

Digital Supervision through the Jabar Beraksi Application for Digital Awareness: How a Digital Ecosystem Reshapes Educational Leadership and School Governance?

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Abstract

This study investigates the utilization of the *Jabar Beraksi* application and its contribution to strengthening the digital awareness of school supervisors and principals. The research was conducted in Sumedang Regency, West Java, Indonesia using a qualitative approach with a multiple case study method. 10 participants were purposively selected. Triangulation was used as a data compilation technique, consisting of in-depth semi-structured interviews using the interpretative phenomenological analysis (IPA) framework and observations to investigate the experience of using the *Jabar Beraksi* application in depth. A six-step thematic analysis was used. The findings reveal that; (1) the *Jabar Beraksi* functions as a digital supervision ecosystem by integrating data management, AI-supported analysis, mentoring, monitoring, and continuous feedback. This integration transforms the role of school supervisors from administrative inspectors into facilitators of school improvement and encourages principals to adopt more reflective and evidence-based management practices. (2) The platform not only improves evidence-based school management but also fosters digital awareness through repeated interaction between educational leaders and the digital ecosystem. The study originally proposes that digital awareness is an organizationally constructed outcome rather than merely an individual attribute. Future research should validate this conceptual model using quantitative or mixed-method approaches across broader educational contexts.

1. Introduction

Digitalization has become one of the most influential forces shaping contemporary education systems worldwide (Asmayawati et al., 2024; Bereczki & Kárpáti, 2021; Cortellazzo et al., 2019; Monnier et al., 2023). Across developed and developing countries alike, governments increasingly view digital transformation not merely as a technological initiative but as a strategic pathway to improving educational quality, efficiency, accountability, and equity. The rapid evolution of digital technologies, coupled with the growing demand for data-driven decision making (Manek et al., 2016), has encouraged educational institutions to redesign traditional practices and embrace digital ecosystems that support learning, administration, supervision, and policy implementation. As educational systems become increasingly interconnected with digital technologies, the ability of educational stakeholders to understand, adopt, and utilize digital tools has emerged as a critical requirement for sustainable educational development.

Despite this global momentum, evidence from recent studies suggests that the digital capacity of educational practitioners remains uneven. Research consistently reports that many educators demonstrate low to moderate levels of digital competence, particularly in areas related to digital content creation, technology-enhanced problem solving, and pedagogical integration of digital tools (Basilotta-Gómez-Pablos et al., 2022; Garzón-Artacho et al., 2021). While teachers often possess basic operational skills for using digital technologies, they frequently encounter difficulties when attempting to integrate these technologies into their professional responsibilities in meaningful and pedagogically effective ways (Basilotta-Gómez-Pablos et al., 2022; Garzón-Artacho et al., 2021; Nikou & Aavakare, 2021). This finding suggests that digital transformation in education cannot be understood solely as a matter of technical competence; rather, it also involves broader issues related to perceptions, readiness, attitudes, and awareness regarding the role of technology in educational practice.

The challenge becomes even more pronounced in developing countries, where disparities in infrastructure, training opportunities, and institutional support often constrain the effective adoption of digital innovations (Kinas & Nilawati, 2024; Ruhimat et al., 2025b). Recent studies indicate that many educational practitioners exhibit limited awareness and utilization of available digital tools, despite growing expectations

for technology integration in educational settings (Ličen & Prosen, 2024). Such limitations are particularly concerning because awareness frequently precedes competence. Individuals who recognize the value, relevance, and potential benefits of digital technologies are more likely to engage in learning, experimentation, and technology adoption. Conversely, limited awareness may inhibit the development of digital competence, regardless of the availability of technological resources. Reflecting this concern, Zhang et al. (2026) emphasize the importance of institutional strategies that systematically strengthen digital readiness and foster sustainable digital transformation across educational organizations.

Indonesia represents a compelling context in which these challenges can be observed. As one of the largest developing countries in Asia, Indonesia has placed educational digitalization at the center of several national reform agendas (Ruhimat et al., 2025b; Supriadi et al., 2025). Various initiatives have been introduced to promote data-based planning (Nurbani et al., 2024), digital learning, educational accountability, and technology-supported governance. However, the implementation of these initiatives remains uneven across schools and regions. Existing evidence suggests that many educational practitioners continue to struggle with the effective use of digital technologies. For example, Camarini et al. (2024) found that primary school teachers frequently experience difficulties in utilizing digital applications, with limitations in digital skills emerging as one of the primary barriers. Such conditions not only affect classroom practices but also create broader challenges for educational management and policy implementation.

Beyond teachers, the effectiveness of educational digitalization depends heavily on school leaders and supervisors who are responsible for monitoring, evaluating, and guiding educational programs. In many cases, educational authorities require timely and accurate information regarding the implementation of priority programs at the school level. However, when digital reporting mechanisms are weak or underutilized, governments often encounter difficulties in obtaining objective and real-time information from schools. As a result, important implementation issues may remain undetected, reducing the effectiveness of educational interventions and limiting opportunities for evidence-based decision making. These challenges highlight the importance of digital awareness among school principals and supervisors, who occupy strategic positions in connecting schools with educational authorities and ensuring the successful implementation of reform initiatives.

In response to these challenges, the Center for Educational Quality Assurance of West Java Indonesia developed an innovative digital platform known as the *Jabar Beraksi* in 2021. The name represents the Indonesian phrase *Kerja Bareng, Bersama Akselerasi Wujudkan Sekolah Impian (Jabar Beraksi)*, reflecting a collaborative vision for accelerating educational transformation through digital technology. The platform was designed to strengthen educational supervision, facilitate data-driven monitoring, and support the implementation of priority educational programs across schools. More specifically, *Jabar Beraksi* integrates three major functions: digital monitoring and reporting, data-based evaluation, and supervision of national educational priority programs in primary and middle school level; Merdeka Curriculum, deep learning, character building, and school planning based on the *Rapor Pendidikan*. Through this platform, supervisors and school leaders can monitor school progress, document activities, submit reports, evaluate performance, and communicate educational data directly to district, provincial, and national authorities. Consequently, the platform has become an important instrument for promoting transparency, accountability, and evidence-based educational governance.

Although *Jabar Beraksi* has been implemented for several years and has begun to attract attention from other regions in Indonesia (BBPMP of West Java, 2025), empirical research investigating its utilization remains extremely limited. Little evidence is available regarding how the platform influences the digital awareness of its primary users, particularly school supervisors and principals. This limitation is significant because digital transformation initiatives often succeed or fail not merely because of technological design, but because of how educational actors perceive, understand, and engage with the technology itself. In other words, understanding digital awareness is essential for explaining why some digital innovations become embedded in professional practice while others remain underutilized.

Furthermore, a review of recent literature reveals a notable research gap. Previous studies have predominantly focused on teachers, university lecturers, and pre-service educators, with considerable attention devoted to digital competence, digital literacy, and technology integration (Basilotta-Gómez-Pablos et al., 2022; Garzón-Artacho et al., 2021; Zhang et al., 2026). Comparatively little attention has been directed toward educational leaders, particularly school principals and supervisors, despite their strategic role in driving organizational digital transformation. Moreover, the concept of digital awareness remains substantially underexplored compared to the more established constructs of digital competence and digital literacy. Consequently, there is a need for empirical studies that investigate how educational leadership actors develop digital awareness through engagement with digital governance platforms.

Therefore, this study aims to report the implementation of a recent educational digitalization innovation in West Java, Indonesia, namely the utilization of the *Jabar Beraksi* application by school supervisors and

primary school principals. Specifically, this study addresses two research questions: (1) How is the *Jabar Beraksi* application utilized in educational supervision and school management processes? and (2) How does the use of the *Jabar Beraksi* application contribute to the digital awareness of school supervisors and principals? By addressing these questions, the study contributes to the growing literature on educational digitalization, expands current understanding of digital awareness within educational leadership, and provides practical insights for policymakers seeking to strengthen data-driven governance and sustainable digital transformation in schools.

2. Method

2.1. Study Design and Location

The research was conducted in Sumedang Regency, West Java, Indonesia using a qualitative approach (Busetto et al., 2020; Charli et al., 2022) with a multiple case study method. The selection of the location was based on the results of pre-research interviews between the author and the staff of the Sumedang District Education Office, who mentioned an increase in digital awareness among supervisors and school principals after using the *Jabar Beraksi* application. Relevant to the initial context requiring further in-depth investigation, a qualitative approach was chosen due to its suitability for understanding phenomena and people's experiences in depth (Lichtman, 2023; Merriam & Tisdell, 2016). Meanwhile, the multiple case study method was selected because this research was conducted in five primary schools across five sub-districts: Tanjungsari, Pamulihan, Cimanggung, Jatinangor, and Sukasari. Interpretative Phenomenological Analysis (IPA) guided the development of the semi-structured interviews to explore participants' lived experiences in using the application, whereas thematic analysis was employed to identify patterns across participants and cases. Interviews were conducted before, during, and after the supervisors and school principals used the *Jabar Beraksi* application. With this research design, we positioned ourselves as observers without providing any specific treatment or intervention to the participants or their experience processes (Meyer et al., 2023) in using the application. The research conducted in five locations simultaneously allowed heterogeneous findings according to the chronology, cases, and context of each school's resources (Alkaabi, 2021).

2.2. Participant

Purposive sampling is used to select research participants (Palys, 2008). In accordance with the research objectives, the purposive criteria are set (Ahmed, 2024; Denny & Weckesser, 2022) with Table 1.

Table 1. Purposive Criteria

No	Aspect	Inclusion	Exclusion
1	Role	School supervisor and School principal	Teacher, school's staff
2	Experience	Have used the <i>Jabar Beraksi</i> application in 6 months or more	Have used the <i>Jabar Beraksi</i> application under 6 months
3	Knowledge	Understand the national educational priority programs in primary school level; Merdeka Curriculum, deep learning, character building, and school planning based on the Rapor Pendidikan.	Have not understand the national educational priority programs in primary school

Point 1, which is to avoid teachers and school staff, is intentionally done because they do not have access permission to the *Jabar Beraksi* application. Point 2 is set as a criterion because the relevance of participants' experiences to the data intended to be collected according to the research questions is necessary. Meanwhile, point 3 is an additional special criterion that we have established. Because without adequate knowledge of the priority programs, the statements are believed to deviate from the content of the *Jabar Beraksi* application. Finally, referring to Table 1, 10 people were designated as research participants. They consist of 5 school supervisors and 5 school principals. They are all assigned to different locations as showed in Table 2.

Table 2. Participants Distribution

Role	District in Sumedang Regency	Name of Primary School
Supervisor and school principal which is meet purposive criteria	Sukasari	Primary State School 1
	Tanjungsari	Primary State School 2
	Jatinangor	Primary State School 3
	Cimanggung	Primary State School 4
	Pamulihan	Primary State School 5

The participants consisted of five school supervisors and five school principals representing five public primary schools located in Sukasari, Tanjungsari, Jatinangor, Cimanggung, and Pamulihan Districts. All participants had used the *Jabar Beraksi* application for at least six months and were directly involved in

implementing and supervising national educational priority programmes. Their demographic and professional profiles are presented in Table 2.

2.3. Instrument and Data Collection

The data in this study is the factual trace of participants' usage and experience with the *Jabar Beraksi* application. By translating the data in that specific sense, two instruments were developed to collect data - using 2 indicators of digital awareness proposed by Abou Hashish & Alnajjar (2024) and Buchan et al. (2024), namely intention to use the application and attitude in application utilization. The first instrument is an observation instrument used to collect evidence of the usage pattern of the *Jabar Beraksi* application. Second, the in-depth semi-structured interview instrument (Belina, 2023; Bingham & Witkowsky, 2021) developed with the interpretative phenomenological analysis framework to explore the meaning behind the experience (Eatough & Smith, 2017) of using the *Jabar Beraksi* application in depth. The use of in-depth semi-structured interview techniques and integrated observation, weaving a triangulation model in the data collection process. Allows each finding to test and sort each other from the data collection stage (Dahal, 2025).

2.4. Data Analysis

The thematic analysis technique is adopted in this research. The technique is used to analyze the scripts from the in-depth semi-structured interviews of the participants and the observation results. In addition to considering the methodological perspective put forward by Dahal (2025), that thematic analysis is suitable for qualitative research, the choice of this technique is also reinforced by its consistency with the types of data being processed and the research questions to be answered (Åkerblad et al., 2021; Charli et al., 2022).

Thematic analysis is conducted thru 6 stages as explained by Ahmed et al. (2025), including; (1) Familiarization with the data, (2) Generating Initial Codes, (3) Searching for Themes, (4) Reviewing Themes, (5) Defining and Naming Themes, and (6) Writing the Report. The results of the data analysis are presented in a descriptive narrative with table has supported. Then, the research findings are discussed and interpreted with relevant previous literature.

2.5. Research Duration and Ethical Approval

The research was conducted over 125 days, from January 27 to June 1, 2026. The conceptualization to the preparation of research instruments was carried out over 15 days. Interviews and observations took 81 days because the research was conducted in five primary schools simultaneously, and data analysis and report preparation took 29 days. Internationally applicable research ethics are strictly adhered to throughout all stages of the research (Bredal et al., 2024).

The research permit was issued by the Dean of the Faculty of Education, Universitas Pendidikan Indonesia (UPI) number 3367/UN40.A1/PK.03.03/2026, in connection with the first author's thesis preparation task. In the context of participant involvement, they were chosen not only because they met the purposive criteria (Table 1) and the relevance of their roles but also because of their willingness to contribute. Interviews were conducted only by appointment based on a schedule mutually agreed upon between the researcher and the participants (Belina, 2023; Demirci, 2024). To ensure the principle of anonymity, in the report section, the real names of each participant are replaced with subject codes, using 'P1' for participant 1, 'P2' for participant 2, and so on. P1-P5 are school supervisors, and P6-P10 are School Principals.

3. Results and Discussion

3.1. Results

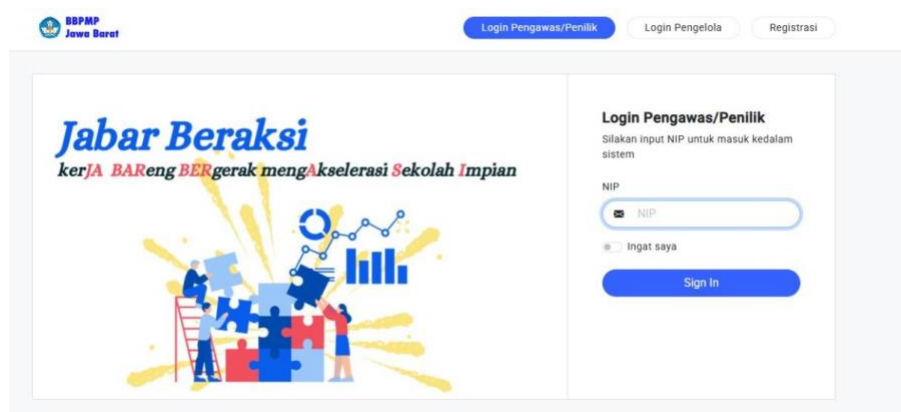
The results of the thematic analysis we conducted have shown that the use of the *Jabar Beraksi* application has encouraged the integration of primary school supervision into a systematic digital platform, shifting the role of supervisors from examining administrative documents to becoming school mentors for data-driven changes, improving school governance to be more evidence-based, and fostering a culture of using technology for controlling and making educational decisions in schools. The results of the thematic analysis are shown in Table 3, which are further reported in detail narratively, as a transparency of the sources of participant statements that have been categorized into codes.

Table 3. Thematic Analysis Results of the Utilization of the *Jabar Beraksi* Application

Theme	Conceptual Meaning	Sub-Theme	Code	Participant
Application Usage Workflow	Integration of supervisory functions within a systematic digital platform	Login and access to the digital platform	Teachers access the application using personal accounts	P1, P2, P7
		Determination of the supervisory focus	Selection of the supervision priority by the principal	P1, P4
		Data input	Collection of qualitative data and evidence	P2, P5
		Evidence-based analysis	Automated summary of school conditions	P3, P8
		Preparation of monitoring and evaluation programs	Intervention recommendations based on school needs	P4
		Monitoring and evaluation activities	Supervision is conducted periodically	P5
Benefits for Supervisor and Principal Performance	Transformation from administrative supervision to evidence-based supervision	Evaluation of supervision implementation	Data-driven decision making	P1, P5
		Evidence-based supervision	Reduction of administrative workload	P2
		Adaptation and development	Data-based decision making	P3
		Transparency and accountability	Interactive and contextual interventions	P4, P2
			Documentation of all supervision activities	P5
Benefits for School Management	Strengthening evidence-based school governance	Support for reflective decision making	More measurable reporting	P6
		Quality of school collaboration	Continuous evaluation	P7
		School management and governance	Improved problem-solving	P8, P10
		Professional school profile	Basis for preparing school programs	P9
		School management	Evidence-based decision making	P10
Enhancing Digital Awareness of Supervisor and Principal	Development of digital awareness for school monitoring and control	Intention to use the application	Increased willingness to use the application	P2, P7
		Attitude toward application utilization	Positive attitudes toward the use of digital technology	P4, P9

3.1.1. Application Usage Workflow

The analysis results show that the use of the *Jabar Beraksi* application follows a systematic digital supervision cycle. School supervisors begin the process by accessing the application using their respective accounts (see Figure 1).

**Figure 1. Display of Login Page in *Jabar Beraksi* Application**

After successfully entering the Civil Servant Identification Number (NIP) and logging in, the supervisor can then see the list of supervised schools. On this page, they can directly select the supervised schools and the focus of the priority programs to be monitored. Look at Figure 2.

Tampil 10 data

Search:

NPSN	Nama	Kecamatan	Kab/Kota	Keterlaporan	Tindakan
20208619	SD NEGERI CILEUTIK	Tanjungsari	Kab. Sumedang	-	Pelaporan Raport Mutu Detail
20208763	SD NEGERI SUKAMANTRI	Tanjungsari	Kab. Sumedang	-	Pelaporan Raport Mutu Detail
20208772	SD NEGERI CILULUK I	Tanjungsari	Kab. Sumedang	-	Pelaporan Raport Mutu Detail
20208794	SD NEGERI CILULUK II	Tanjungsari	Kab. Sumedang	-	Pelaporan Raport Mutu Detail
20208817	SD NEGERI MARGAJAYA	Tanjungsari	Kab. Sumedang	-	Pelaporan Raport Mutu Detail
20208836	SD NEGERI HEGARMANAH	Tanjungsari	Kab. Sumedang	-	Pelaporan Raport Mutu Detail
20208841	SD NEGERI JAYASARI	Tanjungsari	Kab. Sumedang	-	Pelaporan Raport Mutu Detail
20246339	SD NEGERI CIKANDANG	Tanjungsari	Kab. Sumedang	-	Pelaporan Raport Mutu Detail
20254623	SD ISLAM TERPADU ASMAUL HUSNA	Tanjungsari	Kab. Sumedang	-	Pelaporan Raport Mutu Detail

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Figure 2. Display of List of School for Supervisor in *Jabar Beraksi* Application

This stage helps supervisors to prepare a more focused supervision agenda. A primary school supervisor (P1) expressed, "Now we no longer come to the school just to check the administration". Before going to the field, we have already seen the focus of the assistance that needs to be provided thru the application. In the next stage, supervisors input quantitative and qualitative data regarding the school's condition, obstacles, best practices, and support needs. The system then processes the data using Artificial Intelligence (AI) technology, resulting in a more easily understandable summary of the school's condition. This finding was identified from P3, who explained: "The AI resume allows us to understand the main issues of the supported schools more quickly". We no longer have to sift thru each report one by one, which are very numerous. The results of the AI analysis then serve as the basis for developing specific support strategies tailored to the needs of the school. The entire process is concluded with regular monitoring and evaluation, ensuring that supervision is ongoing.

3.1.2. Benefits for Supervisor and Principal Performance

The utilization of *Jabar Beraksi* application present a significant changes to the practice of educational supervision. Supervisors no longer function merely as administrative inspectors but have transformed into change facilitators who help schools improve the quality of education. P1 stated: "Our role feels different". We spend more time discussing and providing solutions rather than just checking the completeness of documents. At the same time, the digitalization of reporting also reduces the administrative burden. As a result, supervisors can allocate more time to focus on coaching. P2 explained: "Our work has become more efficient". The time that was usually spent preparing reports can now be used to engage in dialog with the principal and teachers. In addition, supervision becomes more objective because all decisions are based on the data available in the system. According to P3: "If previously we relied heavily on personal experience, now the mentoring decisions are stronger because they are supported by data collected in the application". Supervisors also feel an increase in transparency and accountability because all supervisory activities are recorded digitally. This finding is very valuable because for a long time, in schools in Indonesia, reports often did not match the facts on the ground. Thus, the treatment of school supervisors experiences a resistance to accuracy. On the other hand, with the *Jabar Beraksi* application, the accuracy of reports containing factual school data automatically improves.

3.1.3. Benefits for School Management

For school principals, the *Jabar Beraksi* application provides support that is more relevant to the actual needs of the school. The coaching program is no longer general but is tailored to the specific conditions of each educational unit. One of the principals - P6, stated: "The support we receive now is more aligned with the issues we actually face at school". This statement is linked to observational findings that prove the existence of a special column in the *Jabar Beraksi* application to report real conditions in schools, including the problems currently faced by school management. This means that the statement P6, which includes "the assistance becomes more aligned with the issues", actually occurs because the supervisors have first understood the problems inputted in the *Jabar Beraksi* application column (see Figure 3).

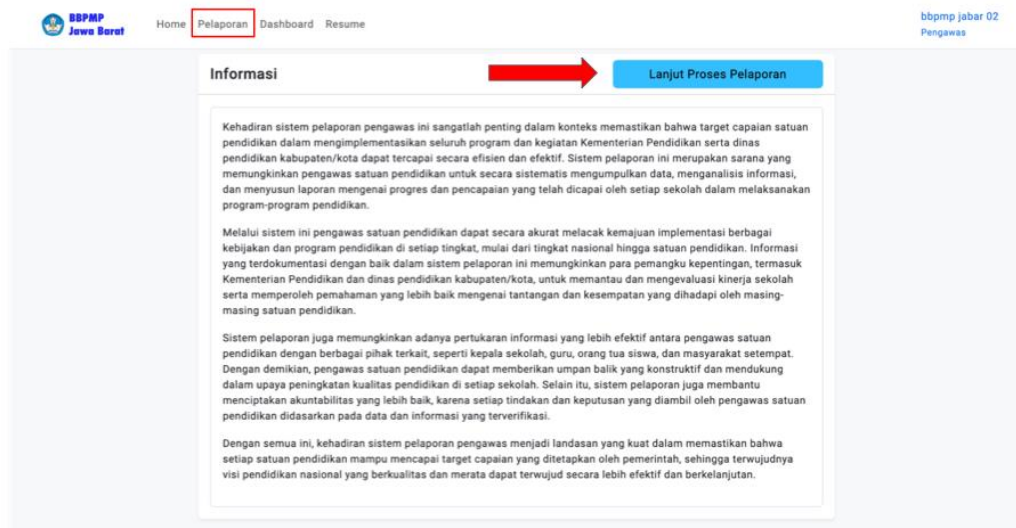


Figure 3. The Column for Input Real Data of School Condition

In different primary schools, the *Jabar Beraksi* application is also considered to have encouraged a culture of reflection and continuous improvement. P7 explained: "We can see what is already good and what needs to be improved. The guidance becomes clearer in its direction". This situation makes the areas for improvement that need to be prioritized clearer. In addition, the relationship between the supervisor and the principal has also become more collaborative. P8 stated: "Discussions with supervisors now focus more on solutions and school development strategies". Indicating that this application has successfully mediated collaborative problem-solving efforts. Another aspect, namely the availability of a more comprehensive school profile, helps schools develop work programs and determine the priorities of school work programs for the next period. In line with this finding, P10 provided a statement that further reinforced it: "The data we report serves as the basis for developing the next program, so school decisions are no longer based solely on estimates". By making data the basis for decision-making, the decisions made by the school management are potentially more effective and sustainable.

3.1.4. Enhancing Digital Awareness of Supervisor and Principal

Another important finding is that the use of the *Jabar Beraksi* application has increased the digital awareness of supervisors and school principals. This digital awareness is reflected in the increased willingness to use the application and the formation of a positive attitude toward technology utilization. At the beginning of the implementation, some participants viewed the application merely as a reporting medium. They were also influenced by previous traditions that tended to carry out professional activities manually. However, after experiencing its benefits, there was a desire to continue utilizing the *Jabar Beraksi* application in school supervision and management activities.

P2 stated: "Initially, we thought this was just a reporting application, but after using it, it turned out to help our work. Now we actually feel the need to open it to see the development of the fostered schools. The principal (P7) also stated: "We have become accustomed to preparing school data in digital format because reports and mentoring now largely refer to applications". Where this statement emphasizes the transition of school leaders from partial manual work to a more systematic and easily monitored work reporting pattern. That progress is then very valuable in ensuring better readability of report data and enabling follow-up recommendations to be structured more effectively. In addition to increasing the intention to use the application, *Jabar Beraksi* also fosters a positive attitude toward the use of technology in educational governance. P4 explained: "We are more confident using digital data because the information that emerges is more complete and easier to analyze". In line with P4, P9 added: "Now we no longer wait for manual reports". We are more comfortable using the data presented in the application to monitor the progress of the school program.

The increase in digital awareness then developed into a culture of data-based school management reporting. Supervisors and principals are becoming increasingly accustomed to systematically documenting school achievements, challenges, and needs. P5 stated: "With this application, we are encouraged to ensure that every activity has clear supporting data". Meanwhile, P10 added: "The data we report serves as the basis for developing the next program, so that school decisions are no longer based solely on estimates". The use of AI-based dashboards and resumes in the *Jabar Beraksi* application also strengthens the controlling function over priority education programs. Supervisors and school principals can monitor the progress of program implementation quickly and accurately. P3 explained: "It is easier for us to monitor whether the priority programs are running or not because the indicators are clearly visible in the application". On the other hand, P8

shared his experience as a school supervisor: "For school principals, this application helps ensure that the targets of educational programs are continuously monitored and evaluated". Both deep learning, the implementation of the Merdeka curriculum, and school planning based on the Education Report can all be clearly reported and monitored.

These findings indicate that *Jabar Beraksi* not only produces technical transformations by becoming the epicenter for school mentoring but also fosters a digital culture in data-driven school supervision and management. The four themes form an interconnected conceptual framework. The digitization of supervision thru the *Jabar Beraksi* application creates a more systematic work process, strengthens the performance of supervisors, improves the quality of school management, and ultimately builds digital awareness among supervisors and school principals (see Figure 4).

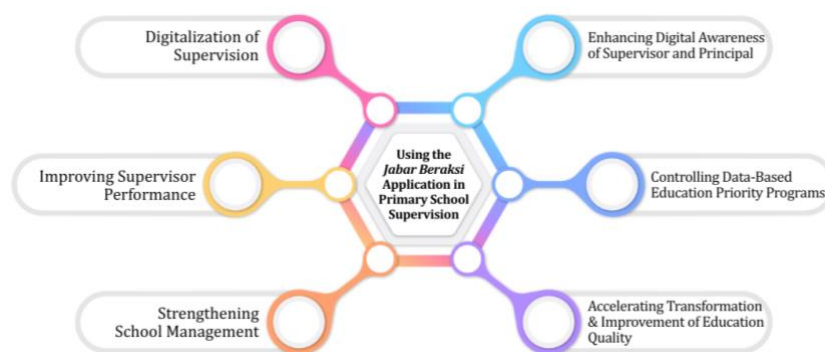


Figure 4. Conceptual Model Founded

The model in Figure 4 shows that the *Jabar Beraksi* has evolved not just as a reporting application, but as a digital supervision ecosystem that encourages supervisors and school principals to develop a data-driven, technology-adaptive, and quality-oriented educational management culture.

3.2. Discussion

3.2.1. Summary of the Main Findings

This study demonstrates that the *Jabar Beraksi* application has evolved beyond a digital reporting platform into a system that supports evidence-based educational supervision and school management. Four major findings emerged. First, the application organizes supervision into a systematic digital workflow. Second, it transforms supervisors from administrative inspectors into mentors and facilitators of school improvement. Third, it strengthens school management through reflective and data-driven decision making. Finally, continuous engagement with the platform enhances the digital awareness of supervisors and principals. Collectively, these findings suggest that educational digitalization is not merely a technological process but also an organizational and cultural transformation.

3.2.2. Expanding Educational Digital Innovation: *Jabar Beraksi* as a Digital Supervision Ecosystem

The findings indicate that *Jabar Beraksi* should be understood as a digital supervision ecosystem rather than a conventional reporting application. Previous studies have emphasized that digital leadership and educational supervision should be integrated to support organizational transformation and strengthen collaboration within schools (Aldawood et al., 2019). The present study extends this perspective by showing that digital supervision can operate through an ecosystem consisting of data integration, AI support, mentoring, monitoring, and continuous feedback.

The first element, data integration, allows supervisors and principals to work from a shared evidence base. School conditions, implementation barriers, and educational priorities are systematically documented, reducing the gap between administrative reports and field realities. This process strengthens evidence-based governance and supports more contextual interventions. The second element, AI support, helps educational leaders identify priority issues through automated summaries and analytical assistance. The findings suggest that AI does not replace professional judgment but augments supervisors' capacity to understand school conditions and formulate appropriate responses. This observation is consistent with recent arguments that successful AI integration in education depends on adaptive leadership and digital mindsets rather than technology alone (Pietsch & Mah, 2025).

The third element is mentoring. Participants reported that supervisors now spend more time discussing problems and identifying practical solutions than checking documents. This finding supports the growing view that educational supervision should promote reflective learning, collaboration, and professional growth (Ruhimat et al., 2025a). It also complements research of Petit et al. (2023) which shows that digital supervision can maintain meaningful professional relationships when technology is designed to facilitate interaction rather than administrative control.

The fourth element is monitoring. Through digital dashboards and structured reporting systems, the application enables continuous observation of educational priorities and school progress. Similar to the findings of Sanoto et al. (2024), digital supervision improves efficiency and overcomes traditional barriers such as distance and complex reporting procedures. However, this study further suggests that monitoring becomes part of an integrated governance process rather than a separate administrative activity.

The final element is continuous feedback. Educational supervision is no longer conducted as a periodic event but as an ongoing cycle of documentation, evaluation, and improvement. This process resembles the flexibility and communication advantages highlighted in remote supervision research (Opesemowo et al., 2025), where technology supports sustained guidance despite organizational and geographical constraints. These five interconnected functions demonstrate that *Jabar Beraksi* is not simply an educational information system. It is a digital supervision ecosystem that integrates technological infrastructure with professional interaction and organizational learning, creating conditions for sustainable educational improvement.

Nevertheless, the findings should also be interpreted with caution because the sustainability of a digital supervision ecosystem depends on several organizational and technological conditions. The increasing reliance on digital platforms and AI-assisted analysis may introduce challenges related to data quality, user dependency on automated recommendations, and unequal digital readiness among educational leaders. Without adequate digital competence, continuous professional support, and institutional commitment, digital supervision risks becoming a compliance-oriented reporting mechanism rather than a tool for meaningful school improvement. Therefore, the effectiveness of *Jabar Beraksi* should not be attributed solely to technological capabilities but also to the capacity of supervisors and principals to critically interpret digital information and integrate it into reflective leadership practices. These considerations suggest that successful digital ecosystems require a balance between technological innovation and human professional judgment.

3.2.3. The Promising Significance of *Jabar Beraksi* for School Management and Educational Governance

The findings also demonstrate that the digital supervision ecosystem contributes to stronger school management. Previous studies have largely examined how technology improves teachers' digital competence and instructional practices (Dang et al., 2024; Rasdiana et al., 2024). Comparatively less attention has been given to the influence of digital ecosystems on managerial practices among educational leaders. The evidence generated in this study suggests that *Jabar Beraksi* encourages a more evidence-based approach to school governance. Supervisors understand school conditions before conducting mentoring activities, allowing guidance to become more contextual and responsive to actual needs. Consequently, school improvement programs are developed based on documented realities rather than assumptions. The application also promotes reflective management and collaborative problem solving. School leaders become more capable of identifying strengths, weaknesses, and priority areas because school conditions are systematically documented and evaluated. In addition, the platform provides a common source of information that strengthens communication among supervisors, principals, and educational authorities.

Another important implication concerns accountability and transparency. Participants perceived that digital documentation improved reporting accuracy and reduced inconsistencies between administrative records and actual school conditions. Such findings support the argument that digital culture and technology leadership play important roles in strengthening educational quality and organizational performance (Rasdiana et al., 2024). Overall, the significance of *Jabar Beraksi* extends beyond operational efficiency. The application supports the development of educational governance that is increasingly reflective, collaborative, evidence-based, and accountable.

3.2.4. Digital Awareness as a Product of Repeated Human-Digital Ecosystem Interaction

The most significant contribution of this study concerns the understanding of digital awareness. Existing literature has primarily discussed digital competence, digital literacy, and technology integration, while digital awareness among educational leaders remains relatively underexplored. Moreover, digital awareness is often treated as an individual disposition. The findings of this study suggest a different perspective. The multi-case evidence indicates that digital awareness develops through repeated interaction between human actors and a digital ecosystem. Initially, many participants viewed *Jabar Beraksi* merely as a reporting requirement.

However, continuous engagement with the platform gradually changed their perceptions. As supervisors and principals repeatedly experienced the practical benefits of data integration, AI support, mentoring, monitoring, and continuous feedback, they developed stronger intentions to use digital technologies and more positive attitudes toward technology-supported educational management. This finding complements the concept of digital mindset proposed by Pietsch and Mah (2025), but also extends it by suggesting that digital awareness can itself be cultivated through sustained technological engagement. In other words, digital transformation does not only require awareness; meaningful interaction with digital ecosystems can also produce awareness.

The findings additionally resonate with broader discussions on digital readiness and the digital divide. Research suggests that successful digital transformation depends not merely on technological access but also on users' readiness and capability to engage with digital environments (Van De Werfhorst et al., 2022). The experiences of the participants indicate that practical organizational experiences can gradually reduce resistance to technology and strengthen adaptive digital behavior. An equally important observation is that digital awareness extends beyond individual attitudes and becomes part of organizational culture. Participants became more accustomed to documenting school activities systematically, monitoring educational programs continuously, and using evidence to support managerial decisions. Thus, repeated interaction with the digital supervision ecosystem gradually embedded technology into everyday professional practice.

3.3. Implications

This study offers several implications for educational policy and practice. First, educational digitalization initiatives should move beyond infrastructure provision and prioritize ecosystems that integrate technology with authentic supervisory functions such as mentoring, monitoring, and continuous feedback. Second, school supervisors and principals should be recognized as strategic actors in digital transformation because their practices influence organizational culture and school governance. Strengthening their digital capacities may generate broader institutional impacts than technology interventions that focus exclusively on classroom instruction. Third, the findings demonstrate that artificial intelligence can support educational leadership when it functions as an analytical partner that strengthens rather than replaces human expertise. Finally, digital awareness should become an explicit objective of educational reform because sustainable digital transformation depends on repeated meaningful engagement with digital ecosystems and the development of positive organizational attitudes toward technology.

3.4. Originality and Contribution

This study contributes to the international literature in several ways. First, unlike most previous studies that focus on teachers' digital competence, this research examines the digital transformation experiences of school supervisors and principals, two educational actors that remain relatively underrepresented in the literature. Second, this study introduces the concept of a digital supervision ecosystem, arguing that effective digital supervision is built upon the integration of data integration, AI support, mentoring, monitoring, and continuous feedback. This perspective broadens previous discussions that primarily view digital supervision as a technological efficiency mechanism. Third, the study proposes that digital awareness is the result of repeated interaction between human actors and digital ecosystems. Rather than treating digital awareness solely as an individual characteristic, the findings highlight its organizational and experiential dimensions. Finally, this study demonstrates that digital supervision ecosystems do more than improve administrative efficiency. They reshape supervisory practices, strengthen school management, cultivate digital awareness, and create the conditions necessary for evidence-based educational governance. These findings suggest that sustainable educational digitalization is fundamentally a cultural and school organizational process, not merely a technological one.

3.5. Limitations and Future Research Recommendation

This study should be interpreted in light of several limitations. First, the findings were derived from a qualitative multiple-case study involving only ten participants within one regency in West Java, which may limit transferability to other educational contexts. Second, the study focused exclusively on school supervisors and principals, without incorporating the perspectives of teachers, students, or policymakers who may also influence the implementation of digital supervision ecosystems. Third, the proposed conceptual model has not yet been quantitatively validated. Future research should examine the model using larger and more diverse samples across different regions and educational levels, employ mixed-method or longitudinal designs, and investigate causal relationships among digital supervision, digital awareness, organizational culture, and educational governance outcomes.

4. Conclusion

This study demonstrates that the *Jabar Beraksi* application has evolved beyond a digital reporting tool into a digital supervision ecosystem that supports educational supervision and school management. The findings reveal that the application integrates data management, AI-assisted analysis, mentoring, monitoring, and continuous feedback into a unified supervisory process. This integration transforms the role of school supervisors from administrative inspectors into facilitators of school improvement and encourages principals

to adopt more reflective and evidence-based management practices. Furthermore, the multi-case evidence indicates that digital awareness among supervisors and principals is not merely an individual attribute but develops through repeated interaction with a meaningful digital ecosystem. This study therefore contributes to the growing literature on educational digitalization by proposing that sustainable digital transformation is fundamentally an organizational and cultural process rather than simply a technological one. The findings also highlight the strategic potential of digital supervision ecosystems to strengthen educational governance, promote data-driven decision making, and support continuous school improvement. Future research should validate this conceptual model using quantitative or mixed-method approaches across broader educational contexts.

Author Contributions

Iyam Siti Maryam: Conceptualization, Methodology, Investigation, Writing - Original draft preparation, and Writing - Reviewing and Editing. Cepi Triatna: Methodology, Data curation, Visualization, and Validation. Nani Hartini: Software, Supervision. All authors contributed equally to this paper. All authors have read and approved the final manuscript.

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Data Availability

The datasets generated during and/ or analyzed during the current study are available from the corresponding author on reasonable request.

Declaration on AI Use

The authors declare that no artificial intelligence (AI) or AI-assisted tools were used in the preparation of this manuscript.

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