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DATA INTEROPERABILITY OF EMIS, SIMPATIKA, AND DAPODIK IN MADRASAH MANAGEMENT: A DOCUMENT AND LITERATURE REVIEW

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Abstract

Educational data management plays an important role in supporting effective madrasah management. EMIS, Simpatika, and Dapodik have different functions in educational data collection, making the connection between these systems important to examine. This study aims to analyze the functions of the three systems, the potential for interoperability, and its benefits for madrasah management. The research uses a qualitative method with a document review and literature study approach. Data were collected from journal articles, books, policy documents, and relevant official sources, then analyzed descriptively. The findings indicate that differences in the functions of EMIS, Simpatika, and Dapodik create a need for more coordinated data management. Interoperability has the potential to reduce repetitive data entry, improve information consistency, and support decision-making. However, its implementation requires data standardization, information synchronization, coordination among system managers, and data security protection. Therefore, interoperability among these three systems can support more effective madrasah management when accompanied by appropriate governance and technical support.

Keywords: *Data Interoperability, EMIS, Simpatika, Dapodik, Madrasah Management.*

INTRODUCTION

Developments in information technology have brought changes to educational administration, including madrasah management. Using information systems helps educational institutions manage data on learners, educators and education staff, and the institutional information needed to support administrative activities and decision-making. Well-managed data can become a basis for madrasahs to prepare plans, determine needs, carry out programs, and evaluate the results of educational management. Therefore, the accuracy and coherence of data are important aspects in supporting the effectiveness of madrasah management.

In the provision of education in Indonesia, several information systems are used by ministries according to their authority. The *Education Management Information System* (EMIS) is used for educational data collection within the Ministry of Religious Affairs, including madrasahs, while the Basic Education Data system (Dapodik) is used for educational data collection within the Ministry of Primary and Secondary Education. In addition, Simpatika was previously used to support the administration of madrasah educators and education staff. However, in January 2025, the Ministry of Religious Affairs announced the transition from Simpatika to EMIS 4.0 GTK Madrasah. This change shows that educational data management continues to develop in line with administrative needs and prevailing policies (Kementerian Agama Republik Indonesia, 2025).

Although each system has different functions and management environments, the need for accurate and consistent educational data is an interrelated issue. Differences in data formats,

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update mechanisms, and administrative procedures can cause obstacles when information must be matched or used by different parties. If data management is not well coordinated, administrative processes risk repeated data entry, inconsistent information, and delayed data updates. These conditions can affect operators' work efficiency and the accuracy of information used in madrasah decision-making.

One concept relevant to meeting this need is data interoperability. Interoperability is the ability of information systems to exchange data and use the exchanged information in a structured way in line with prevailing standards and provisions. In the educational context, interoperability relates not only to the technical ability of systems to connect with each other but also includes the consistency of data meaning, information quality, clarity of authority, and the security of its use. Thus, interoperability needs to be understood as part of educational data governance, not merely the merging of applications.

Studies on educational data integration show that coordination and information verification are important aspects in supporting data synchronization. The study by Yanto and Hamdi (2025), for example, discusses the integration of Dapodik, EMIS, and Dukcapil data to support the synchronization of school participation rates in Muaro Jambi Regency. The study shows obstacles in the form of limited internet networks, incomplete or inconsistent data, and problems in updating information. These findings give a picture that data integration requires technical support and coordination among managers. Nevertheless, findings in that regional context cannot be directly generalized to all madrasahs in Indonesia.

Based on this, discussing the interoperability of EMIS, Simpatika, and Dapodik is important for understanding differences in system functions, opportunities for data exchange, its benefits for madrasah management, and the obstacles that need attention. This study also needs to consider the change in Simpatika's position after the transition to EMIS 4.0 GTK Madrasah so that the analysis remains in line with developments in educational data collection systems. Using a document and literature review approach, the study seeks to identify principles, opportunities, and challenges of interoperability based on relevant sources, without assuming that all these systems have been fully integrated.

This study aims to analyze the functions and positions of EMIS, Simpatika, and Dapodik in educational data management, examine opportunities for interoperability in supporting madrasah management, and identify its benefits, challenges, and strengthening strategies. The results are expected to provide an understanding of the importance of standardization, validation, institutional coordination, and data protection in realizing more effective and responsible educational information management.

METHODS

This study uses a qualitative approach with a *library research* design through a document and literature review. The study aims to analyze the functions, opportunities, and challenges of the data interoperability of EMIS, Simpatika, and Dapodik in madrasah management. Data sources were obtained from scholarly journal articles, books, policy documents, and official publications of government agencies relevant to educational data collection systems.

Data were collected through searching, selecting, and documenting sources based on their relevance and credibility. The data were then grouped by theme, covering system functions, interoperability opportunities, data quality, benefits, and implementation challenges. The analysis was carried out descriptively through data reduction, information display, comparison across sources, and drawing conclusions. The results of the analysis were used to identify interoperability opportunities and obstacles and to formulate strategies for strengthening data management in madrasah management.

DISCUSSION

Differences in the Functions and Positions of EMIS, Simpatika, and Dapodik in Madrasah Management

Based on the document and literature review, educational data management in Indonesia involves information systems with different functions, scopes, and authorities. EMIS (*Education Management Information System*) is used by the Ministry of Religious Affairs to support the collection of religious education data, including madrasahs. Dapodik (Basic

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Education Data) is the educational data collection system within the Ministry of Primary and Secondary Education. Meanwhile, Simpatika was previously used to manage the administration of madrasah educators and education staff. These functional differences show that educational data management depends not only on the existence of applications but also on the suitability of the information managed by each system.

EMIS plays a role in providing information related to the provision of madrasah education. The data managed can support administrative needs, the mapping of institutional conditions, and the formulation of education policy. Dapodik has a similar role within the educational data collection environment managed by the Ministry of Primary and Secondary Education. Both systems have interests related to the quality of educational data, but they cannot be assumed to have entirely the same scope, procedures, and management mechanisms. This difference is one reason it is important to study data interoperability (Kementerian Agama Republik Indonesia, 2025).

In the context of madrasah management, the existence of information systems should not be seen merely as a means of fulfilling administrative obligations. The data collected need to be usable to support the planning, organizing, implementation, and evaluation of educational programs. Information on learners, educators, education staff, and institutional conditions can help managers understand madrasah needs in a more focused way. However, these benefits depend heavily on the accuracy, completeness, and currency of the information available.

The position of Simpatika needs to be understood based on the latest policy developments. The Ministry of Religious Affairs announced that EMIS 4.0 GTK Madrasah replaced Simpatika in January 2025. The transition took effect together with the start of data collection for the even semester of the 2024/2025 academic year. Thus, Simpatika is better discussed as part of the development of madrasah teacher and education staff (GTK) administration systems, while GTK data management after the transition needs to be linked to EMIS 4.0 GTK Madrasah (Kementerian Agama Republik Indonesia, 2025).

This change shows that the integration of administrative functions can be achieved through developing systems that already exist. However, merging functions within one platform does not automatically mean that all education systems across ministries are connected. Therefore, interoperability analysis needs to distinguish between the integration of functions within one system environment and data exchange among agencies. This distinction is important so that the discussion does not conclude that interoperability has been fully achieved merely because applications have been updated or functions merged (Pemerintah Republik Indonesia, 2019).

Results of the Comparative Review of System Functions and Interoperability Potential

Table 1. Comparison of Educational Information System Functions and Interoperability Potential

Aspect	EMIS	Simpatika	Dapodik
Management environment	Ministry of Religious Affairs	Previously within the Ministry of Religious Affairs	Ministry of Primary and Secondary Education
Main function	Collection of religious education data, including madrasahs	Madrasah GTK administration before the transition	Collection of educational unit data within Dapodik's scope
Current position	Covers GTK data management through EMIS 4.0 GTK Madrasah	Replaced by EMIS 4.0 GTK Madrasah in 2025	Remains the educational data collection system within the relevant ministry
Relevant opportunities	Provision and management of madrasah education data	Study of changes and continuity in GTK administration	Exchange of educational information according to needs and authority
Points to note	Validity, updating, and standardization of data	Adjustment of processes and data management after the transition	Data conformity, validation, and exchange mechanisms

Source: Compiled from official documents of the Ministry of Religious Affairs of the Republic of Indonesia (2025) and information on educational data collection systems

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The table shows that it is not appropriate to treat the three system names as three applications that currently hold equal positions. Simpatika's functions have been transferred to EMIS 4.0 GTK Madrasah, so discussion of current systems needs to focus on EMIS and Dapodik, while Simpatika remains relevant for explaining the development of madrasah GTK data administration.

From this comparison, interoperability can be understood through three aspects. First, the technical aspect, namely the ability of systems to exchange data through appropriate mechanisms. Second, the semantic aspect, namely a shared understanding of the meaning and structure of information. Third, the institutional aspect, namely the existence of rules, authority, and responsibilities that allow data to be used legitimately. These three aspects need attention because technical data exchange does not necessarily produce information that is consistent or immediately usable.

Thus, the comparison of system functions becomes the basis for determining which information needs to be connected, not for merging all data without consideration. Interoperability needs to be developed based on real needs, appropriate standards, and the limits of managers' authority. This approach is more realistic for madrasah management than assuming that all applications must be merged into one system.

Opportunities for EMIS–Dapodik Interoperability in Educational Data Management

Opportunities for interoperability between EMIS and Dapodik can be seen in the need to exchange information involving educational units in different management environments. Both systems play a role in educational data collection, so the information they manage can be related in certain processes. However, this relatedness of information needs does not always mean that all data can be exchanged automatically.

The study by Yanto and Hamdi (2025) on the integration of Dapodik, EMIS, and Dukcapil data to support the synchronization of school participation rates in Muaro Jambi Regency gives a picture of the importance of coordination in cross-agency data management. The study explains that integration efforts were carried out through coordination among data managers and periodic verification. It also found several obstacles, including limited internet networks, incomplete or inconsistent data, and problems in updating learner data that can lead to double recording. These findings show that integration problems relate not only to technology but also to work procedures and data quality (Yanto & Hamdi, 2025).

These findings are relevant to understanding madrasah management needs because educational data are often used by more than one party. When each agency collects data according to its own procedures, differences in information can arise if there is no adequate matching mechanism. For example, a change in a learner's status or a move from one educational unit to another requires an accurate update so that the information used does not differ between records. Nevertheless, the results of the study in Muaro Jambi Regency cannot be directly taken to represent all madrasahs in Indonesia. The study focused on a regional context and particular data synchronization needs. Its findings are more appropriately used to identify problems that may arise in data integration, not as evidence that all madrasahs experience the same problems or that all systems have been integrated nationally.

For madrasah management, interoperability opportunities can be directed at clear needs, such as matching educational unit identities, verifying learner data, and supporting administrative processes that require cross-system information. This development needs to be based on available official mechanisms and the approval of the authorized parties. If data exchange is carried out in a standardized way, administrative processes have the potential to become more efficient and the risk of inconsistent information can be reduced.

Thus, opportunities for interoperability between EMIS and Dapodik need to be understood as an effort to build targeted information exchange. Its success is determined not only by the ability of applications to communicate with each other but also by the suitability of data, clarity of purpose, and coordination among the institutions that manage them.

Standardization and Data Quality as the Basis of Interoperability

Standardization is an important element of interoperability because each system needs a clear reference to recognize and understand the data being exchanged. In educational management, differences in writing formats, institutional identities, reference codes, and

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information structures can make data matching difficult. Therefore, information exchange requires standards that allow data from various sources to be understood consistently.

This principle is in line with the One Data Indonesia policy, which stresses the importance of data standards, metadata, interoperability, and the use of reference codes and master data. In the educational context, this principle provides a basis for building data governance that is accurate, up to date, integrated, and accountable. Standardization functions not only to unify formats but also to help explain the meaning of data, the source of information, and the terms of its use.

For example, if two systems hold information about an educational unit in different identity formats, a mechanism is needed to ensure that both records refer to the same institution. Without an appropriate matching mechanism, data can be recorded twice or paired incorrectly. Something similar can happen with learner data when identity or administrative status is not updated consistently.

However, standardization alone is not enough to guarantee data quality. Information in a uniform format can still contain errors if entry is careless or updates are late. Therefore, validation needs to be part of the data management process. Validation can be carried out through completeness checks, identity matching, tracing information sources, and correcting data that do not match.

This analysis shows that interoperability and data quality influence each other. Data exchange can help improve information consistency, but the quality of the exchange still depends on the source data. If the initial information is inaccurate, the integration process can instead spread errors to other systems. Therefore, strengthening interoperability needs to be accompanied by validation procedures and clear assignment of responsibility to each data manager.

Benefits of Interoperability for the Effectiveness of Madrasah Management

Interoperability has the potential to improve the effectiveness of madrasah management by simplifying administrative processes and improving the use of information. One expected benefit is a reduction in repeated data entry. When the same information is needed in several administrative processes, standardized data exchange can reduce the need to re-enter information manually. Operators can then focus more on checking, updating, and validating data.

Another benefit is improved information consistency. Data managed separately can differ when updates are made at different times. Through clear matching and updating mechanisms, these differences can be identified and corrected more easily. Nevertheless, consistency does not occur automatically. Managers still need to determine the reference data source, correction procedures, and the party responsible for changes in information (Mutmainah et al., 2025).

Interoperability also has the potential to support data-based decision-making. Madrasah heads need adequate information to plan activities, estimate resource needs, and evaluate program implementation. Accurate and easily checked information can help managers understand the institution's condition more comprehensively. Conversely, incomplete data or data that differ across records can hinder planning and reduce trust in the information used.

However, these benefits need to be understood critically. Connected systems do not necessarily make work faster if the exchange procedures are complicated or the available data are of poor quality. Therefore, the success of interoperability should be evaluated through measurable indicators, such as reduced repeated entry, fewer recording errors, improved accuracy of updates, and the timely availability of needed information.

Thus, interoperability is better positioned as a means of strengthening madrasah governance, not as an end in itself. Technology can ease access to and exchange of information, but its benefits depend on managers' ability to ensure data quality and use it appropriately to support managerial decisions.

Technical, Institutional, and Data Security Challenges

Implementing interoperability faces technical challenges related to differences in format, data structure, validation mechanisms, and infrastructure capability. Not all systems are developed with the same information structure. Therefore, data mapping is needed to determine which information can be exchanged, which data need to be adjusted, and which information is

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not relevant to share. This challenge becomes even more important when data exchange involves systems managed by different agencies.

The study by Yanto and Hamdi (2025) shows that limited internet networks, human resource capability, and data inconsistency can hinder synchronization. These findings show that technology development needs to be accompanied by infrastructure support and improved operator capability. A well-designed system can still encounter obstacles if users lack adequate access or do not yet understand data management procedures.

From an institutional perspective, differences in authority between the Ministry of Religious Affairs and the Ministry of Primary and Secondary Education require clear coordination. Information exchange needs an agreed basis, purpose, and procedure. Without a clear division of responsibility, data errors can be difficult to trace because it is unknown who is responsible for entry, validation, or updating information.

Another challenge relates to security and the protection of personal data. Educational data can include information on learners and educators that must be managed with attention to privacy rights and personal data protection provisions. Therefore, data exchange needs to consider the purpose of use, access authority, and information security in accordance with Law Number 27 of 2022 on Personal Data Protection. Interoperability must take into account the purpose of use, access authority, and the data protection provisions in force. Access-rights settings, securing the exchange process, and recording activity are steps that need to be considered to reduce the risk of inappropriate use of information.

Thus, interoperability challenges cannot be resolved merely by adding application features. An approach is needed that combines technical readiness, institutional coordination, operator competence, and information protection. The balance between ease of data exchange and access control is an important condition for interoperability to support madrasah management responsibly.

Strategies for Strengthening Interoperability in Madrasah Management

Based on the review, strengthening interoperability can begin by identifying the data exchange needs most relevant to madrasah management. Not all information needs to be connected across systems. Setting priorities should consider administrative benefits, user needs, managers' authority, and the risks that may arise. A staged approach can help ensure that integration is developed based on real needs, not merely a desire to merge all applications.

The next step is to strengthen data standardization and validation. Each piece of information exchanged needs a definition, identity, and format that the receiving system can recognize. Checking procedures are also needed so that incomplete or inconsistent data can be corrected before use. In this way, interoperability can support information quality while reducing the risk of duplication and recording errors.

Strengthening inter-agency coordination is also an important part. System managers need clarity about the types of data that can be exchanged, the purpose of use, update schedules, and correction procedures. At the madrasah level, operators need guidance and training to understand data collection and validation processes according to their authority. Adequate technical support is also needed to help users when problems arise in data management.

In addition, the implementation of interoperability needs to be evaluated periodically. Evaluation can be done by measuring changes in administrative completion time, the frequency of repeated entry, the number of data inconsistencies, and the accuracy of information updates. These indicators can help determine whether the mechanisms applied truly provide benefits or still need improvement (Pusat Data dan Teknologi Informasi, Kementerian Pendidikan Dasar dan Menengah, n.d.).

Finally, developing interoperability must follow changes in prevailing policies and systems. Simpatika needs to be positioned as part of the historical development of madrasah GTK management, while discussion of current systems needs to consider EMIS 4.0 GTK Madrasah and Dapodik. This approach helps keep the analysis accurate and avoids recommendations that do not match the state of educational data collection systems.

Overall, the review shows that interoperability has the potential to strengthen madrasah management through improved administrative efficiency, information consistency, and support for decision-making. However, these benefits depend on standardization, data quality, inter-agency coordination, human resource readiness, and information protection. Therefore, developing interoperability needs to be carried out in a staged, measurable way in line with

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authority so that educational information systems can be used optimally to support madrasah management.

CONCLUSION

Based on the document and literature review, the data interoperability of EMIS, Simpatika, and Dapodik has the potential to support the effectiveness of madrasah management through improved administrative efficiency, information consistency, and data-based decision-making. However, Simpatika was replaced by EMIS 4.0 GTK Madrasah in 2025, so current interoperability studies need to consider the development of that system. Implementing interoperability requires standardization, data validation, inter-agency coordination, human resource readiness, and personal data protection. This study provides an understanding of the opportunities and challenges of educational data exchange and underlines the importance of focused data governance. Therefore, strengthening interoperability needs to be carried out in stages according to needs and authority so that it can support madrasah management that is more effective, accurate, and responsible.

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