptual analysis	Literature and policy reports	Integration of academic data, perceptions, and processes into teacher practice	Teachers need to develop pedagogical data literacy that combines data with content knowledge.	Teacher training should include the development of data-based analytical and interpretive skills.	Build teacher education curricula that include practice-based data literacy.
18	Nouri et al., (2019)	Learning analytics in Europe	Review of national policies and practices	Document analysis, national project reports	Varies, depending on the country (MOOCs, LMS, national systems)	No European strategy yet; approaches are fragmented; focus is more on higher education.	The need for an ethical framework, national funding, and attention to K-12.	Develop cross-country strategies and policy support for Learning adoption Analytics.
19	Ogata et al. (2024)	Co- design of data-driven educationa l technology	Case study	Design study & interview	Yes, LEAF platform & dashboard	The 6-phase co-design model has proven effective in implementing data-driven educational technology (LA) and building teacher trust.	Co- design is essential for the sustainability of educational technology	Adoption of the 6-phase co-design model in other environments

20	Öz & Arastaman, (2022)	Principal's view on data-driven management	Qualitative study (case study)	Semi-structured interviews	Yes, e- Okul and MEBBIS	Principals use e-Okul and MEBBIS but face constraints of time, training, and technical resources in implementing DBDM.	Need for training, technical support and data culture in schools	Develop data analysis support systems in schools
21	Parham et al. (2018)	Comparison of data-driven decision-making tools between education and the military	Ethnographic field study	Observation, interviews, document analysis	Military decision-making model (MDMP), Data Wall /Data Room	Military decision-making tools are more complex and support collaboration; schools can learn from the military's approach to building a data culture.	Schools need to adopt visual and collaborative models to support data-driven decision making.	Developing visual, data-driven decision-making tools such as military models for education.
22	(Peters et al., 2021)	The effects of DBDM on low-achieving readers	Meta-analysis of 6 quasi-experimental studies	Reading literacy test, motivation questionnaire	Yes, LPA platform (quop)	LPA has a small but consistent impact on low-achieving students' reading fluency and motivation; combination with RS is more effective.	The LPA approach needs to be combined with instructional interventions	Use LPA to support differentiated instruction
23	Rohma et al. (2020)	School-based management & teacher professionalism	Quantitative	Questionnaire, documentation, observation	Not explained	School-based management and teacher professionalism have a significant impact on improving teacher performance.	Increasing professionalism and school autonomy is essential	Develop data-driven & local context-based teacher training
24	(Schildkamp et al., 2019)	Leadership roles in data teams	Exploratory case study	Interviews, data team observations	Five building blocks of transformational leadership	Five key behaviours of leaders: vision, individual support, intellectual stimulation, safe climate, and networking.	Leaders need transformational skills for DBDM success.	Use these five blocks to train school leaders to build data teams.
25	(Schildkamp et al., 2017)	Driving and inhibiting factors of DBDM	Quantitative survey (HLM)	Questionnaire	Partly, through the school data system	Data usage is driven by collaboration and organizational characteristics; but is still minimal in direct teaching.	Schools need a strong data & collaboration culture	Facilitate collaboration & leadership for effective DBDM
26	(Schildkamp, 2019)	iterative model of data use for school	Theoretical study and literature review	Literature analysis of 5 review studies	Formal/informal data, big data, research	iterative model includes goals setting, data collection, sense	School leaders must support the use of data at all stages of	literacy capacity and leadership

		improvement			evidence, iterative models	-making, corrective action, and evaluation; leadership & data literacy are key.	quality improvement.	roles in data use practices.
27	van Geel et al., (2019)	Leadership changes during DBDM intervention	Multilevel latent class & multi-state modelling	Observation, longitudinal survey	Framework of the Dutch Inspectorate of Education	Leadership was stable (44%) or improved (40%) during the two-year DBDM intervention.	DBDM interventions impact leadership style and capacity.	Focus on developing educational leadership in DBDM interventions.
28	Wang (2019)	The tension between DDDM and moral decision making	Critical review of literature	Cross-disciplinary literature (psychology, philosophy, management)	The 6-step model of DDDM (Mandinach), has been criticized for being ambiguous	DDDM is often inadequate for ethical decisions with conflicts of interest.	Schools need to combine a moral and ethical approach to data use.	Develop a data-driven ethical decision-making framework for school leaders.
29	Wilcox et al., (2021)	DBDM in inclusive education	Narrative review study	Literature analysis, case study	IEPs , classroom assessment systems, focus on intellectual disabilities and transition	Data is rarely used in individual decision making despite its importance.	There is a need for teacher training in data literacy for inclusive education.	Increase access to training and support for data use for teachers in inclusive classrooms.
30	Young et al. (2018)	The influence of SSE on decision-making practices in Ireland	Qualitative study with semi-structured interviews	Principal interviews and document analysis	School internal data, CAT4, P-POD system	Data usage is more focused on attendance and exams; less use of contextual and demographic data.	Principals need training in utilizing diverse data.	There is a need to strengthen the capacity of school principals in comprehensive data literacy.

3.1.1 School Leadership as a Catalyst for Data-Based Decision-Making (DBDM)

Research by Schildkamp (2019) and van Geel et al. (2019) consistently indicates that the effectiveness of DBDM implementation is significantly influenced by the quality of school leadership. Principals who exhibit transformational traits such as being vision-oriented, providing instructional support, and effectively managing change are more successful in incorporating data into strategic decision-making. Moreover, changes in leadership style during DBDM interventions, such as enhancing stability and accountability, positively affect student learning outcomes. Additionally, Parham et al. (2018) present an innovative approach by comparing the decision-making process used in military contexts (the MDMP Model) to the needs of schools. Their findings suggest that the visual aids and collaborative processes from the military can be adapted to enhance decision-making in schools, particularly in complex situations that demand quick and suitable responses.

3.1.2 Development and Testing of DBDM Measurement Instruments

The development of instruments to measure DBDM readiness and effectiveness has become an important focus in several studies. Doğan & Demirbolat (2021) developed and tested the Data-Driven Decision-Making Scale (DDDMS), which includes four main factors: technological infrastructure, data culture, leadership support, and personal capacity. This scale

has been proven to have high validity and reliability. It can be used practically by policymakers and researchers to assess the condition and readiness of schools for DBDM practices.
Instrument validity is important because schools will have difficulty identifying areas for improvement and designing effective data-based interventions without the right measuring tool. Such studies also open up opportunities for developing contextual local indicators, especially in developing countries.

3.1.3 Data Team Collaboration and Professional Culture

DBDM is not an individual activity but a collective process requiring cross-functional collaboration within the school environment. Articles such as those written by Schildkamp (2019) show that forming a data team with members from diverse backgrounds (teachers, principals, administrative staff) can increase the effectiveness of data analysis and the preparation of action plans. Open communication mechanisms, clear task division, and regular training related to data literacy generally support optimally functioning data teams. This collaboration also creates a space for professional reflection that strengthens evidence-based teaching practices. These studies suggest that the formation and strengthening of data teams must be an integral part of school development strategies.

3.1.4 Implementation of DBDM in Inclusive Education

Although DBDM has great potential to support inclusive education, literature shows that its implementation in this area still faces many obstacles. Wilcox et al. (2021) revealed that data available for students with special needs is often not optimally utilized in planning Individualized Education Programs (IEPs) and learning strategies. This is due to low teacher data literacy, lack of special training, and limited integration of classroom assessment systems with macro data systems. In this context, it is important to develop an inclusive information system and train teachers to interpret and utilize data appropriately to meet students' diverse needs. If accompanied by appropriate policy and technology support, DBDM can be a strategic tool for creating a responsive, adaptive, and equitable learning system.

3.1.5 Implementation Barriers: Culture, Technology, and Data Literacy

Although DBDM conceptually promises to improve the quality of education, its implementation still faces various structural and cultural obstacles. In many studies, the main obstacles include:

a. Lack of data literacy among teachers and principals;
b. Lack of systematic and ongoing training;
c. Lack of supporting technology infrastructure (analytic dashboards, real-time reporting systems);
d. School culture that does not fully support the use of data in decision-making.

Several articles suggest that organizational culture change is an important prerequisite for sustainable DBDM implementation. Schools must develop a reflective culture, be open to evaluation, and be ready to make informed adjustments. In addition, data literacy and data-driven leadership training systems must be designed comprehensively to address implementation challenges in the field.

3.2. Discussion

3.2.1 General Interpretation of the Results in the Context of Other Evidence

The studies reviewed consistently emphasize that the effective implementation of Data-Based Decision Making (DBDM) in education is significantly influenced by organizational culture. Schools that foster collaborative, learning-oriented, and data-positive cultures demonstrate a better integration of DBDM into their leadership and instructional practices.

Several articles also highlight the importance of transformational leadership in nurturing such a culture, which aligns with existing theories, such as those proposed by Schein and Fullan. Empirical findings reveal consistent patterns: schools with strong leadership, a clear vision, and a shared sense of responsibility are more likely to use data constructively. This supports previous meta-analyses on school improvement that argue that organizational readiness and culture shape how policies are enacted at the school level. Additionally, organizational culture moderates the adoption of data systems; schools that are resistant to change or lack reflective practices often face

3.2.2. Limitations of the Evidence Included in the Review

Limitations of the Review Processes Used. This SLR relies on a thematic synthesis of 30 articles, but limitations include:

a. Selection Bias: The review is based only on accessible, peer-reviewed sources; grey literature or localized case studies may be underrepresented.

b. Inconsistent Reporting of Context: Many studies lacked clear reporting on contextual variables (e.g., school size, urban/rural setting), limiting contextual interpretation.

c. No Inter-Rater Reliability: The coding and interpretation of themes were not cross-validated, which could introduce subjectivity.

3.2.2.2 Implications for Practice, Policy, and Future Research

Practice:

a. School leaders should invest in building data-literate cultures by promoting open communication, shared goals, and reflective dialogue.

b. Teacher professional development must integrate cultural dimensions, not just technical aspects of data use.

Policy:

a. Education policymakers should incorporate organizational culture assessments into DBDM-related reforms or accountability systems.

b. Funding and support programs must be sensitive to cultural readiness and not impose one-size-fits-all DBDM mandates.

Future Research:

a. There is a need for cross-cultural comparative studies to examine how organizational culture shapes DBDM across regions.

b. Mixed-methods and longitudinal designs should be used to explore causal pathways between cultural variables and data use.

c. Research should investigate the student and teacher perspective more deeply, especially in underrepresented contexts like rural or marginalized communities.

4. Conclusions and Suggestions

A review of 30 international scientific articles shows that Data-Based Decision-Making (DBDM) has become an important strategic approach in contemporary education reform. Implementing DBDM has been proven to support the improvement of learning quality, school managerial effectiveness, and the formulation of policies that are more contextual and responsive to student needs. However, the success of this approach is highly dependent on several determinant factors, such as school leadership, data team collaboration, data literacy of educators, and adequate technological infrastructure.

School leadership, especially transformational leadership, has been shown to be a major catalyst in integrating DBDM practices. Principals who can build a data-based vision, provide instructional support, and create a collaborative professional ecosystem tend to be successful in directing schools towards a culture of evidence-based decision-making. In addition, the existence of an effectively functioning data team plays an important role in analyzing data, interpreting findings, and developing intervention strategies.

This study also highlights the urgency of developing valid instruments to assess the school's capacity to implement DBDM. Scales such as DDDMS contribute significantly to providing systematic and reliable evaluation tools. In the context of inclusive education, DBDM practices still face significant challenges, especially related to the limitations of relevant data, teacher data literacy, and system integration. Without the support of technology and continuous training, the potential of DBDM to improve educational equity and inclusiveness will not be optimally realized.

On the other hand, structural challenges such as cultural resistance, teacher workload, and the lack of an adaptive training system are still serious obstacles to the widespread implementation of DBDM. Therefore, systemic changes are needed, starting with instilling a reflective culture, strengthening data infrastructure, and reforming teacher and principal training curricula. Based on the results of this study, several recommendations can be put forward:1) Expansion of data-based leadership training programs for principals; 2) Systematic strengthening of teacher data literacy and analytical skills; 3) Development of an inclusive, integrative, and easily accessible education information system; 4) Preparation of education policies based on the results of micro and macro data analysis; and 5) Further research that focuses on the context of developing countries, longitudinal approaches, and the effectiveness of DBDM interventions. With the right strategy, DBDM can become a strong foundation for educational transformation that is efficient, equitable, adaptive, and oriented towards improving the learning outcomes of all students.

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