Hifz-Tracker: Digital Progress Monitoring for Quran Memorization

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ABSTRACT

Effective monitoring of Al-Quran memorization (hafazan) and revision (murajaah) requires systematic documentation of students' recitation performance and learning progress. Despite the increasing adoption of digital technologies in tahfiz education, integrating attendance, memorization assessments, revision histories, and progress reporting across multiple stakeholders remains a significant information-management challenge. This study presents the design, development, and verification of Hifz-Tracker, a web-based Quran memorization progress monitoring system developed for Pusat Tahfiz Al-Quran Al-Falah. The system was developed using the System and Database Life Cycle (SDBLC) approach, supported by iterative prototyping throughout requirements analysis, database design, implementation, and verification. MySQL was employed as the relational database management system to integrate student profiles, attendance records, hafazan and murajaah activities, assessments, and authorized parent–student relationships. The application also incorporates an external Juz 30 Application Programming Interface (API) to provide Quranic reference information and support accurate surah and ayah selection. Role-based interfaces facilitate memorization recording and assessment by teachers, progress monitoring by students and authorized guardians, and institutional oversight by administrators. System verification involved 23 functional test cases and seven non-functional checks, all of which were reported as successful under the specified testing conditions. These results provide initial evidence that the developed system operates according to its functional requirements. However, further evaluation involving teachers, students, and parents in an actual educational setting is needed to assess system usability, user satisfaction, and effectiveness in managing student progress records. This study presents the development of a web-based Quran memorization progress monitoring system using the SDBLC approach and MySQL to support structured student record management and progress reporting in tahfiz education.

Keywords: Al-Quran Memorization, Tahfiz Education, Student Progress Tracking, Relational Database, Web-Based Information System

INTRODUCTION

Tahfiz education relies on repeated observation of memorization quality rather than a single measure of content completed. Teachers commonly need to monitor memorized verse ranges, murajaah activities, attendance, assessment outcomes and the history of corrections over time. These records are essential for identifying gaps in retention, supporting individualized supervision and communicating progress to parents or guardians. Where records are dispersed across handwritten logbooks and disconnected spreadsheets, retrieval and reconciliation become increasingly difficult, particularly when several teachers or administrative staff require access to a common history.

The operational problem is substantiated by previous development studies. Suryana et al. (2021) described the relevance of computerized monitoring to evaluation and instructional decision-making in Quran memorization programmes. More recently, Hafizuddin et al. (2026) documented administrative difficulties arising from manual memorization assessment in a Bruneian tahfiz institution, while Izzatilla et al. (2026) identified risks of record

loss, inefficient reporting and limited guardian transparency under conventional workflows. These studies establish the practical significance of digital record management without implying that a particular implementation is universally effective.

Digital solutions have also advanced beyond basic record entry. Arsad et al. (2026) developed HafazTrack Pro to visualize hafazan progression, and Ibrahim et al. (2024) explored mobile learning support for tahfiz. Thus, neither web-based monitoring nor progress dashboards constitute a novel feature in themselves. The design problem considered here is narrower: how can routine hafazan, murajaah, attendance and assessment transactions be integrated with Quran-specific input validation, role-restricted access and historical reporting within a consistent relational information structure?

To address this operational challenge, a database-driven progress-tracking application was developed for Pusat Tahfiz Al-Quran Al-Falah. The study objectives were to establish user and information requirements, translate these into a relational data model, implement integrated modules for memorization monitoring and reporting, and document the verification procedures reported during development. The central concern is not the novelty of web access itself, but the traceable connection between teaching transactions, data integrity rules and controlled access to cumulative progress information.

LITERATURE REVIEW

2.1 Digital Monitoring in Tahfiz Education

The integration of digital technologies into tahfiz education has created opportunities to improve how students' memorization activities are recorded, monitored, and evaluated. Unlike conventional academic assessments that may focus primarily on examination outcomes, Quran memorization requires continuous observation of recitation accuracy, memorized verses, and revision activities. Suryana et al. (2021) explored website-based monitoring to support the evaluation of Quran memorization progress, while Ibrahim et al. (2024) examined the use of technological tools to support tahfiz learning. Muslim et al. (2024) investigated Quran memorization techniques and learners' memory-system tendencies. These studies highlight the importance of considering both memorization progress and the learning practices that contribute to its development.

The challenges experienced by tahfiz students also suggest a need for more systematic progress documentation. Nik Abdullah et al. (2021) examined students' experiences, motivations, and difficulties in memorizing the Quran, including the roles of teachers and parents in supporting learning. From an information-management perspective, these findings provide a rationale for maintaining accessible records of memorization activities and teacher feedback. Such records may help teachers review previous assessments and allow authorized parents to remain informed about their children's progress. However, the availability of progress information should not be assumed to improve memorization achievement without further empirical evaluation.

Previous system development studies have addressed several aspects of digital monitoring in tahfiz institutions. Arsad et al. (2026) introduced a dashboard for presenting hafazan progress, while Izzatilla et al. (2026) developed a web-based monitoring system involving different institutional stakeholders. Hafizuddin et al. (2026) also examined the digitalization of Quran memorization assessment and related administrative processes. Collectively, these studies show that electronic records, progress visualization, and stakeholder access are established features of digital tahfiz systems. Nevertheless, their relevance to the present study extends beyond the availability of individual functions. Effective progress monitoring also depends on how memorization records, revision activities, attendance, and assessment information are organized and linked to support continuous reporting.

Research on learning analytics provides further considerations for designing meaningful progress-monitoring interfaces. Matcha et al. (2020) and Valle et al. (2021) emphasized the importance of relating dashboard information to learning processes and objectives. Rets et al. (2021) examined factors influencing students' perceptions of dashboard usefulness, while Kaliisa et al. (2023) highlighted stakeholder requirements, privacy, and evaluation considerations in dashboard development. Paulsen and Lindsay (2024) similarly discussed the

importance of designing dashboards that support learning-related needs rather than merely displaying data. Although these findings were not established specifically in tahfiz education, they suggest that progress information should be organized in ways that allow users to understand recorded activities and review changes over time.

From an information-systems perspective, the usefulness of digital monitoring also depends on the underlying data structure and the context in which information is collected. Ahn et al. (2019) emphasized contextual requirements in dashboard design, while Curran et al. (2026) examined the role of educational dashboards in supporting information visibility and decision-making. Peffers et al. (2007) further established the importance of clearly defining the problem, design process, and evaluation when developing information-system artifacts. Together, these studies provide a basis for examining Hifz-Tracker as an integrated information system in which database design, recording procedures, and access permissions are considered alongside the user interfaces.

2.2 Research Gap and System Requirements

The reviewed literature indicates that digital monitoring, progress dashboards, and stakeholder access have already been explored in tahfiz education. However, the development of an institutional monitoring system requires more than providing these functions independently. Memorization assessments, revision records, attendance information, and student profiles must be organized within a consistent data structure so that information recorded during teaching activities can be retrieved accurately for subsequent monitoring. This requirement is particularly relevant when teachers, students, parents, and administrators access related academic information for different purposes. In response to these considerations, Hifz-Tracker was designed to integrate hafazan and murajaah recording, attendance management, assessments, and progress reporting through a MySQL relational database. Quran-specific recording requirements were addressed through the integration of a Juz 30 reference API to support surah and ayah selection. Role-based access was incorporated to distinguish teachers' recording responsibilities from students' progress review, authorized parental monitoring, and administrative management. These design decisions connect the educational and information-management needs identified in previous studies with the operational requirements of Pusat Tahfiz Al-Quran Al-Falah. The contribution of this study therefore lies in documenting how these requirements were translated into an integrated web-based system using the System and Database Life Cycle (SDBLC) approach. Rather than introducing digital monitoring as a new concept, the study focuses on the relationships between classroom records, Quran-specific data validation, controlled information access, and historical progress reporting. The resulting implementation provides a basis for examining system functionality, while its usability and effectiveness in routine institutional practice remain subjects for future evaluation.

Table 1: Comparison of related studies and the present system

Study	Primary emphasis	Relevance to the present contribution
Suryana et al. (2021)	Website-based monitoring and evaluation of Quran memorization	Establishes the instructional need for accessible progress records.
Ibrahim et al. (2024)	HiQMA mobile application supporting tahfiz teaching and learning	Represents learner-facing learning support rather than the present records-management focus.
Arsad et al. (2026)	HafazTrack Pro dashboard with graphical memorization indicators	Supports the importance of visual reporting; does not make dashboards novel in this study.
Izzatilla et al. (2026)	Web monitoring, guardian access and automatic notifications	Demonstrates multi-role monitoring already exists, requiring a more specific contribution claim.
Hafizuddin et al. (2026)	Digital assessment and institutional progress administration	Supports requirements-driven integration of assessment and administration.
Present development	Relational modelling, Quranic input rules, role-specific transactions and documented test cases	Offers an implementation-focused account of the integrated workflow in a local tahfiz setting.

METHODOLOGY

3.1 System Development Approach

This study adopted a System and Database Life Cycle (SDBLC) perspective coupled with iterative prototyping. As illustrated in Figure 1, development proceeded through an initial study, data modelling, implementation, verification and operational refinement. The initial study examined the record-keeping workflow and the information required by teachers, students, parents and administrators. Successive designs converted the requirements into entity relationships, normalized tables, validation logic and role-specific interfaces. Prototyping supported revisions to the data-entry and retrieval workflows. This paper documents these development activities and summarizes the verification evidence available in the project records, without presenting a separate controlled effectiveness study.

3.2 System Requirements Analysis

The initial requirements were identified through informal consultations with teachers and inspection of existing records at Pusat Tahfiz Al-Quran Al-Falah. Four stakeholder roles were modelled. Teachers require authenticated access to attendance, memorization, revision, assessments and parental approval requests; students need read-only access to their own progress; parents require account registration and teacher-authorized access to linked children; and administrators manage user profiles, institutional progress, audit information and backup controls. These roles were translated into application privileges rather than allowing all users unrestricted access to the same records.

Requirements were translated into identifiable system functions and data-quality constraints. In particular, the application needed to associate each progress entry with a valid student and teacher; validate Juz 30 surah and ayah ranges; restrict functions according to user role; record attendance and assessments; maintain historical learner progress; and provide recoverable system records. Table 2 summarizes the requirements and the implementation evidence documented during development.

Table 2: Requirements-to-implementation mapping

Requirement	Operational rationale	Reported implementation evidence
Role-restricted authentication	Separate administrative, instructional and viewing privileges	Login routing and role-specific dashboard cases.
Memorization and murajaah records	Preserve daily memorization and revision history	Structured transaction modules and progress cases.
Juz 30 validation	Reduce incorrect surah/ayah records	Invalid selection and reversed-range rejection in test scenarios.
Attendance integration	Avoid contradictory same-day progress records	Attendance entry and absence-dependent controls.
Guardian visibility	Enable controlled family access to individual records	Parent–student linking, approval and revocation functions.
Audit and backup	Support accountability and recoverability	Administrative audit and backup cases

3.3 Database Design and System Architecture

The conceptual database model was transformed into a relational schema that connects user accounts, teacher and student profiles, parent–student relationships, hafazan records, murajaah activities, attendance and assessments. Primary and foreign keys associate academic transactions with the relevant learner and responsible teacher, while the separate parent–student linkage supports controlled retrieval of individual records. This structure allows attendance and recitation observations to be captured separately and consolidated in student progress histories.

The logical database schema was designed according to Third Normal Form (3NF) principles to reduce data redundancy and maintain referential integrity. MySQL was used as the relational database management system,

while PHP running on Apache handled server-side processing. The presentation layer was developed using HTML, CSS, and JavaScript. Together, these technologies support the recording, management, and retrieval of academic information across the system's functional modules. The system was developed and tested in a localhost environment using Apache, PHP, and MySQL. Its web-based interfaces were accessed through a browser to examine the implemented functions before deployment in an operational institutional environment.

The system integrates an external Al-Quran Juz 30 API to retrieve surah information, verse numbers, and Quranic text. This allows teachers to select the appropriate surah and verses when recording students' hafazan activities. Before saving a record, the system checks whether the selected surah and verse range are valid. It also prevents hafazan records from being entered for students marked as absent. However, the accuracy of the Quranic text retrieved from the external API has not been independently verified. The current system only validates surah and verse numbers. The accuracy of the Quranic text retrieved from the external API has not been independently verified. As a future improvement, a qualified external expert in Quranic studies from a recognized Islamic institution in Malaysia should be appointed to review the Quranic content. The review should compare the displayed verses, verse numbering, and tajweed markings, where applicable, against an approved Uthmani-script mushaf. This would help ensure the accuracy and reliability of the Quranic text before the system is implemented in an actual tahfiz institution.

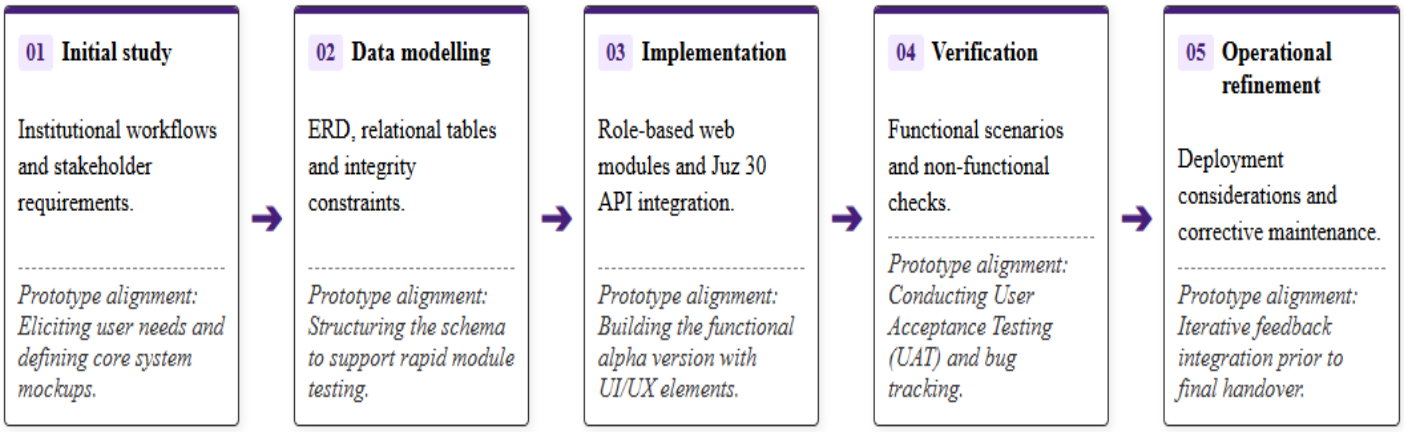


Figure 1: SDBLC-oriented prototyping process for the database-driven tracking system.

The implementation integrated PHP-based application logic, MySQL database management, and the Juz 30 reference API with interfaces designed to support different user roles. The development documentation included unit, integration, system, and user acceptance testing activities, with the latter involving teacher, parent, and student roles. However, the available documentation provides limited evidence of a systematic user evaluation, particularly regarding participant selection, task completion, and usability assessment. Therefore, the reported testing results provide initial evidence of system functionality, while further evaluation under actual institutional conditions is required to establish its usability and practical effectiveness.

SYSTEM IMPLEMENTATION AND DISCUSSION

4.1 System Implementation and Functionalities

The developed system provides an integrated platform for managing classroom records and monitoring student progress through role-specific interfaces. The administrator dashboard presents an overview of institutional academic progress and student records (Figure 3), while the teacher dashboard displays class statistics, recent student activities, and access to attendance, hafazan recording, and assessment functions (Figure 4). These interfaces support the daily management of academic activities and enable different stakeholders to access information according to their responsibilities.

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User access is managed through the login and registration interfaces (Figure 2). Registered users can log in using their credentials, while students use their identification details to access their accounts. A password recovery function is also available for users who have difficulty accessing the system. New users are required to provide their personal information during registration. For parents or guardians, additional details such as their relationship with the student and the student's identification number are collected to establish the parent–student connection. However, access to a child's academic records is granted only after the teacher has reviewed and approved the request, as further explained in Section 4.1.4. This authorization process helps protect student information while allowing parents to monitor their children's learning progress.

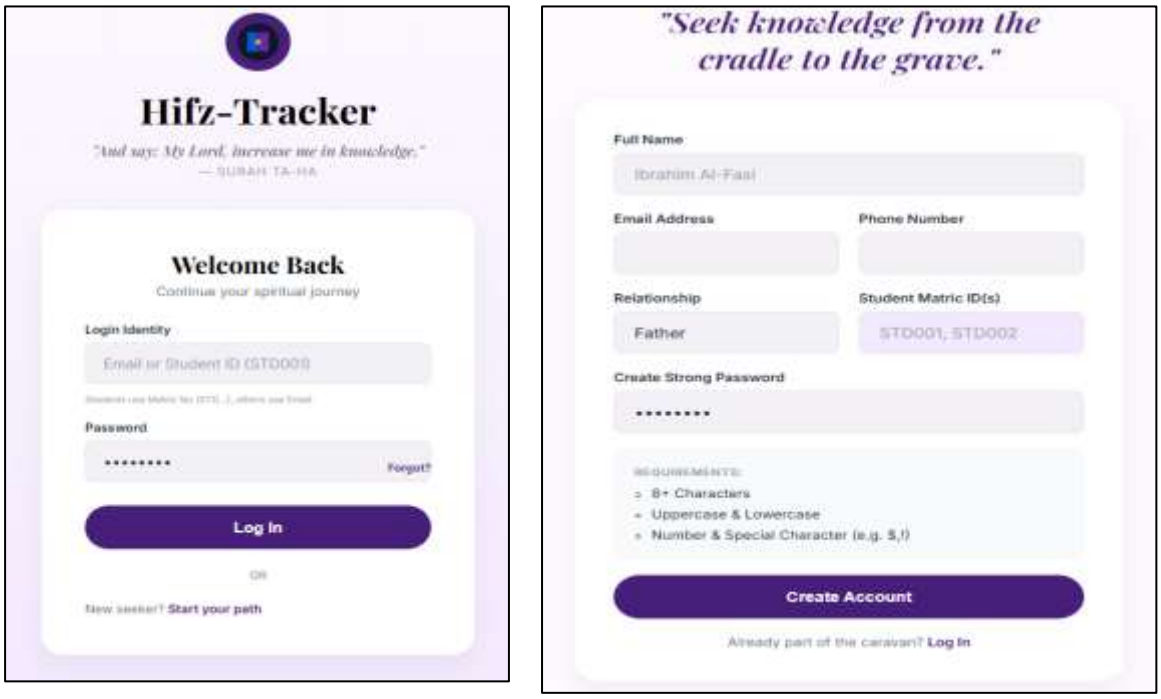


Figure 2: Authentication and account-registration interfaces used for role-specific access to the Hifz-Tracker system.

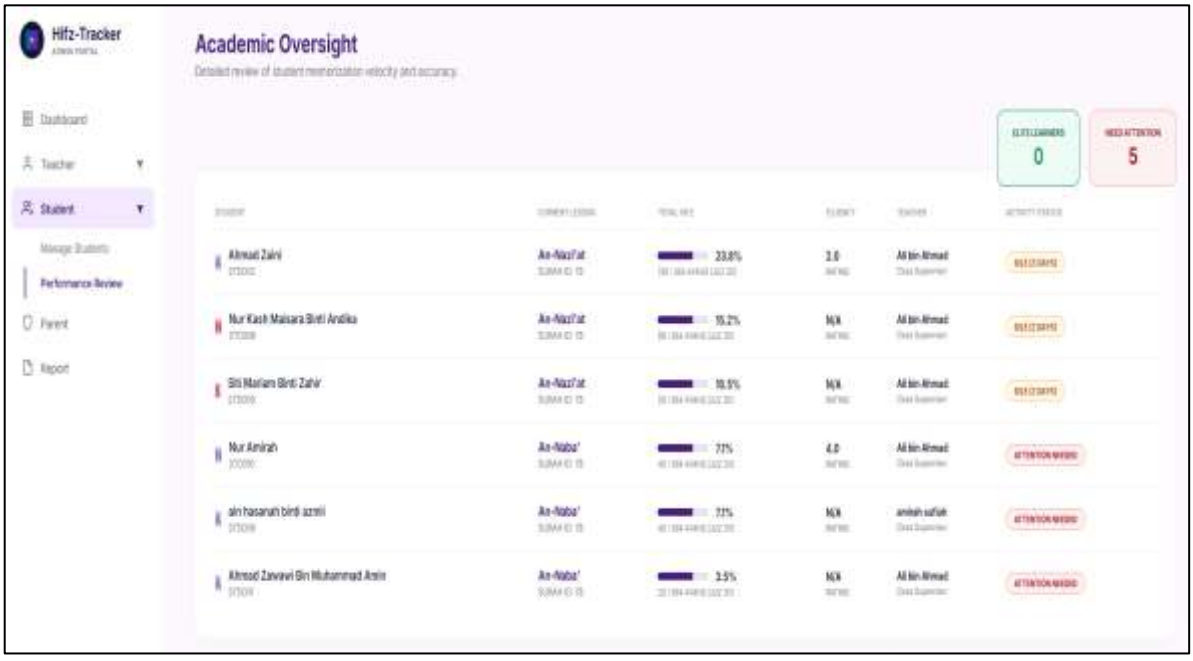


Figure 3: Administrative academic overview showing learner-level institutional progress indicators.

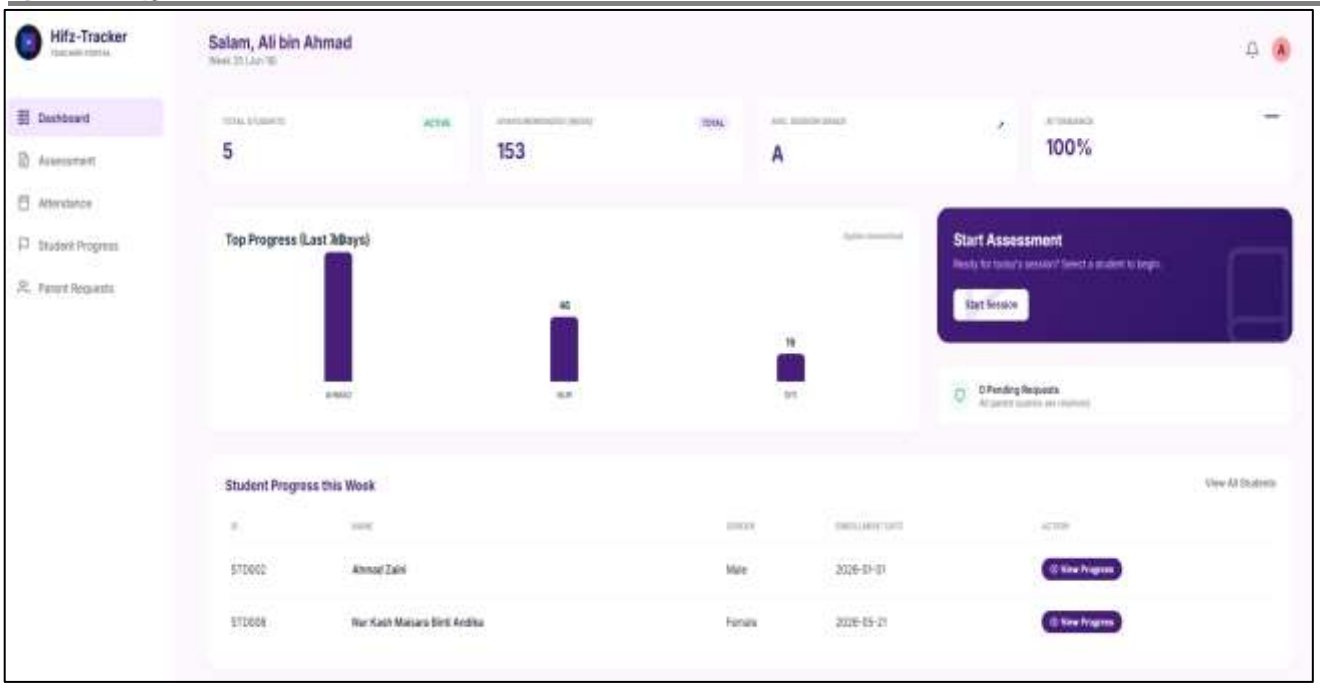


Figure 4: Teacher dashboard presenting class progress, assessment access and recent student activity.

4.1.1 Attendance Management

Teachers manage daily attendance through an interface that displays the list of registered students and allows each learner to be marked as present, absent, or late (Figure 5). Additional remarks may be recorded when necessary. Attendance information is stored as part of the student's academic history and can be retrieved alongside memorization records. The system also applies an attendance-related validation rule that prevents hafazan progress from being submitted for students recorded as absent. This connection between attendance and memorization recording helps maintain consistency across classroom activities and student progress information.

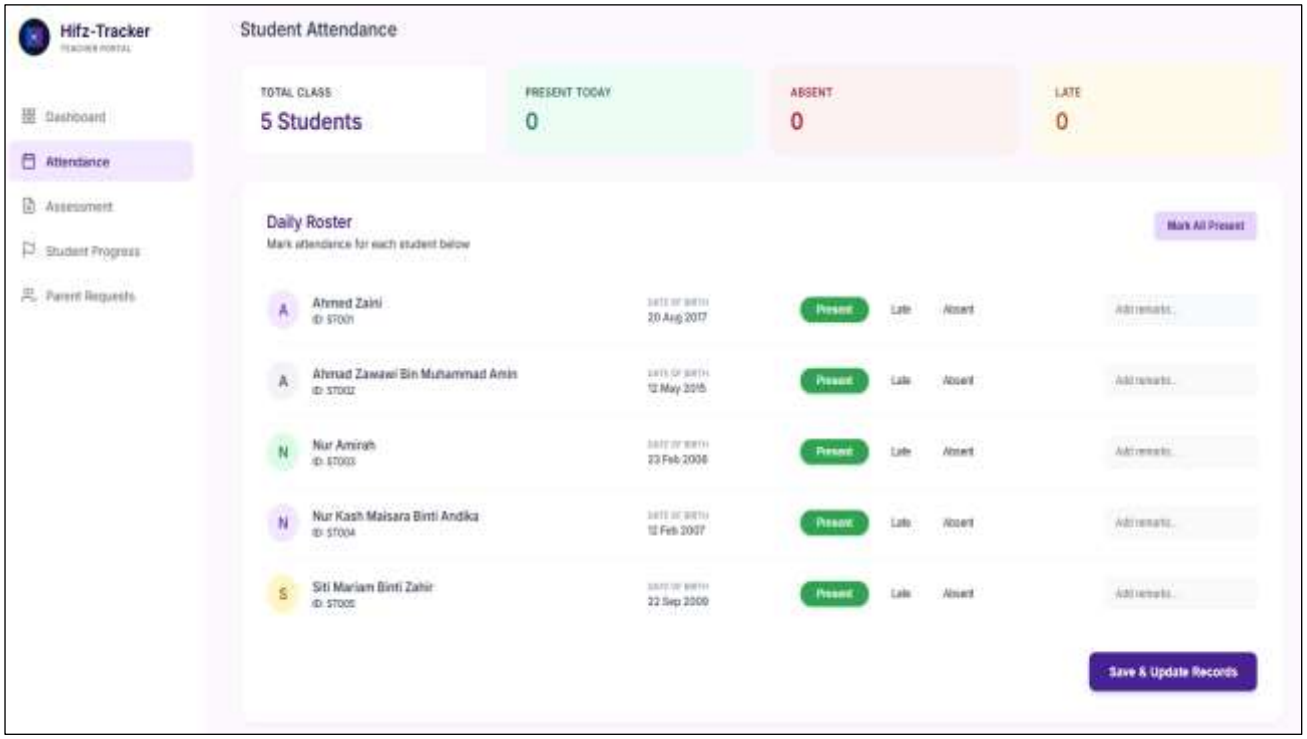


Figure 5: Teacher attendance form used to register daily learner status.

4.1.2 Hafazan and Murajaah Recording

Following attendance recording, teachers can document students' hafazan activities through the progress-submission interface (Figure 6). Each entry is associated with a student, session type, surah, and selected ayah range. The integrated Juz 30 API supplies Quranic reference information to support verse selection and recording validation. Teachers can also identify recitation errors relating to memory, tajweed, and pronunciation, together with additional assessment notes. The recorded information is stored in the MySQL database and linked to the relevant student and teacher. Murajaah activities are maintained as separate revision records, allowing memorization and revision performance to be reviewed as related aspects of student progress.

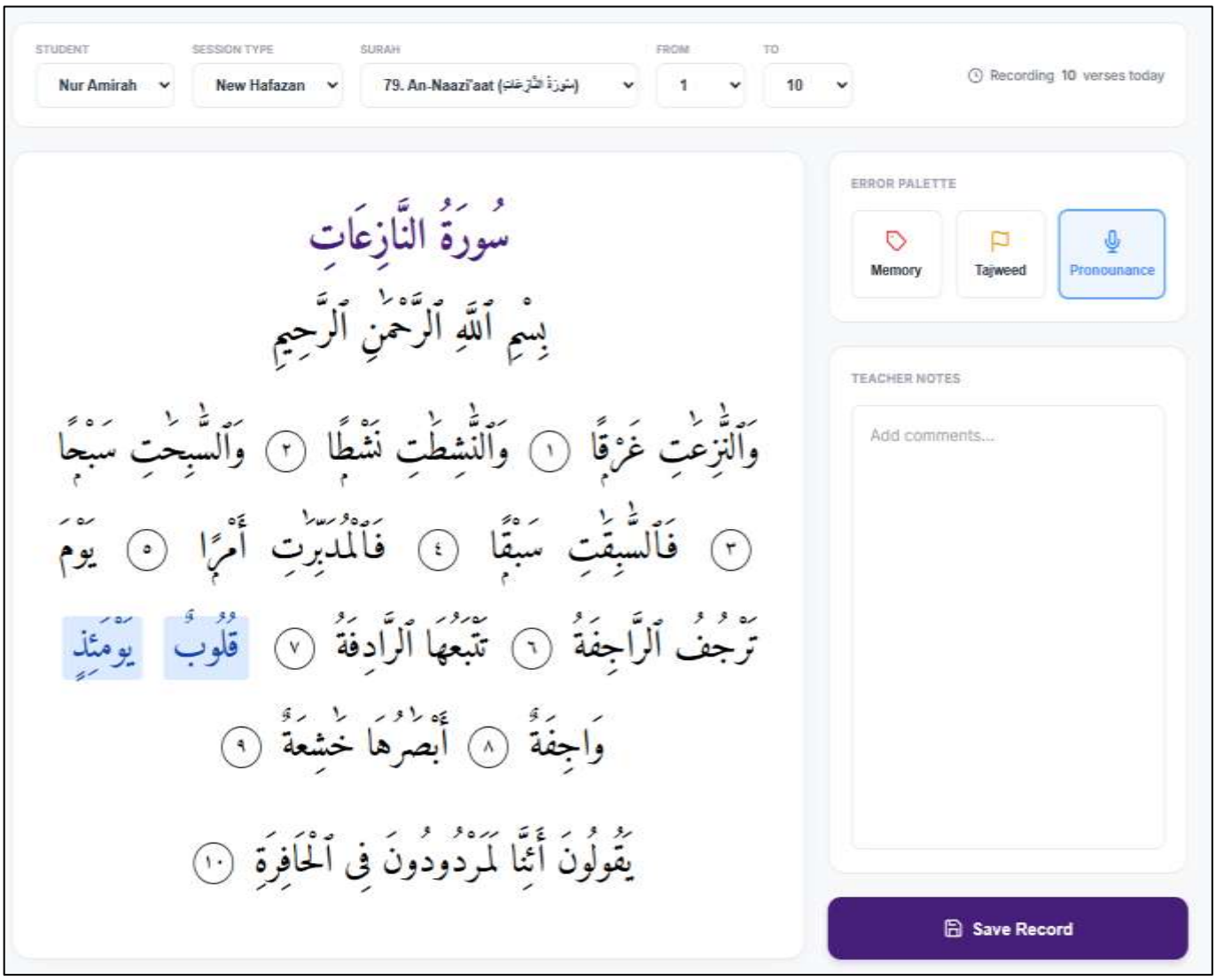


Figure 6: Hafazan recording form with Quranic text, verse selection, error categories and teacher notes.

4.1.3 Student Progress Monitoring

The student module provides access to individual memorization records through a dashboard presenting overall hafazan progress and recent learning activities (Figure 7). Students can also retrieve detailed progress histories containing dated memorization sessions, attendance information, and recorded feedback (Figure 8). These records are obtained from information entered during teachers' assessment activities, allowing learners to review their progress over time without modifying the original academic records.

A consolidated progress report brings together hafazan, murajaah, and attendance information within a single view (Figure 9). The report includes recorded surah and ayah ranges, recitation errors, revision ratings, and attendance history. By linking these records through the MySQL database, the system allows related academic

information to be presented as an organized learning history. This design supports the retrieval of individual progress information while maintaining the distinction between teacher-managed assessments and student access.

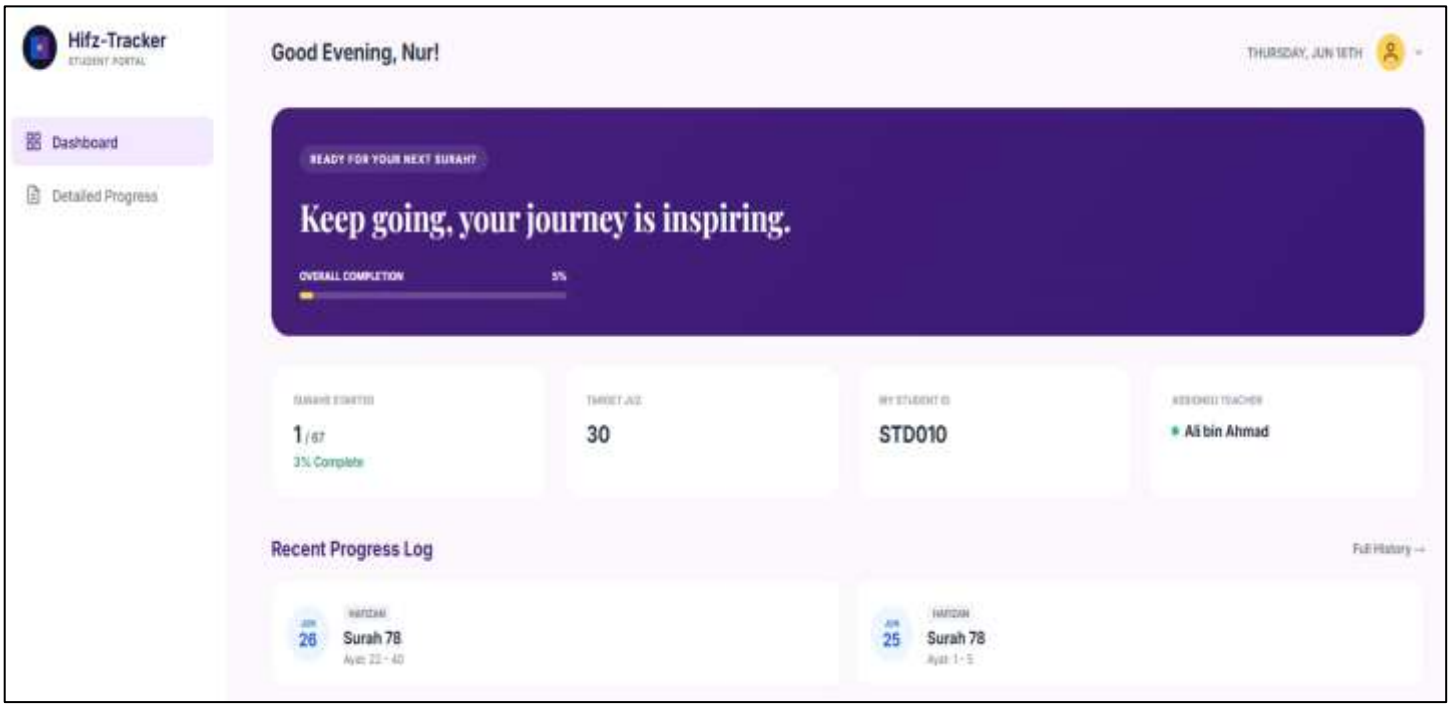


Figure 7: Student dashboard with memorization progress and recently recorded activities.

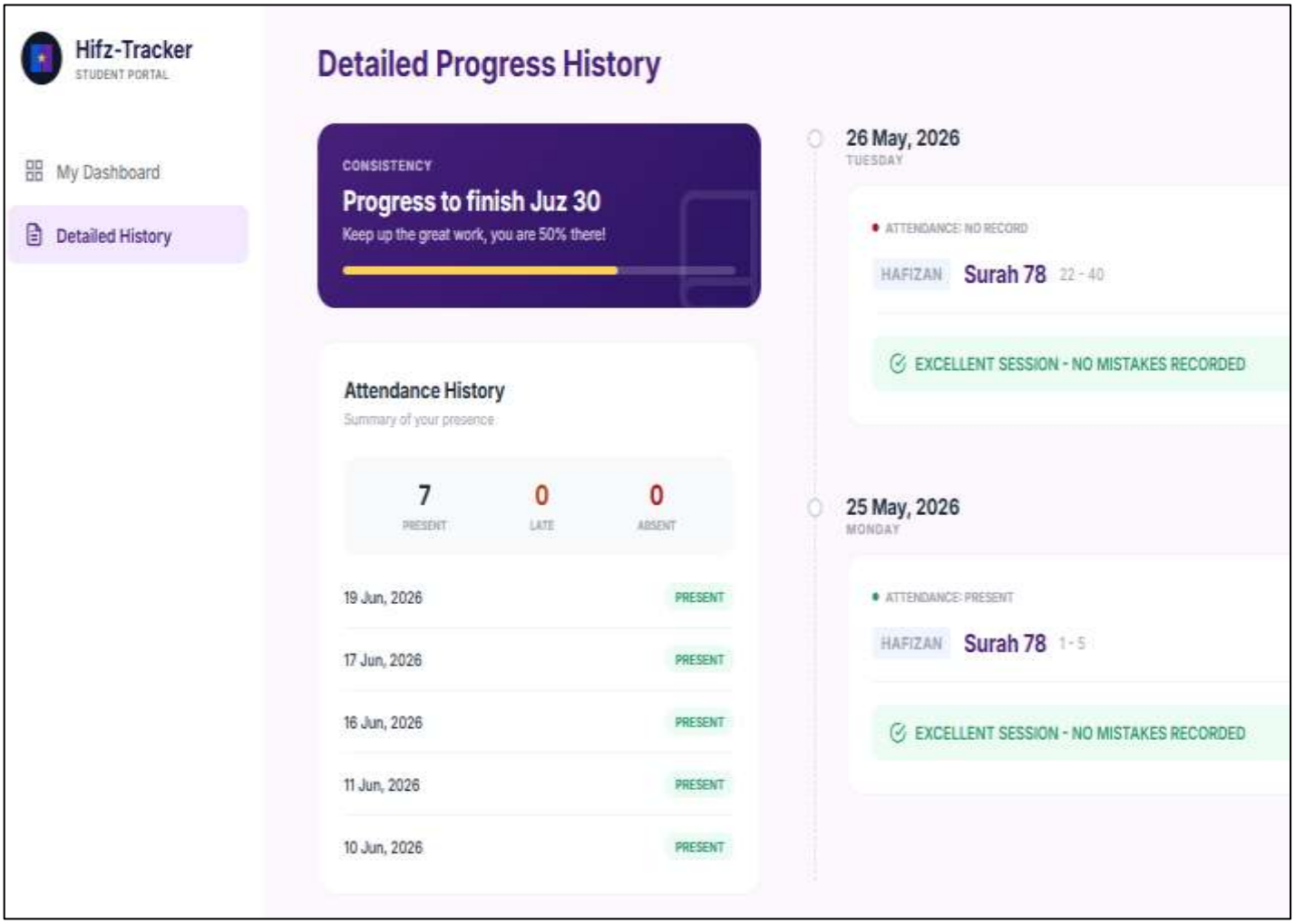


Figure 8: Student detailed-progress history showing dated hafazan entries and attendance.

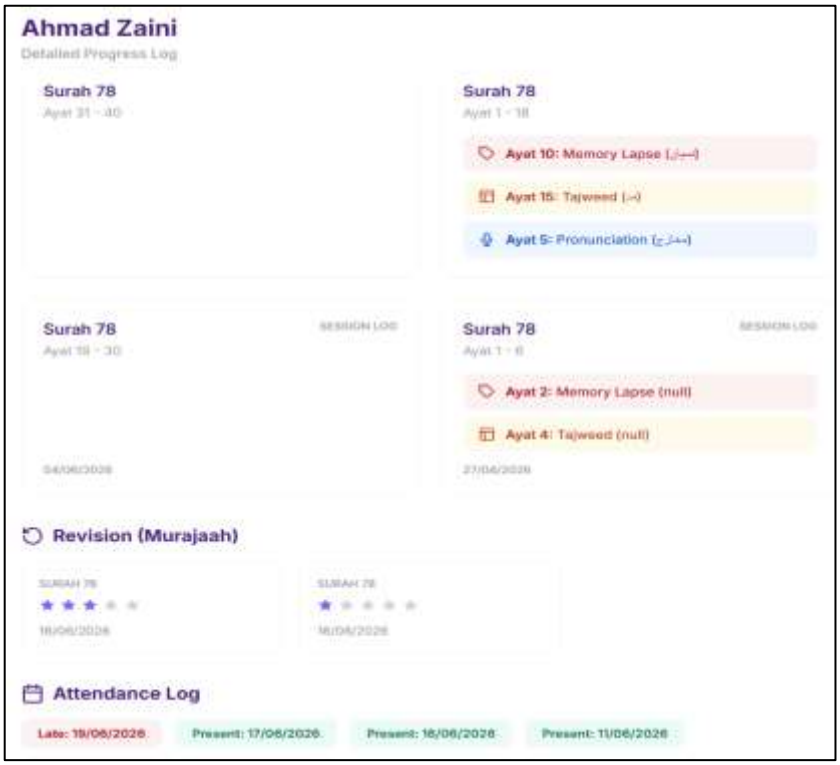


Figure 9: Consolidated student report containing hafazan, murajaah and attendance information.

4.1.4 Parent Access and Authorization

The parent module allows guardians to monitor their children's learning progress through a controlled authorization process. Parents are required to register an account and submit a request to link their profile to the relevant student using the student's identification number. The request is then reviewed by the teacher, who has the authority to approve, reject, or revoke access when necessary. Once the request has been approved, parents can view their child's memorization progress and learning history through the parent portal (Figure 10). Access is restricted to viewing information, ensuring that academic records entered by teachers cannot be modified by parents. This authorization mechanism helps safeguard student information by ensuring that only verified and approved guardians can access the relevant progress records.

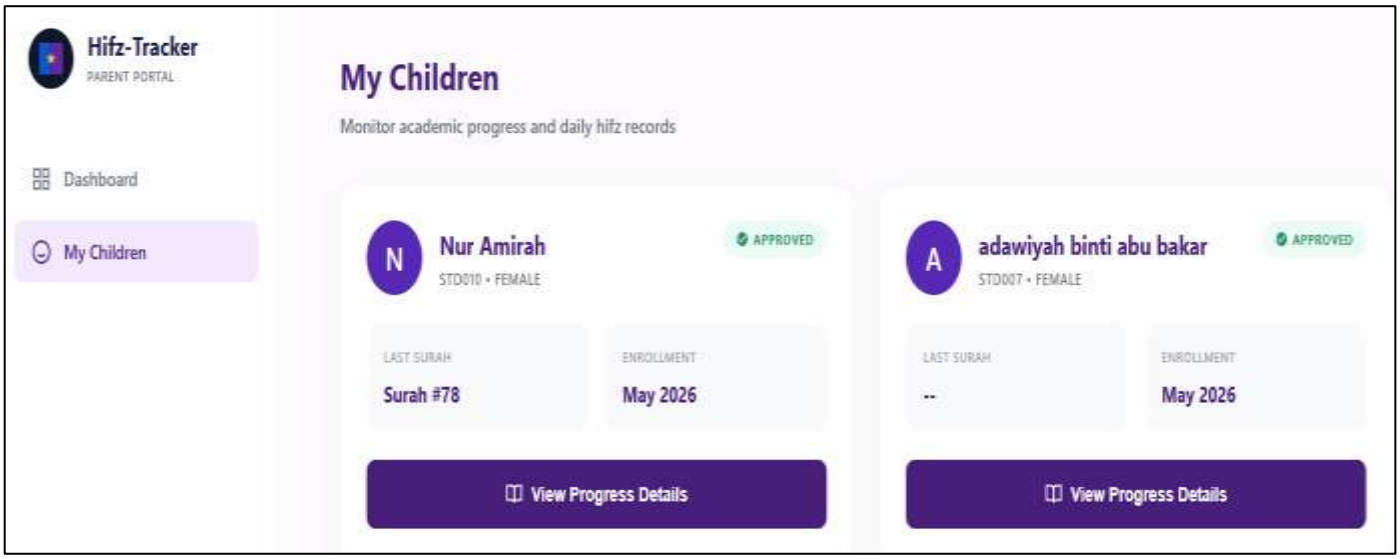


Figure 10: Authorized parent portal displaying linked children for progress retrieval.

4.1.5 System Administration and Backup

The administrative module supports the management of user accounts, system activities, and data preservation. As shown in Figure 11, the system settings interface provides information on automated backup status, a manual backup function, and a history of available recovery points. The development-stage functional testing confirmed that the system could successfully generate and download database backup files. However, database restoration was not tested during this study. Therefore, the ability to recover data from these backup files has not yet been confirmed. Future testing should involve restoring a backup file to a separate MySQL database and checking whether student records, related data, and system functions can be recovered successfully. This would help ensure that the backup files can be used to restore institutional records when needed.

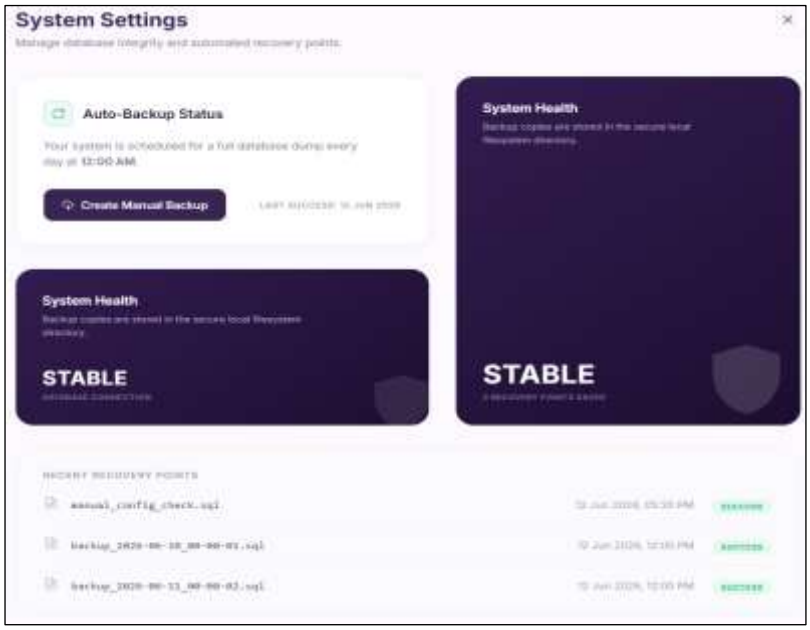


Figure 11: Administrative system settings with backup status and recovery-point history.

4.2 System Design Contributions

The main contribution of Hifz-Tracker lies in the integration of Quran memorization activities, revision records, attendance management, and student progress reporting within a unified web-based information system. A MySQL relational database was used to establish relationships between student profiles, academic activities, and assessment records, allowing information recorded during classroom sessions to be retrieved for subsequent monitoring. This integrated structure supports the management of hafazan and murajaah activities alongside attendance and assessment information, providing a consistent approach to maintaining individual learning histories.

A key design consideration was the incorporation of Quran-specific recording requirements into the system's database-driven workflow. The integration of an external Juz 30 Application Programming Interface (API) supports surah and ayah selection during memorization recording, while application-level validation helps prevent invalid verse ranges from being submitted. The system also implements role-based access to accommodate different user responsibilities. Teachers manage memorization assessments and attendance records, students review their learning histories, and authorized parents monitor their children's progress. Administrative functions support institutional record management and data preservation. Together, these components establish a connection between classroom recording activities, data validation, and progress reporting across different user roles.

Although previous studies have explored digital memorization monitoring, progress dashboards, and parental access, the present study focuses on integrating these functions according to the operational requirements of a tahfiz institution. Using the System and Database Life Cycle (SDBLC) approach, the development demonstrates

how institutional requirements can be translated into relational database structures, application functions, and controlled information access. Its contribution is therefore associated with the documented integration of domain-specific recording requirements and information-management processes rather than the introduction of entirely new monitoring features. The resulting system provides a basis for further investigation into its usability, reliability, and practical effectiveness in supporting Quran memorization progress monitoring.

5. Verification, Limitations And Future Development

5.1 Development-Stage Verification

System verification was conducted during development to examine whether the implemented functions operated according to the specified requirements. The development report documented 23 black-box functional test cases covering user authentication, role-based access, surah and ayah validation, hafazan and murajaah recording, attendance management, parent–student authorization, administrative operations, audit logs, and database backup. All functional test cases were reported as successful under the specified testing conditions.

Seven non-functional checks were also conducted to examine selected aspects of system performance and operation, including interface responsiveness, historical-record retrieval, input security, and connection recovery. The recorded results showed that the administrative dashboard loaded in 1.4 seconds against a specified threshold of 2 seconds, while a historical-record query was completed in 0.9 seconds against a threshold of 1.5 seconds. These results provide preliminary evidence of acceptable technical performance within the tested scenarios. However, the measurements were obtained under specific development conditions and cannot be generalized to larger datasets or environments involving multiple concurrent users.

The project documentation also identified user acceptance testing activities involving teachers, parents, and students. Nevertheless, detailed information concerning participant numbers, assessment instruments, and systematically analysed feedback was insufficient to establish the system's usability or effectiveness in actual institutional practice. Although the implemented PHP logic and database constraints provide opportunities for white-box testing, formal statement and branch coverage measurements were not documented. Therefore, the reported verification findings should be interpreted as evidence of initial functional implementation rather than comprehensive system validation. To address this limitation, a pilot usability study involving teachers, students, and parents is recommended before the system is fully deployed. Participants would be asked to perform tasks relevant to their roles, such as recording hafazan activities, viewing student progress, and accessing authorized student reports. Their task completion, time taken, and difficulties encountered would be recorded. After completing the tasks, participants would answer the ten-item System Usability Scale (SUS) questionnaire to evaluate their perceived usability of the system. The findings would help identify usability problems and guide further improvements before actual implementation.

5.2 System Limitations and Future Enhancements

Despite the successful completion of the reported development-stage tests, several limitations remain. One important consideration concerns the authenticity of Quranic content retrieved through the external Juz 30 API. As the system presents Quranic verses to teachers and students, the accuracy of the text, surah information, and verse numbering is essential. Although the system incorporates Quranic reference retrieval and input validation, the available documentation does not establish whether the API content has been verified by a recognized religious authority. Future development should therefore prioritize the identification of a trusted Quranic data source and the implementation of appropriate content verification procedures before wider institutional deployment.

Reliance on an external API also introduces potential challenges related to internet connectivity, service availability, and changes to the API structure. To address these challenges, a future version of Hifz-Tracker could store verified Juz 30 reference data, including surah information, verse numbers, and Quranic text, in the MySQL database. When the external API is unavailable, the system could retrieve this information from the local database instead. This approach would reduce dependence on the external API and allow teachers to

continue accessing Quranic reference information when the API service is interrupted, provided that the application and database remain accessible. However, this mechanism has not yet been implemented or tested. Future improvements could include maintaining a locally stored and verified Quranic reference dataset, implementing appropriate error-handling mechanisms, and providing alternative access when the external service is unavailable. Further technical evaluation is also needed to assess database performance under larger workloads, concurrent user access, system security, and the reliability of backup restoration procedures.

A further limitation is that Hifz-Tracker was developed and tested in a localhost environment rather than deployed for routine use at the institution. Consequently, its usability, accessibility, and operational performance under actual institutional conditions have not yet been established. Although user acceptance testing activities were identified in the development documentation, the available evidence is insufficient to determine how effectively the system supports daily progress monitoring and academic record management. Future research should involve deploying the system in an appropriate operational environment, followed by structured evaluations with teachers, students, and parents to examine usability, user satisfaction, task completion, and record-management efficiency. Additional improvements could include printable student progress reports, flexible reporting periods, and enhanced visual summaries of hafazan and murajaah activities. Such evaluations would help determine whether the system is easy to use and supports daily record-management activities. Further studies could also examine whether Hifz-Tracker reduces reporting time and improves the management of student progress records.

Another potential enhancement is to expand Hifz-Tracker beyond Juz 30 to support all 30 Juz of the Quran. This would require extending the Quranic reference database to include all surahs, verses, and their corresponding Juz information. The existing hafazan and murajaah modules could then be adapted to allow teachers to record student progress across the entire Quran. Further testing would be required to evaluate database performance, data accuracy, and system reliability when handling larger amounts of information and multiple users.

CONCLUSION

This study presented the design and development of Hifz-Tracker, a web-based Quran memorization progress monitoring system developed using the System and Database Life Cycle (SDBLC) approach. The system integrates hafazan and murajaah recording, attendance management, student assessments, and progress reporting through a MySQL relational database. The incorporation of a Juz 30 API and role-based interfaces supports Quran-specific recording activities and controlled access to student progress information. Development-stage verification included 23 functional test cases and seven non-functional checks, all of which were reported as successful under the specified testing conditions. These findings provide initial evidence of the system's functionality and technical performance. However, further evaluation involving teachers, students, and parents is required to establish its usability and effectiveness in actual tahfiz education settings. Future development should also address Quranic data authenticity, API reliability, system security, and performance under realistic operating conditions. Overall, this study demonstrates how a requirements-driven database development approach can support the integration of academic record management and student progress monitoring within a tahfiz institution. Future work should focus on improving Quranic data reliability, strengthening system recovery, evaluating usability in real institutional settings, and extending the system to support all 30 Juz of the Quran.

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