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Digital Governance-Informed Instructional Design Framework for Madrasah Education: A Systematic Literature Review

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Abstract

The current era of modern Madrasah (Islamic schools) mandates their capacity to show not only effective learning outcomes but also their performance in public accountability aligned with digital governance. Nevertheless, the process of administrative digitization and instructional processes are conducted separately, leaving performance management scattered across these two areas. The present study intends to come up with an integrated conceptual framework that can effectively combine the concepts of Digital Governance (DG) and Instruction Design (ID). Using a Systematic Literature Review methodology (from 2015 to 2025) and Conceptual Design-Based Research approach, the study made use of a Boolean search string containing key terms like ("Digital Governance" or "Public Accountability") and ("Instructional Design" or "Data-Driven Learning") and "Madrasah". In total, out of 1,450 identified literature, a PRISMA-based screening technique yielded 55 studies after applying certain inclusion criteria such as peer-reviewed English language articles. In this way, DG-ID Integration Framework is designed by developing four major pillars consisting of data governance in relation to accountability; digital infrastructure and its alignment to policy; ID-informed pedagogical modalities; and stakeholders' e-participation.

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INTRODUCTION

The international call for digital transformation in the field of public administration has radically changed the educational institutions on a global level and obligated them to introduce technology not only as an organizational instrument but also as a tool that would increase both accountability and pedagogical performance (Ayoub et al., 2025; Atabekova et al., 2025; Hashim et al., 2022; Saeed & Taher, 2026). Educational institutions, especially those from developing countries, are confronted with the need for introducing innovative teaching methods that would correspond with the skills needed by students in the 21st-century while meeting growing accountability requirements from the public sector. This requirement is especially pertinent to religious institutions that are required to develop digital governance that would be based on technology while preserving their culture and religious beliefs. Islamic schools, commonly known as Madrasah, have a vital role in shaping characters and delivering general national education in many Muslim countries, such as Indonesia (Hidayah, 2021; Laksana, 2014; Mas'ud et al., 2019; Thoha et al., 2023). These institutions

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face dual pressures: the need to modernize pedagogy to meet 21st-century competencies and the demand for stronger public accountability and administrative efficiency (Aparac-Jelušić & Kurbanoglu, 2019; Corboş et al., 2024). This disconnection hinders instructional advancement from being strategically guided by institutional performance data, resulting in systemic inefficiencies and stagnated quality progress (Demartini et al., 2024; Souto-Otero & Beneito-Montagut, 2016).

Digital governance (DG) can be viewed as the extension of e-government with the addition of the concepts of transparency, participation, and performance incorporated in digital technologies (Romanelli, 2021; Tavares et al., 2016). Within the realm of education, digital governance is not only concerned with the transformation of bureaucratic operations but also with the capacity to generate metrics that would serve as indicators for the assessment of the quality of instruction (Trinidad, 2023; Zeide, 2017). Hence, the efficiency of DG depends greatly on the consistency between digital systems and organizational policy that seeks to align administrative data systems with learning data systems to avoid silos (Kaffenberger & Hwa, 2024; OECD, 2022). Consequently, each decision that is made during pedagogical design is guided by valid data (data-driven design), which is the key to maintaining data integrity and earning the trust of people (Boateng et al., 2024; Law & Liang, 2020; Triyoga et al., 2025). On the other hand, using the DG and ID synthesis approach allows for the concept of performance accountability to evolve into the assessment of the contributions made by learning interventions to the attainment of institutional goals (Murray et al., 2015; Nnorom et al., 2023). Thus, the success of digital governance is no longer measured by the sophistication of hardware, but rather by the extent to which the technology improves the quality of pedagogical interactions and learning outcomes (Asare et al., 2023).

Learning outcomes are made more effective using ID, which is a systematic approach (Cabi, 2021; Pengsuwan & Klunboot, 2025; Wibowo & Saliman, 2025). For example, in ADDIE, there is a continuous improvement where the Analysis stage identifies performance gaps while the Evaluation stage evaluates the success according to specified goals (Karaduman & Akman, 2024; Saritepeci & Durak, 2024). On the other hand, Digital imperative states that ID should consider the advancements in technology and address the data generated from the Learning Management System (LMS) (DeMelo-Cevallos, 2023; Miah et al., 2020; Sajja et al., 2025; Suhono et al., 2025). In this section, it is explained what the main theoretical relation between ID and DG is: the data needed during the Analysis and Evaluation stages of ID are exactly the data that DG needs to manage and provide accountability on (Caliskan et al., 2024).

The current literature offers comprehensive insight into Digital Governance (DG), highlighting transparency, data management, and public reporting within the public sector (Güler & Büyüközkan, 2023; Idrus et al., 2024; Sun et al., 2024). Concurrently, the domain of Instructional Design (ID) provides systematic frameworks to ensure the efficacy and organization of learning experiences (Altin, 2021; Bajracharya, 2019). Several previous studies have explored the digitalization of education in Madrasahs, focusing on the adoption of information technology for bureaucratic efficiency and administrative reporting (Bustamin & Putri, 2022; Putri & Sakapurnama, 2024). In contrast to this administrative approach, studies in Instructional Design (ID) emphasize that educational effectiveness is highly dependent on the quality of pedagogical interactions and the design of the learning environment (Foley & Curtin, 2022). Although the literature on digital learning methods in Madrasahs is growing, a sharp dichotomy exists where digital governance (DG) systems operate within a management framework, while ID quality assurance methodologies operate within an academic framework without coherent integration (Frandani et al., 2024; Habibi et al., 2022). This creates a situation where the abundance of digital data lacks direct relevance to improving classroom instructional quality. Most frameworks implemented in Madrasahs are ad-hoc and not designed to structurally link DG accountability mechanisms with ID quality assurance methodologies (Frandani et al., 2024; Herman et al., 2022). As a result, Madrasah administrators are often trapped in a routine of reporting large amounts of data, but lack practical pedagogical insights for curriculum improvement. An unresolved issue is the lack of an integrated governance paradigm capable of converting administrative data into actionable pedagogical insights under Madrasah-specific regulations (Rokhimawan et al., 2022). There is no conceptual model that explicitly integrates the "accountability logic" of Public Administration with the "learning logic" of Education within a single digital ecosystem aligned with Madrasah institutional values (Ashari et al., 2022; Hamdanah, 2022).

This study addresses this gap by proposing a DG-ID Integration Framework through a Unified Performance Feedback Loop (Zhu, 2025). This framework ensures that data within Digital Governance systems directly contributes to improving instructional design and educational reform in Madrasahs (Rahman et al., 2024). Accordingly, this research aims to formulate a theoretical and practical Digital Governance (DG) and Instructional Design (ID) Integration Framework to facilitate educational reform in modern Islamic schools (Madrasah). By establishing an integrated Performance Feedback Loop, this study seeks to bridge the gap between administrative governance and learning practices in the field.

This study offers three main contributions. First, it develops a conceptual synthesis between Digital Governance, as a branch of Public Administration, and Instructional Design, as a domain within the Learning Sciences, thereby expanding the paradigm of integrated performance accountability in public education beyond traditional bureaucratic boundaries. Second, it adopts a Systematic Literature Review (SLR) approach to construct a robust and evidence-based conceptual model through systematic data triangulation. Third, it provides a practical institutional framework for administrators and policymakers in implementing educational digitalization, positioning pedagogical quality as the primary indicator of governance success and ensuring that technology serves to enhance learning rather than merely fulfilling administrative functions.

METHOD

This research utilizes a Conceptual Design-Based Research (C-DBR) methodology, which is appropriate for constructing a resilient conceptual framework that is theoretically based while addressing practical issues of institutional transformation. The methodology is systematically supported by a Systematic Literature Review (SLR) to ensure evidence-based model development (Ang, 2018; Calderon Martinez et al., 2025; Parida & Brown, 2018). The C-DBR methodology is appropriate for constructing a resilient conceptual framework that is theoretically based while addressing a practical issue (institutional transformation).

Phase I: Protocol for Systematic Literature Review (SLR)

The SLR was conducted using the PRISMA-S method in Scopus and Web Science databases, covering the period from January 2015 to December 2025. The search strategy involved the use of Boolean operators in combining strings within the three main domains: 1) DG/Accountability: ("Digital Governance" OR "Public Accountability" OR "Data Governance"); 2) ID/Pedagogy: AND ("Instructional Design" OR "Curriculum Development" OR "Data-Driven Learning"); and 3) Context: AND ("Madrasah" OR "Islamic Schools" OR "Religious Education" OR "Education in Developing Countries").

A systematic and meticulous screening process was adopted to guarantee the inclusion of high-quality evidence in the SLR synthesis. Inclusion Criteria: Articles from peer-reviewed journals written in English, with a publication date between 2015 and 2025. Academic research considering at least two main domains: Digital Governance, Instructional Design, or Madrasah context. Empirical studies that present quality evidence, insights, or theoretical frameworks related to educational performance management. Exclusion Criteria: Grey literature sources, such as non-peer-reviewed documents, reports, policies, or book chapters. Studies focusing only on Information Technology infrastructure, disregarding digital governance and its impact on education. Papers published beyond the defined time period (2015-2025).

The selection and screening process, which narrowed an initial 1,450 records down to 55 final studies, is illustrated in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart in Figure 1. These 55 articles were then subjected to Thematic Content Analysis to identify fundamental principles of digital governance and isolate universal procedures for instructional design models.

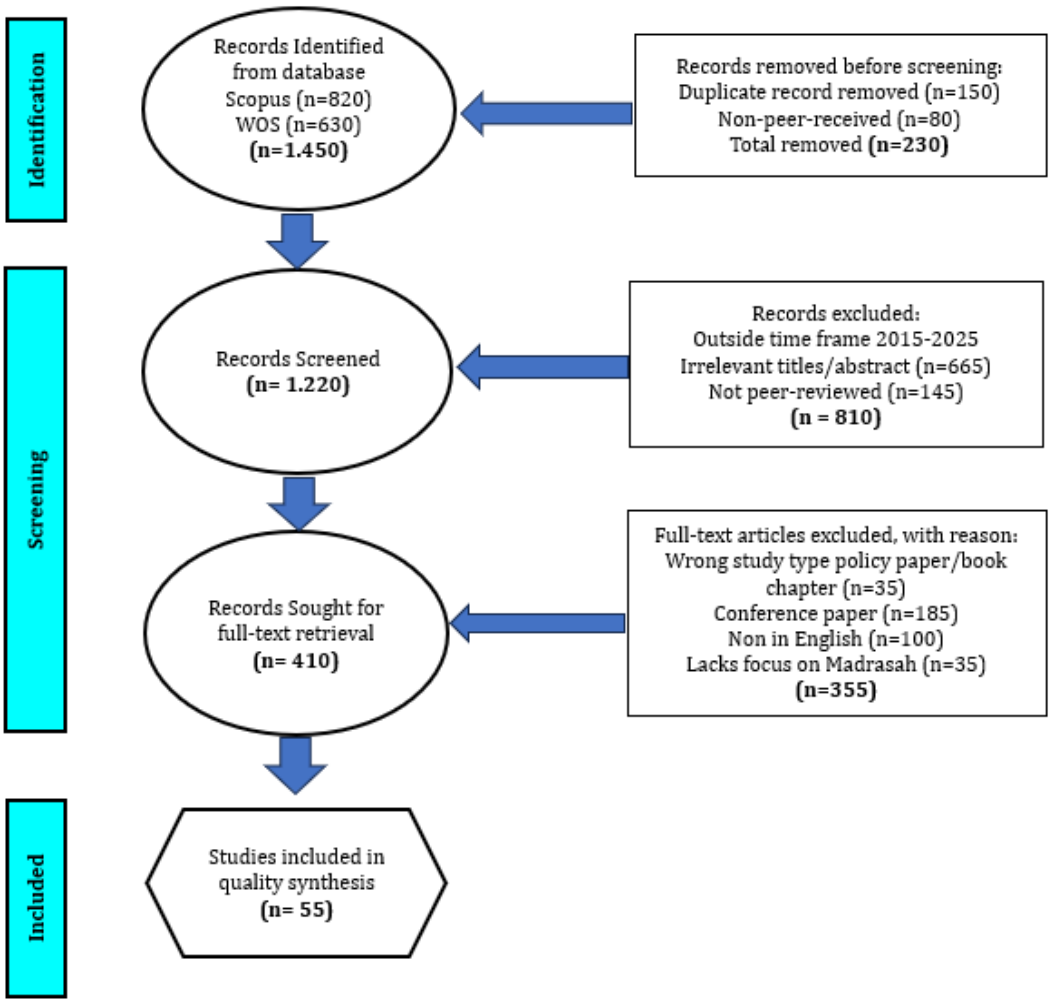

Figure 1. PRISMA Flowchart

The final selection of journal articles (n=55, as enumerated in the References) was subjected to Thematic Content Analysis (Annur et al., 2022; Hamdanah, 2024; Mainuddin et al., 2024). The analysis aimed to: 1) Identify fundamental principles and elements of digital governance (transparency mechanisms); 2) Isolate universal procedures and data prerequisites of identification models; and 3) Map the distinctive challenges and current digital practices within the Madrasah context.

Phase II: Development of the Conceptual Model

The DG-ID Integration Model has been created based on an adaptive synthesis approach. The integration structure has been formulated as a causal feedback loop, with DG output (accountability information) being carefully aligned as input into ID phases such as analysis and assessment. The above-mentioned has resulted in a closed-loop performance management cycle adapted to the Madrasah environment.

Phase III: Rational and Pragmatic Validation

The rational and practical adequacy of the proposed integration model has been tested through expert elicitation. An expert panel consisting of public sector accountability experts, educational technology experts, and Islamic education policy experts evaluated the first draft of the proposed model. Feedback received from the expert panel has been used in further refinement of the model components to ensure soundness of the cycle logic.

RESULTS

Principal Conclusions from Thematic Content Analysis

In this regard, according to the SLR, the lack of strategic alignment of administrative data and pedagogy in implementation is considered the main obstacle to improving the quality of learning in the digital education environment. It should be mentioned that the accountability metrics used in such settings tend to focus on financial responsibility rather than the actual impact on learning, which shows the importance of an integral approach. In order to have an insight into the existing research landscape, the selected literature was grouped thematically and chronologically.

The distribution of selected literature shows that there is a kind of structural imbalance between the existing studies on Digital Governance and Instructional Design, which often proceed independently from each other. Such a pattern prevents current research from connecting the information obtained from administrative data systems with pedagogy practices. In order to illustrate this issue, the selected literature was sorted thematically, proportionally, and chronologically as Table 1.

Table 1. Allocation of Selected Articles by Domain and Year (2015-2025)

Principal Thematic Domain	Quantity of Articles (n)	Proportion (%)	Predominant Publication Year Interval	Rationale for Research Deficiency
Digital Governance and Accountability	18	33%	2019 to 2023	Emphasis on administrative efficiency; data infrequently associated with educational outcomes
Instructional Design (ID) and Pedagogical Frameworks	17	31%	2020 to 2024	Emphasis on methodology (ADDIE, Gagne); insufficient institutional data governance support (ID model lacks overarching governance)
Digitalization in the Context of Madrasah/Islamic Education	12	22%	2018 to 2022	Concentrate on the obstacles to adoption; digitalization remains disjointed and predominantly administrative
Explicit DG-ID Integration or Performance Frameworks	8	14%	2021 to 2025	Critical Gap: These articles recognize the necessity for integration but offer merely conceptual appeals or incomplete, hence necessitating the creation of a full DG-ID Framework.

Table 1 illustrates that Digital Governance and Instructional Design are the most frequently used terms, which comprise 33% and 31%, respectively, of the total body of research. However, despite their importance and prevalence, the two topics seem unrelated, as there is no interrelationship between administrative data management and educational processes. Moreover, research within the context of Madrasah institutions (22%) seems concerned more with the adoption of technology rather than the integration of performance. More importantly, only 14% of the articles try to connect Digital Governance and Instructional Design, indicating that a significant knowledge gap exists.

Exposition of DG-ID Integration Framework

The research presents the DG-ID Integration Framework, conceived as a cyclical, self-enhancing performance management system for madrasah. To visualize the proposed integration mechanism, the DG-ID framework is presented in Figure 2.

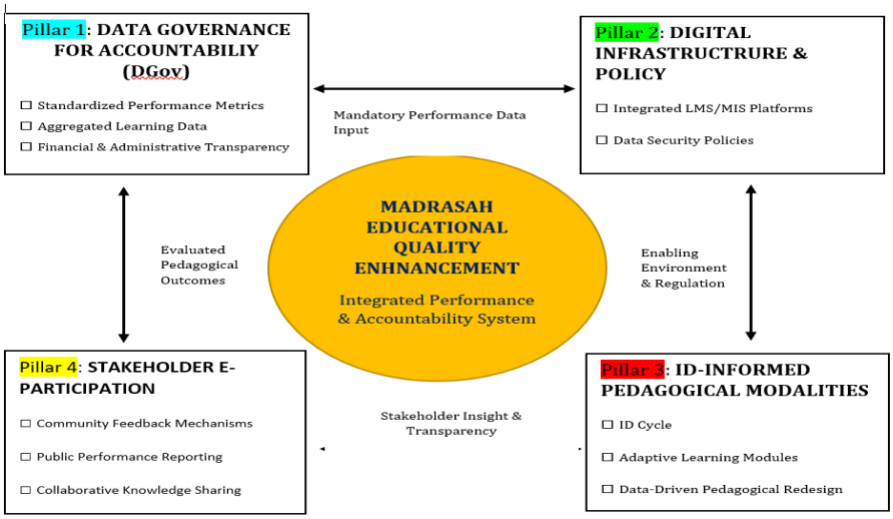

Figure 2. The DG-ID Integration Framework

As shown in Figure 2, the DG-ID Integration Framework is a circular model built on four mutually dependent pillars: Data Governance for Accountability (Pillar 1), Digital Infrastructure and Policy (Pillar 2), Instructional Design-Informed Pedagogical Modalities (Pillar 3), and Stakeholder E-Participation (Pillar 4). The key principle in this model is the feedback cycle between Pillars 1 and 3. For instance, performance data from data governance (Pillar 1) constitutes the principal source for the analysis stage of the instructional design process (Pillar 3). At the same time, intervention results will be reflected in the governance system to enhance accountability reports and decision-making. Pillar 2 represents an enabler level facilitating integration by digital infrastructure and policy alignment. On the other hand, Pillar 4 operates as an external validator that integrates stakeholder e-participation into the system.

The Four Interrelated Pillars

Pillar 1: Data Governance for Accountability (DG Core)

The key focus of this pillar is on the regulation and development of infrastructure to manage educational data as a public good (Boadu et al., 2025; Nel et al., 2023). These aspects are composed of standardizing KPIs in areas of financial operations, administrative tasks, and learning achievements; IDBM, which integrates the administration and learning databases; and RTPA for ensuring accountability to the public. The integration role provides reliable, standardized, and timely data inputs essential in the analysis and evaluation phases of instructional design (Pillars 3).

Pillar 2: Digital Infrastructure and Policy (DG Enabler)

This pillar guarantees that the foundational environment facilities integration. Elements include the implementation of Integrated Learning Management Systems (LMS), a Policy for Data Security and Ethical Use, and Mandatory Digital Capacity Building for all personnel and instructors. The integrative function establishes a secure, compliant, and universally accessible platform for the digital delivery and governance of instruction (ID and DG).

Pillar 3: Instructional Design-Informed Pedagogical Modalities (ID Core)

This pillar represents the instructional core, emphasizing systematic quality assurance of this learning process (Donough et al., 2025; Shahzad & Lodhi, 2023). Elements include the implementation of a compulsory cyclical ID model, the creation of Adaptive Learning Modules targeting specific learning deficiencies found through data analysis, and the formulation of Standardized Assessment Design directly correlated with institutional KPIs (Bajracharya, 2019; Piliouras et al., 2023). This pillar systematically employs the accountability data from Pillar 1 to initiate Re-Analysis and Re-Design activities, guaranteeing that teaching is grounded in evidence (Laumakis et al., 2019; Lindsay, 2019).

Pillar 4: Stakeholder Electronic Participation (Integration/Digital Governance)

This pillar enhances accountability by integrating an external feedback mechanism, in accordance with DG principles of participation (Macadar et al., 2019; Man & Manaf, 2023). Its key elements include digital feedback mechanisms for students and parents, public reporting of performance data beyond financial disclosures, and collaborative platforms for Open Educational Resources (OER). This integrative function strengthens the legitimacy of the DG system while providing essential qualitative context and external validation for instructional design analysis. To provide a visual representation of the research distribution across thematic domains, Figure 3 illustrates the proportion of studies and highlights the existing imbalance in the literature.

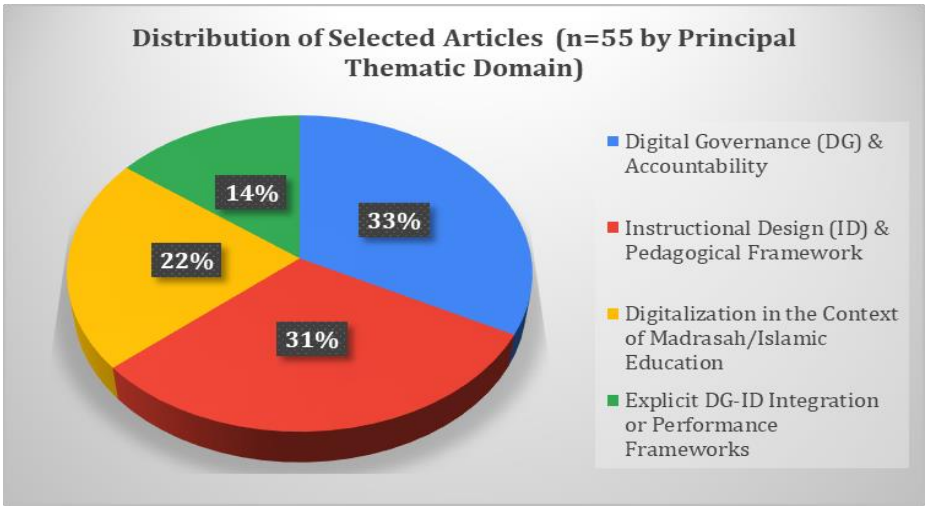

Figure 3. Distribution of Selected Literature by Thematic Domain

It can be seen from Figure 3 below that there is a strong dominance of studies within the Digital Governance domain, followed by the Instructional Design domain. Moreover, the ratio of studies incorporating elements of both domains is rather small. Such visual evidence proves once again that, despite the fact that both domains are quite mature, they do not yet have much integration. It means that there is a very low number of cases where these two domains interact, which, in turn, proves the need to develop the DG-ID Integration Framework.

Discussion

The DG-ID Framework profoundly transforms the function of Digital Governance in education. It is regarded not just as a monitoring instrument but also as a strategic catalyst for educational enhancement. The paradigm establishes a causal relationship by requiring that the result of DG (performance data) be utilized as the necessary input for ID (needs analysis), hence necessitating administrative accountability to directly impact instructional effectiveness. This discovery corresponds with the public sector transition towards Performance Accountability, wherein institutions are evaluated based on measurable outcomes rather than intentions (Koltay, 2016). For Madrasah, achieving financial openness (a DG objective) is insufficient without concomitant transparency in instructional data.

The Strategic Pivot: From Administrative Automation to Digital Pedagogical Catalyst

In synthesizing 55 selected articles and validating the DG-ID Integration Framework, there is an emerging paradigm shift in the context of Madrasah reforms. Digital governance in religious education has always remained within the ambit of "administrative automation," where only the documentation process is automated. Nevertheless, it is contended that for Madrasahs to prosper in the digital era, governance needs to transform into an enabler of quality instruction.

Digital Integration as a Quality Driver

In the realm of e-learning and blended learning, the "Data Governance" pillar (Pilar 1) becomes the basis for educational accountability. While the past systems have considered LMS and MIS as two different aspects of technology, here, there is a requirement for a Technical Interoperability Layer. The system will ensure that the data about student performance can be fed into the education process instantly. For example, any high level of failure rate in a particular module online (Pilar 3) could be identified by the data on the governance dashboard (Pilar 1), which would then prompt a resource change in favor of further teacher training.

Bridging the Accountability Pedagogy Gap in Madrasahs

In particular, Madrasah's unique regulatory environment through the efforts made by the Ministry of Religious Affairs in implementing digital transformation (e.g., EMIS and ERKAM) offers an enabling environment for this proposed model. Pillar 2 of this framework entails the development of the "Digital Infrastructure," which is beyond the procurement of technological gadgets but involves the creation of the "Pedagogical Policy Alignment." This is achieved through the incorporation of educational quality indicators within the accountability framework of the institution, which makes leadership accountable not only for financial aspects but also for enhancing the educational outcomes digitally.

Technological Implications for Online Learning

In the realm of online learning, this paper has added another dimension to Data-Informed Instructional Design. The theory suggests that "Educational Quality" is an inevitable outcome of high-integrity data flow. Through the participation of various stakeholders, such as parents and other members of the community via digital e-participation avenues (Pillar 4), the social accountability system reinforces instructional efficiency. The overall digital environment guarantees that the transformation process of the Madrasah will not be mere window dressing, but rather a transformative approach in pursuit of global standards of education.

It becomes imperative to illustrate how top-tier governance data can be translated into practical instruction in classrooms. This process requires a causal data flow, which is characterized by administrative accountability as the initial catalyst of evidence-based pedagogy. Figure 4 provides the visual representation of the integration process, which demonstrates the flow of data through the ID cycle stages of Analysis, Design, Development, Implementation, and Evaluation, starting from the DG stage.

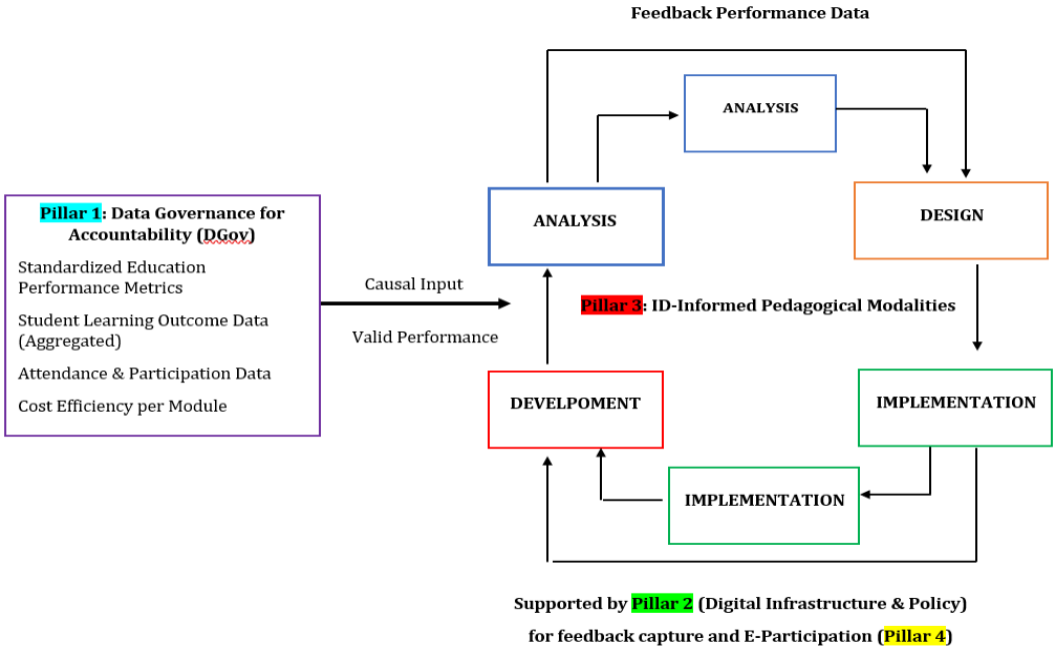

Figure 4. The Causal Relationship Data Flow from DG to ID Cycle Stages

According to Figure 4, the "Analysis" stage in the instructional cycle model does not solely depend on anecdotal findings anymore, but is governed by the "Data Governance" dimension, which ensures the availability of standardized data on the students' performance. This approach helps bridge the disconnect between the accountability requirement imposed by the Madrasah administration and its educational process.

The framework enhances the Public Administration literature by introducing a domain-specific model for performance management. It transcends the broad notions of e-governance (Indrayani, 2023; Mohamad & Halimah, 2024) to demonstrate how the principles of Digital Governance - specifically Digital Governance (Pillar 1) and E-Participation (Pillar 4) - can be implemented to oversee the primary function of an educational public institution (instruction). It confronts the "dark side" of digitalization (Santolamazza et al., 2025; Waheduzzaman & Khandaker, 2022) by integrating accountability protocols directly into the instructional cycle.

The framework offers the essential macro-organizational context frequently lacking in conventional ID Models. The durability and scalability of data-driven ID (Pillar 3) over a whole educational system depend on the institutionalization of DG (Pillars 1 and 2) (Drury et al., 2023). The Framework incorporates ID as a management system rather than merely a design technique.

The Framework holds significant practical ramifications for Madrasah administrators and policymakers (Haddade, 2022; Jaelani & Masnun, 2019). Leaders can substantiate investments in certain digital technologies (Pillar 2) through documented learning deficiencies detected via ID analysis, hence enhancing the efficiency and accountability of public finances (Andronic, 2024; Quang & Tri, 2021; Russo et al., 2022). Professional development for educators must transition from fundamental technology adoption to the mastery of data interpretation (Pillar 1) and the adoption of evidence-based design (Pillar 3), in accordance with the demand for enhanced pedagogical abilities in Islamic education (Arar et al., 2022; Asfiati, 2023). The greater legitimacy provided by E-Participation (Pillar 4) assures that the Madrasah system is attuned to community demands, hence bolstering public trust through transparent reporting of educational outcomes (Annur et al., 2022; Munirah et al., 2022).

In order to formulate the DG-ID Integration Framework into operational policy at an institutional level, operational goals and KPIs need to be set out for every pillar. In this way, the movement towards digital maturity within the Madrasahs will be based on clear criteria in terms of accountability and instruction. Table 2 shows how the DG-ID Integration Framework will be implemented in a practical sense in the Madrasah setting through operational goals, examples of their use, and KPIs:

Table 2. Implementing the DG-ID Framework in Madrasah

Foundation of the Framework	Operational Aim	Exemplary Madrasah Application	Key Performance Indicators (KPIs)
Pillar 1: Data Governance for Accountability	To implement consistent, dependable, and centralized data management for transparent reporting and informed decision-making	Establishment of a Centralized Educational Data Warehouse interconnected with all administrative (financial, staffing) and instructional systems.	Data Accuracy Rate: At least 95% accuracy in student performance data. Reporting Latency: Performance dashboards refreshed within 24 hours after data acquisition. KPI Achievement Rate: The proportion of educational KPIs fulfilled each year.

Foundation of the Framework	Operational Aim	Exemplary Madrasah Application	Key Performance Indicators (KPIs)
Pillar 2: Digital Infrastructure and Policy	To provide resilient, secure, and compliant digital platforms and institutional rules essential for facilitating integration	Compulsory integration of the Learning Management System (LMS) with the Management Information System (MIS). Regulation requiring data-sharing mechanisms and digital competency training.	System Uptime: LMS/MIS availability is at least 99.5%. Digital Proficiency of Staff: 80% of teaching and administrative personnel successfully complete the annual DG/ID certification. Policy Compliance Index: Incidence of data security breaches (should be zero).
Pillar 3: Instructional Design-Informed Pedagogical Modalities	To systematically utilize DG data to analyze performance gaps, design targeted instruction, and evaluate pedagogical efficacy.	Educators must utilize Performance Dashboards, informed by Pillar 1 data, to initiate course Re-Analysis and targeted module Design on a quarterly basis.	Instructional Redesign Cycle Time: Decrease in the duration necessary to amend a course module informed by failure data (from 4 weeks to 1 week). Student Learning Gain (SLG): Quantifiable enhancement in topic proficiency subsequent to ID-based intervention. Review Loop Completion Rate: All instructional units are subjected to formal instructional design review on an annual basis, achieving a 100% rate.
Pillar 4: Stakeholder E Participation	To validate accountability through the integration of external feedback and the enhancement of transparency in the performance reporting.	Initiating an Open Performance Portal for the community and creating specific digital channels for parents and alumni feedback regarding curricular efficacy.	Stakeholder comments Integration Rate: The proportion of external comments formally integrated into the ID Analysis (Pillar 3). Public Transparency Index: Annual issuance frequency of public performance reports. E-participation Rate: The proportion of parents and alumni who actively provide feedback each semester.

This study's originality is in its specific emphasis on the systematic integration of Digital Governance (DG) and Instructional Design (ID) within the distinctive governance framework of Madrasah. To the best of our knowledge, this framework is the first model to create a direct, closed-loop dependency, putting Digital Governance as the catalyst for Instructional Quality Assurance within a particular institutional setting, despite the existence of prior digital frameworks (Abdullah et al., 2025; Maskin et al., 2025; Wedi et al., 2025).

Beyond its theoretical framework, this research offers significant contributions to the broader field of educational digitalization:

1. Strategic Digitalization Architecture. It moves the discourse of digitalization in religious education from mere 'administrative automation" to "strategic pedagogical asset", where digital infrastructure is mandated to support learning outcomes.
2. Data Interoperability for Accountability. This research contributes a technical logic for integrating disparate digital systems (LMS and MIS), ensuring that institutional accountability is measured by real-time pedagogical performance rather than just fiscal compliance.

3. Evidence-Based Digital Transformation. By utilizing a Systematic Literature Review (SLR) to synthesize evidence from 2015 to 2025, this study provides a validated blueprint for policymakers at the Ministry of Religious Affairs (Kemenag) to implement data-driven digital reforms that are culturally and regulatorily aligned with the Madrasah context.
4. Stakeholder E-Participation Model. It extends the concept of digital governance by integrating external feedback through digital channels, fostering a social accountability layer that validates the legitimacy of the digitalized Madrasah system.

LIMITATIONS

The implementation of this particular methodology framework faces numerous limitations due to the nature of both its methodology and context. The proposed integration of the DG-ID Framework is essentially theoretical, since the very design of the study can be classified as an SLR and C-DBR framework. Thus, the actual efficiency of its usage, its feasibility, and its practical impact on the students' performance have not been objectively proven. Furthermore, the framework is characterized by contextual specificity, as its design reflects some unique features of the regulatory environment and management peculiarities that take place in the Indonesian Madrasah. While the core theoretical concepts themselves are applicable on a general level, their practical utilization in other cultures may face some modifications. Finally, the scope of research performed in the frame of the SLR included only the peer-reviewed materials published in the databases Scopus and WoS.

CONCLUSION

This research successfully bridges the gap between fragmented administration, digital governance, and pedagogical practices in Madrasahs with the help of the DG-ID Integration Framework, which is different from previous digital models because it presents a closed loop, specific dependency relationship wherein institutional accountability data directly drives the instructional design process. A systematic literature review comprising 55 peer-reviewed publications (2015-2025) reveals that while digitalization processes in religious education have advanced, they have been limited mainly to administrative automation. In this context, the current research presents a unique architectural solution transforming compliance data into instructional design information.

In sum, the main finding of the current research suggests that the quality of education in the era of technological transformations depends not only on the use of digital means, but, first of all, on data-driven governance with high integrity in accordance with the instructional design process. The DG-ID framework presents a multidimensional model structured through four pillars, ensuring that Madrasah administrators will be responsible for the learning results achieved. Thus, it becomes possible to facilitate the evolution of the educational governance strategy at Kemenag from e-government to educational governance.

On an applied level, this framework equips Madrasah administrators with guidelines to merge the LMS system into the MIS system so that they can foster a culture of making decisions using data. For policymakers, this framework can serve as the foundation to redefine KPIs within the realm of religious education. Nonetheless, this framework is limited due to its conceptual nature. Further studies are needed to empirically validate the framework and explore its impact over time on students' learning outcomes and teachers' digital literacy skills.

AUTHOR CONTRIBUTIONS

MM and TT conceived the initial concept and the theoretical structure. The systematic literature search and data extraction were carried out by MM and RWA. EFG and AU undertook expert consultation and rationalization of the conceptual model. TT and RWA undertook the thematic analysis and constructed the performance indicators. The manuscript was prepared by MM and AU, and all authors participated in revising the final draft and approving it for submission.

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