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E-RANPs: A Data-Driven Digital System for Quranic Recitation (Tasmik) Assessment Management in Primary Islamic Education

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Abstract. The management of Quranic recitation (Tasmik) assessment in primary Islamic education requires systematic and continuous recording to support the monitoring of students' learning progress. However, preliminary observations of Islamic Education teachers' practices in Perlis revealed diverse and fragmented approaches to managing Tasmik records, including record books, physical files, spreadsheets, online sheets, existing digital systems, and mobile applications. A preliminary needs assessment further indicated broad teacher support for a more systematic online solution. This study documents the needs-driven development, contextual adaptation, pilot implementation, and iterative refinement of e-RANPs, a data-driven digital system designed to manage continuous Tasmik assessment in primary Islamic education. The study adopted a Design and Development Research approach involving five stages: preliminary needs assessment, field exploration, system adaptation and development, pilot implementation, and system refinement. Field exploration was conducted in three selected schools to examine existing practices and systems. The development of e-RANPs was informed by an earlier teacher-developed digital Tasmik recording initiative, e-RTR, and subsequently adapted to meet the contextual requirements of schools in Perlis. System development activities included stakeholder engagement, workshops, briefings, and technical development initiatives. The initial pilot involved 20 schools and generated generally positive user responses. Practical challenges primarily involved internet connectivity and access to digital devices, leading to subsequent technical refinements. The findings indicate that e-RANPs represents more than a digital record-keeping platform; it transforms continuous Tasmik assessment records into organised information that supports student progress monitoring, reporting, and data-informed educational management. The study contributes a context-specific model for the digital management of Quranic recitation assessment in primary Islamic education.

Keywords: *data-driven education, digital assessment, educational technology, Islamic education, Quranic recitation, Tasmik assessment*

INTRODUCTION

Digital transformation has changed how educational institutions collect, organise, access, and use information. Its significance extends beyond converting paper documents into electronic formats. Contemporary digital systems can support assessment, monitoring, reporting, teaching, and educational decision-making. However, their value depends on how effectively data are organised, interpreted, and incorporated into professional practice [1].

Digital learning environments have also expanded teachers' access to information about student performance and learning processes. Hase and Kuhl [2] found that digital learning data can inform instructional design and responses to diverse learning needs, although translating available data into instructional action remains a challenge. Thus, digitalisation becomes meaningful when it transforms data into accessible and useful information.

This issue is particularly relevant to Quranic recitation assessment, commonly known as *Tasmik*. Tasmik requires teachers to listen to, observe, and assess students' recitation repeatedly throughout the learning process. These repeated assessments generate longitudinal information about student progress. However, the value of this information depends not only on teacher judgement but also on the mechanisms used to record, organise, retrieve, monitor, and report it.

Preliminary exploration in Perlis indicated considerable variation in how Islamic Education teachers managed Tasmik records. Record books and physical files coexisted with spreadsheets, online sheets, existing digital systems, and mobile applications. This diversity suggested the absence of a fully standardised

mechanism for managing continuous Tasmik assessment information. At the same time, the preliminary needs assessment indicated broad teacher support for a more systematic online solution.

Field exploration was subsequently conducted at three selected primary schools, SK Seri Indera, SRI I, and SK Jejawi, to examine existing practices and identify contextual requirements. The development of e-RANPs was also informed by e-Rekod Tasmik Raudzati (e-RTR), earlier grassroot digital Tasmik recording initiative developed by an Islamic Education teacher in Kedah. Rather than directly replicating e-RTR, e-RANPs involved contextual adaptation, functional expansion, stakeholder engagement, and iterative refinement. The original innovator was subsequently involved as the principal coordinator of e-RANPs.

Development activities included workshops, briefings, stakeholder engagement, and technical development initiatives, supported financially by the Perlis Islamic Religious and Malay Customs Council (MAIPs). An initial pilot involving 20 schools was conducted in February 2026. The pilot generated generally positive responses but also identified practical challenges related mainly to internet connectivity and access to digital devices.

Against this background, the present study positions e-RANPs as a context-specific, teacher-oriented, and data-driven digital assessment management system. Its intended role is to transform continuous Tasmik assessment records into organised information that supports student progress monitoring, reporting, and data-informed educational management.

Research Objectives

This study aimed to develop and document the implementation of e-RANPs as a context-specific digital system for managing continuous Quranic recitation assessment. Specifically, the study sought:

To examine existing practices and needs related to Tasmik assessment recording among Islamic Education teachers in Perlis.

To identify contextual requirements through field exploration of existing Tasmik recording practices and systems.

To document the adaptation and development process of e-RANPs as a digital Tasmik assessment management system.

To examine initial implementation experiences and technical refinements arising from the pilot deployment of e-RANPs.

Research Questions

The study addressed the following questions:

What are the existing practices and needs related to Tasmik assessment recording among Islamic Education teachers in Perlis?

What contextual requirements for a digital Tasmik assessment management system can be identified through field exploration of existing practices and systems?

How was e-RANPs adapted and developed as a context-specific and data-driven digital Tasmik assessment management system?

What initial implementation experiences, practical challenges, and technical refinements emerged from the pilot implementation of e-RANPs?

LITERATURE REVIEW

Digital Transformation and Educational Data

Digital transformation involves changes in organisational processes, information management, and educational decision-making rather than merely replacing paper records with electronic files [3], [4]. Digital systems can support the collection, organisation, retrieval, and use of educational information for assessment and monitoring [1]. The educational value of digitalisation depends on whether data can be transformed into meaningful information and action. This process may be represented as shown in Figure 1:

Figure 1. Digital Transformation Process

This progression is particularly relevant to continuous assessment because repeated assessment generates longitudinal information that may otherwise remain dispersed across different records.

Data-Driven Assessment and Decision-Making

Data-driven decision-making refers to the systematic use of evidence to inform educational judgement and action. Relevant evidence may include achievement, progress, engagement, attendance, and assessment information [5]. However, the availability of data does not guarantee meaningful use. Teacher use of ICT-based data systems is influenced by system characteristics, individual factors, leadership, and socio-cultural context [1]. Hase and Kuhl [2] similarly highlighted the challenge of translating digital learning data into instructional action. For Tasmik assessment, repeated teacher observations can provide valuable evidence of student progress, but only when records can be systematically retrieved, interpreted, and used.

Digital Assessment and Human-Centred Design

Digital assessment systems can integrate repeated assessment information within a common environment, supporting recording, retrieval, progress monitoring, and reporting [6]. Learning analytics dashboards further demonstrate how complex educational data can be presented in accessible forms for teachers and other users [7].

Effective systems should respond to teachers' actual information needs and working contexts. Human-centred development therefore requires attention to users, their practices, and the problems technology is intended to address [8], [9]. Educational design research also emphasises iterative development in authentic settings [10]. These principles are relevant to the transition from e-RTR to e-RANPs. The earlier initiative provided practical knowledge, while implementation in Perlis required contextual adaptation, functional expansion, stakeholder involvement, and refinement.

Digital Technology in Islamic and Quranic Education

Technology has increasingly influenced Islamic and Quranic education through digital resources, mobile applications, artificial intelligence, memorisation tools, and recitation support [11], [12], [13]. Much of this work, however, has focused on learner-facing applications and direct learning support.

Less attention has been given to teacher-facing systems for managing the information generated through continuous Quranic assessment. E-RANPs addresses this gap by connecting teacher-led Tasmik assessment with digital recording, progress monitoring, reporting, and educational management.

Research Gap and Conceptual Positioning

Existing research has established the importance of educational data systems, digital assessment, learning analytics, and human-centred design. Nevertheless, these areas remain insufficiently integrated within continuous Quranic recitation assessment. E-RANPs addresses this intersection through the following pathway as shown in Figure 2.

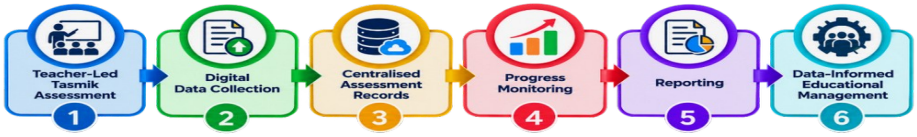

Figure 2. Intersection Pathway of Research Gap

Accordingly, the study positions e-RANPs as a context-specific digital assessment management system rather than merely an electronic record.

METHODS

Research Design

The study employed a Design and Development Research (DDR) approach. This approach was appropriate because the study involved identifying an educational need, developing a context-specific technological solution, implementing it in authentic settings, and refining it based on implementation evidence.

The development process comprised five phases:

Preliminary Needs Assessment

Field Exploration

System Adaptation and Development

Pilot Implementation

System Refinement

Preliminary Needs Assessment

The first phase examined existing Tasmik recording practices among Islamic Education teachers in Perlis and their perceptions of digital recording. The assessment identified diverse practices, ranging from conventional records to spreadsheets and digital applications. It also indicated broad support for a systematic online approach.

Field Exploration

Field exploration was conducted at SK Seri Indera, SRI 1, and SK Jejawi. The purpose was to examine existing Tasmik management approaches and identify contextual and functional requirements for a broader digital system.

System Adaptation and Development

E-RANPs was informed by e-RTR, a teacher-developed digital Tasmik recording system designed to support systematic and centralised management of Quranic recitation data [14]. Development involved contextual adaptation, functional expansion, workshops, stakeholder engagement, implementation briefings, and technical development. The original e-RTR innovator subsequently served as principal coordinator of e-RANPs. Development activities received financial support from MAIPs.

Pilot Implementation

An initial pilot was conducted in 20 primary schools in February 2026. The purpose was to examine implementation under authentic conditions rather than establish causal effectiveness. Initial responses were generally positive, while practical challenges primarily concerned internet connectivity and access to digital devices.

System Refinement

Implementation feedback informed subsequent technical refinement. Figure 3 illustrates the iterative development cycle from development to refinement.

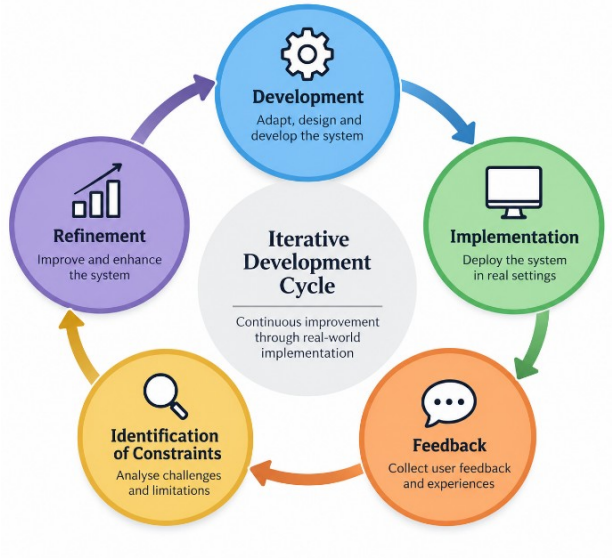

Figure 3. Iterative Development Cycle of System Refinement

Data Sources and Analysis

Evidence was drawn from the preliminary needs assessment, field exploration, development documentation, pilot implementation experiences, user feedback, and technical observations. Needs-assessment information was analysed descriptively to identify dominant practices and perceived needs. Field and development information was examined for contextual and functional requirements, while pilot feedback was analysed to identify recurring implementation experiences and technical challenges. The analysis focused on the development trajectory rather than causal evaluation of effectiveness.

RESULTS AND DISCUSSION

Findings and System Development

Existing Tasmik Recording Practices and Identified Needs

The preliminary needs assessment examined existing Tasmik recording practices and respondents' views towards digital recording prior to the development of e-RANPs. The findings revealed considerable variation in the methods used to record and manage Tasmik assessment information, ranging from conventional physical records to independently adopted digital tools.

A total of 72 responses concerning existing recording practices were analysed. Respondents could report more than one method of recording; therefore, the frequencies for individual methods were not mutually exclusive and the percentages do not total 100%.

Table 1. Existing Tasmik Recording Methods Prior to the Development of e-RANPs

Recording method	Frequency (n)	Percentage (%)
Physical Tasmik record book	43	59.7
Tasmik record form	24	33.3
Tasmik record file	19	26.4
Google Sheets	17	23.6
Microsoft Excel	6	8.3
AppSheet application	1	1.4

Note: Multiple responses were permitted; therefore, percentages do not total 100%.

As shown in Table 1, physical Tasmik record books were the most frequently reported method, used in 43 responses (59.7%). Tasmik record forms were reported in 24 responses (33.3%), while record files were used in 19 responses (26.4%). These findings indicate that conventional physical recording methods continued to play a substantial role in the management of Tasmik assessment information prior to the introduction of e-RANPs.

At the same time, the findings showed that digital recording practices had already begun to emerge. Google Sheets was the most frequently reported digital method, appearing in 17 responses (23.6%), followed by Microsoft Excel in six responses (8.3%). One response (1.4%) reported the use of an AppSheet application. The presence of these digital approaches indicates that some teachers or schools had already taken independent steps towards digitising Tasmik records before e-RANPs was developed.

The needs assessment also examined respondents' views towards digital Tasmik recording. Of the 73 school-level responses collected for this item, five did not provide a response, resulting in 68 valid responses.

Table 2. Respondents' Views Towards Digital Tasmik Recording

Response	Frequency (n)	Percentage of valid responses (%)
Strongly Agree	20	29.4
Agree	34	50.0
50/50	9	13.2
Disagree	5	7.4
Total valid responses	**68**	**100.0**

The findings demonstrate substantial support for digital Tasmik recording. Among the 68 valid responses, 34 (50.0%) agreed and 20 (29.4%) strongly agreed with digital recording. Taken together, 54 of the 68 valid responses (79.4%) expressed a positive view towards digital Tasmik recording. Nine responses (13.2%) indicated a neutral or undecided position, while only five (7.4%) disagreed.

A particularly important finding emerged when respondents' current recording practices were considered alongside their views towards digital recording. While 69.4% of the responses concerning existing practice relied exclusively on physical methods, 79.4% of valid responses to the digital-recording item agreed or strongly agreed with digital Tasmik recording. This contrast reveals a gap between current practice and digital readiness. The prevailing practice remained predominantly physical, yet respondents demonstrated substantial readiness for a transition towards digital recording.

These findings provided the empirical foundation for the subsequent development of e-RANPs as a context-specific digital Tasmik assessment management system. Rather than being introduced solely as a technology-driven innovation, e-RANPs was developed in response to documented existing practices, emerging digital adoption, and respondents' readiness for a more systematic digital recording environment.

Contextual Requirements

Exploration of the three schools demonstrated that existing approaches responded to local requirements but varied in organisation and implementation. The findings indicated that a broader system needed to balance standardisation with contextual usability. Figure 4 shows the process of schools' exploration and observation of the existing approaches by researchers. The system also needed to remain practical for teachers while enabling assessment information to be managed within a more structured environment.

Figure 4. Process of Exploration the Existing Approaches in the Schools

Adaptation from e-RTR to e-RANPs

The transition from e-RTR to e-RANPs represented contextual adaptation rather than simple replication. Practical knowledge from the earlier teacher-led initiative was retained, while the system was adapted for broader implementation in Perlis. Figure 5 illustrates the e-RTR sheets that be adapted to e-RANPs.

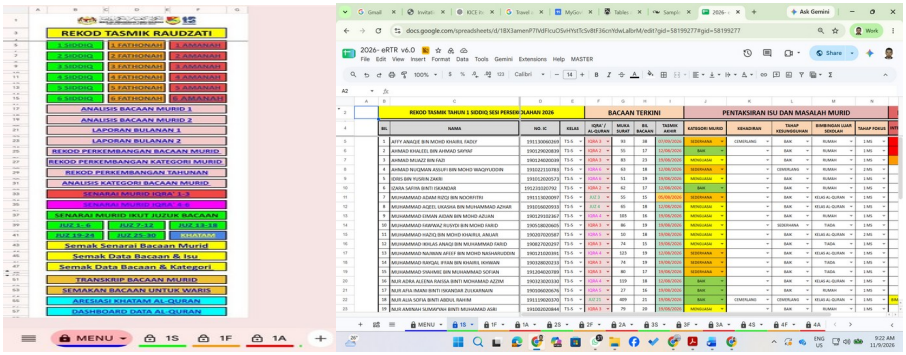

Figure 5. Inter-face of e-RTR Sheets

Functional Development

The system was developed around the following information pathway from the learning process of Tasmik, recording the assessment digitally and monitoring the reporting through online dashboard and analysis as shown in Figure 6. The principal shift was from individual record keeping towards structured assessment information management.

Figure 6. Development of e-RANPs Process towards Structured Assessment

Pilot Implementation and Initial Feedback

Following the development phase, e-RANPs was initially implemented in selected primary schools to examine its practical application within authentic Tasmik assessment settings. The pilot implementation provided an opportunity for Islamic Education teachers to use the system as part of their routine Quranic recitation assessment and recording activities.

Overall, the initial implementation indicated generally positive experiences among users. Teachers were able to use e-RANPs for recording Tasmik assessment information, monitoring students' Quranic recitation progress, and accessing assessment records through digital devices. The implementation also demonstrated the practical potential of the system to support a more structured and accessible approach to managing continuous Tasmik assessment data.

Nevertheless, several practical challenges emerged during implementation. The most frequently observed issues were related to internet connectivity and network stability, particularly when accessing or updating assessment records online. Differences in the availability and suitability of digital devices also influenced the user experience. In addition, users provided suggestions concerning system navigation, accessibility, record retrieval, and several functional features that could further support teachers in managing students' Tasmik progress.

These implementation experiences were not treated as evidence of system effectiveness but rather as formative feedback within the development process. The feedback obtained from users was subsequently used to identify technical and operational areas requiring refinement. Consequently, the pilot implementation served as an important iterative stage between system development and further implementation of e-RANPs.

Iterative System Refinement

The pilot implementation served as a formative stage for identifying practical and technical aspects of e-RANPs that required further refinement. Feedback from actual use in schools was reviewed by the development team and translated into specific functional and technical improvements. The refinement process focused on improving the practicality of Tasmik recording, strengthening the information captured by the system, and resolving identified technical issues. Four main refinements were undertaken following the initial implementation, as summarised in Table 3.

Table 3. Key Refinements to e-RANPs Following Initial Implementation

Area of refinement	Refinement undertaken	Intended purpose
Tasmik recording mechanism	Improved the use of the asterisk (*)	To provide a more teacher-friendly

Area of refinement	Refinement undertaken	Intended purpose
	marker in the recording interface	mechanism for recording students' Quranic recitation progress
Student notes	Added a dedicated notes field	To enable teachers to record relevant issues or circumstances concerning individual students
Achievement and intervention information	Added fields for students' achievement levels and intervention categories	To support more systematic identification and monitoring of students according to their progress and intervention needs
Technical functionality	Corrected identified scripting errors	To improve the reliability and functionality of the system during use

One of the functional refinements involved improving the use of the asterisk (*) marker within the Tasmik recording process. The mechanism was adjusted to make the recording process more practical and teacher-friendly, particularly during routine Tasmik activities.

A dedicated notes field was also introduced to allow teachers to document relevant issues or circumstances concerning individual students. This refinement expanded the function of e-RANPs beyond recording recitation progress alone by allowing contextual information related to students' Tasmik activities to be retained alongside their assessment records.

In addition, fields for student achievement levels and intervention categories were incorporated into the system. These additions enabled assessment records to be organised not only according to students' current recitation progress but also according to their achievement status and identified intervention needs. This refinement strengthened the system's capacity to transform recorded Tasmik data into information that could support subsequent monitoring and intervention planning. Technical refinement was also undertaken through the correction of identified scripting errors. These corrections addressed technical issues encountered during implementation and contributed to improving the operational reliability of the system.

Rather than treating the initial version of e-RANPs as a final product, the development team used implementation experiences to progressively refine its functions and technical components. This iterative process enabled e-RANPs to evolve in response to actual school-based practices and strengthened its contextual suitability as a digital Tasmik assessment management system.

Discussion

From Electronic Records to Data-Driven Assessment Management

The principal contribution of e-RANPs is the transition from electronic recording towards structured assessment data management. A spreadsheet or electronic form may digitise a record without changing how the information is used. E-RANPs establishes a pathway through which repeated assessment evidence can become cumulative information as shown in Figure 7.

Figure 7. Process of e-RANPs Contribution towards Structured Assessment Data Management

This positioning is consistent with data-driven education literature, which emphasises that data acquire educational value through interpretation and use rather than collection alone [1], [5].

Human-Centred and Contextual Development

The findings support the importance of beginning educational technology development with actual user practices. Teachers were already using various tools to manage Tasmik records, indicating an existing professional need rather than a problem created by technology developers. E-RANPs therefore represents a response to existing practice and reflects the human-centred principles highlighted by Wiley et al. [9].

More broadly, the evolution of educational assessment, human-centred learning analytics, and structured human support for data use reinforces the need to preserve professional judgement while strengthening the usability of educational information [15], [16], [17].

Scaling Grassroots Innovation

The relationship between e-RTR and e-RANPs illustrates how teacher-led innovation can inform broader educational technology development. The important mechanism was adaptation rather than replication.

Practical knowledge embedded in the original initiative was retained while system functions were contextualised and expanded. Figure 9 illustrates the adaptation of e-RTR to e-RANPs development.

Figure 9. The Adaptation of e-RTR to e-RANPs Development

Pilot Implementation as Development Evidence

The pilot demonstrated why implementation should be treated as a source of development evidence. Positive initial responses supported the system's contextual relevance, while connectivity and device issues identified conditions requiring technical and operational attention. Thus, technical functionality and implementation feasibility are related but distinct. Educational technology requires both a functional system and appropriate infrastructure.

Preserving Teacher Judgement

A central design principle of e-RANPs is the preservation of teacher judgement within the Tasmik assessment process. The system maintains a clear distinction between assessment judgement and assessment information management. The assessment of students' Quranic recitation remains the responsibility of the teacher, while e-RANPs provides the digital infrastructure for recording, organising, monitoring, and reporting the information generated through that assessment.

This distinction is particularly important in Tasmik assessment, where teachers directly listen to students' Quranic recitation and exercise professional judgement regarding their progress and achievement. E-RANPs does not automate or replace this evaluative process. Instead, digitalisation occurs after the teacher-led assessment, transforming the resulting assessment records into structured information that can be subsequently monitored and reported.

Within this process, human judgement remains at the point of assessment, while digital technology supports the subsequent management and utilisation of assessment information. e-RANPs can therefore be characterised as a form of human-centred assessment with digitally supported information management. This positioning demonstrates that digital transformation in assessment does not necessarily require the automation of professional judgement; it can instead strengthen the information environment surrounding teacher-led assessment.

Contribution to Digital Islamic Education

The development of e-RANPs contributes to the digital Islamic education landscape by extending the role of educational technology beyond applications that interact directly with learners. Much of the digitalisation of Quranic education has centred on technologies that support learning activities, such as digital Quran resources, mobile applications, multimedia learning materials, and technology-assisted Quranic instruction. e-RANPs represents a complementary orientation in which digital technology supports the teacher-facing information management processes surrounding Quranic assessment. These two orientations can be distinguished conceptually as illustrated in Figure 10.

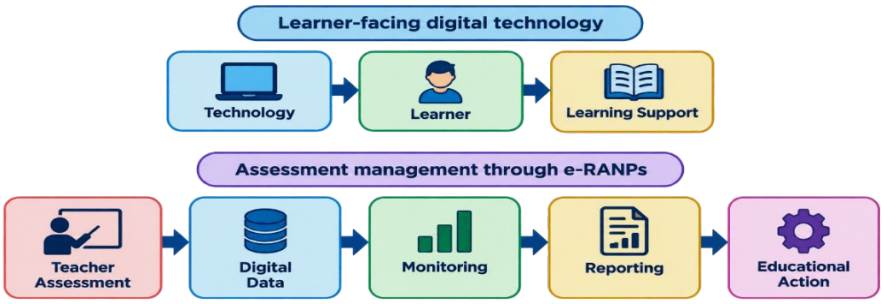

Figure 10. Learner and Teacher Assessment Flows

The distinction does not imply that one orientation is more important than the other. Rather, they represent complementary dimensions of digital transformation in Islamic education. Learner-facing technologies primarily support the learning experience, whereas teacher-facing information systems can strengthen the organisation, monitoring, and utilisation of educational information generated through teaching and assessment practices.

In this respect, e-RANPs broadens the conceptualisation of digital innovation in Quranic education. Its contribution lies not in automating Quranic recitation assessment, but in creating a structured digital information environment around teacher-led Tasmik assessment. This demonstrates how digital transformation in Islamic education can encompass both direct learning technologies and the information systems that support educational practice, monitoring, reporting, and subsequent educational action.

Implications

This study has both theoretical and practical implications for the development of digital assessment systems in Islamic education. Theoretically, the study extends the understanding of Tasmik records beyond their conventional function as documentation of students' Quranic recitation progress. When systematically captured and organised through a digital system, continuous Tasmik records can be viewed as longitudinal educational data that support monitoring, reporting, and subsequent educational action. This perspective positions Tasmik assessment within a broader data-driven educational framework while maintaining teacher judgement as the basis of assessment.

The study also demonstrates how a teacher-led digital innovation can be adapted and developed into a context-specific educational information system. In this respect, e-RANPs connects teacher-led assessment practices with digital data management and educational monitoring within the context of Quranic education.

Practically, the study provides a development pathway grounded in actual educational needs and implementation contexts. Figure 11 illustrates that the development of e-RANPs was not driven solely by technological possibilities. Instead, it began with existing Tasmik practices, incorporated contextual exploration and adaptation of an existing teacher-developed initiative, and continued through pilot implementation and iterative refinement.

Figure 11. The Development of e-RANPs System

The study therefore provides a practical example of how digital assessment management systems in Islamic education can be developed through a needs-driven, context-sensitive, and iterative process. Such an approach may provide useful guidance for similar educational digitalisation initiatives in which existing teacher practices and assessment data need to be systematically transformed into information for monitoring, reporting, and educational action.

CONCLUSION

This study documented the needs-driven development and initial implementation of e-RANPs as a context-specific, teacher-oriented, and data-driven digital system for continuous Quranic recitation assessment management.

The primary challenge was not the absence of Tasmik assessment but the fragmentation of its associated information. e-RANPs addresses this problem by providing a structured pathway from teacher-generated assessment records towards accessible information for monitoring and reporting.

The study also demonstrates that educational digital transformation can emerge through the systematic scaling of grassroots teacher innovation. The transition from e-RTR to e-RANPs involved contextual adaptation, functional expansion, stakeholder involvement, pilot implementation, and iterative refinement.

The findings further highlight that educational technology development must account for the wider implementation environment. Internet connectivity and device accessibility influenced pilot experiences, demonstrating that infrastructure remains an important condition for sustainable digital transformation.

Importantly, e-RANPs preserves teachers' professional responsibility for Quranic recitation assessment. It does not replace teacher judgement with automated assessment but strengthens the management of information generated through teacher-led Tasmik.

Limitations and Future Research

The study focuses on system development and initial implementation rather than causal effectiveness. The 20-school pilot should therefore be interpreted as an initial implementation phase rather than evidence that e-RANPs improves student achievement or teacher performance.

Future research should examine system usability, teacher acceptance, perceived usefulness, administrative workload, data quality, sustained adoption, and the ways teachers use e-RANPs information to inform educational interventions. Subsequent studies may also investigate relationships between systematic Tasmik monitoring and student recitation development through longitudinal or quasi-experimental designs.

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