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Development of MABBAR Web-Based Evaluation System for Enhancing Arabic Listening Competency (*Mahārah al-Istimā'*) in Junior High Schools

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Abstract

The lack of specialized digital tools for structured auditory exposure frequently limits the development of Arabic listening skills (*mahārah al-istimā'*) at the secondary education level, as observed in preliminary studies at SMP IT Yasalam where conventional audio methods showed limited engagement. This study develops and evaluates the effectiveness of MABBAR, a web-based evaluation system that integrates Native Speaker Text-to-Speech (TTS) and automated feedback to provide self-regulated auditory input. Using a Research and Development (R&D) approach with a modified Borg & Gall model (1983), the study progressed through eight stages from needs analysis to dissemination. The subjects were 39 eighth-grade students at SMP IT Yasalam, Bogor. Data were collected via expert validation rubrics, pre-test/post-test instruments, and a 20-item usability questionnaire using a 5-point Likert scale. The findings indicate that MABBAR is highly feasible, with material experts scoring it 5.00/5.00 and media experts scoring 4.87/5.00. Statistical analysis through a paired-sample t-test revealed a significant improvement in student performance ($p = 0.001$), with the mean score increasing from 74.64 to 84.26. Based on the perception questionnaire, students gave a 96.64% positive response, specifically identifying the benefit of independent audio control in reducing cognitive load. MABBAR transforms the listening evaluation process into an adaptive, self-regulated learning ecosystem suitable for the Society 5.0 era.

Keywords: Arabic Linguistics, Arabic Teaching, Mahārah al-Istimā', MABBAR, Web-based Evaluation.

Introduction

In the context of Arabic language pedagogy in Indonesia, the primary challenge in teaching *mahārah al-istimā'* (listening skills) is closely linked to the lack of a supportive linguistic environment (*bi'ah lugawiyyah*). At the junior high school level, students are typically exposed to Arabic phonology for only 2 to 4 hours per week within the classroom setting. This restricted duration hinders the process of phonological and semantic internalization, as learners lack consistent auditory input. Recent research indicates that without media capable of providing repetitive and independent audio simulations, students tend to experience stagnation in their receptive skills (Husna et al., 2022). Operationally, this stagnation is manifested in the students' inability to distinguish similar phonemes (*makhārij al-hurūf*) and a failure to grasp global meaning from complex oral texts. Therefore, the integration of web technology is no longer merely an optional aid but an urgent necessity to extend the boundaries of conventional classrooms into a ubiquitous digital space.

Furthermore, the limitations of traditional, paper-based assessments often exacerbate these pedagogical hurdles. Conventional methods rarely offer the flexibility required for students to revisit difficult audio segments, often resulting in high cognitive load and decreased engagement during evaluation (Perry et al., 2022). To address this, there is an emerging need for a sophisticated digital infrastructure specifically the MABBAR systemn which leverages web-based accessibility to bridge the gap between classroom instruction and independent practice. By digitizing the listening experience, educators can provide a more immersive and interactive environment that compensates for the lack of a physical *bi'ah lugawiyyah* (Uzun, 2023).

The transition from conventional evaluation systems to web-based platforms is fundamentally grounded in the theory of Self-Regulated Learning (SRL). Within a web-based architecture, learners exercise full control over their learning pace, a concept known as self-paced learning, which allows for the repetitive access of audio materials until comprehensive understanding is achieved (Zainuddin et al., 2020). To facilitate this autonomy, the MABBAR system incorporates specialized features, including an adaptive audio question bank and an automated feedback interface. By providing these functionalities, the system serves as both an assessment tool and a medium for cognitive reinforcement, fostering student independence and learning motivation.

Technically, the selection of the Vue.js and Node.js frameworks in the development of MABBAR provides advantages in responsiveness and real-time data processing. Amidst

the diversity of hardware owned by students-ranging from laboratory computers to personal smartphones a web-based system ensures inclusivity of access without requiring application installations that burden device memory. This technical efficiency is crucial in guaranteeing the continuity of the evaluation process, as technical obstacles often encountered in heavy applications are frequently a primary factor in decreasing student learning motivation (Jaffar et al., 2022). With a lightweight architecture, MABBAR is capable of delivering high-quality streaming audio without significant lag.

Furthermore, the developed evaluation system integrates simple gamification principles into the presentation of quizzes and feedback. Based on Self-Determination Theory (SDT), the provision of instant feedback in the form of scores and corrections immediately after completing tasks can trigger dopamine release, which enhances students' emotional engagement in learning (Hanafi et al., 2021). In the context of Arabic language learning, which is often perceived as 'rigid' and 'difficult' by junior high school students, the interactive approach through MABBAR is expected to transform such negative perceptions into an enjoyable and challenging learning experience. Evaluation is no longer viewed as a daunting burden, but rather as a challenge to achieve a higher level of proficiency.

As a concluding point of the introduction, it is essential to emphasize that the development of MABBAR at SMP IT Yasalam represents a strategic step toward modernizing the local Arabic language curriculum. By utilizing a systematic Research and Development (R&D) methodology, this study goes beyond product creation to include scientific validation of both material and media feasibility. The results of this research are expected to provide practical contributions for Arabic language education practitioners in designing adaptive evaluation systems, as well as theoretical contributions to the literature on CALL (Computer-Assisted Language Learning), specifically concerning the development of listening skills at the primary and secondary education levels.

The digital transformation in language learning over the last decade has driven significant changes in the way learners interact with materials, teachers, and evaluation systems. Educational technology has not only expanded access but also increased the effectiveness of the learning process through interactivity, personalization, and assessment automatio (Bećirović et al., 2021). In the context of language learning, the integration of technology has proven to strengthen the practice of technology-enhanced language learning (TELL), particularly through the use of web-based platforms that provide rapid feedback and accurate learning analytics to support pedagogical decision-making (Lee, 2022).

At the junior high school level (Junior High Schools), the need for adaptive, authentic, and data-driven learning evaluation has become increasingly relevant, aligning with national education policies that promote formative assessment and the integration of digital literacy into the curriculum. Digital-generation learners demonstrate a strong preference for evaluation media that are visual, interactive, and gamified; thus, web-based assessment systems have emerged as an approach capable of enhancing participation, motivation, and learning retention (Rahman et al., 2022).

Nevertheless, the implementation of Arabic language learning evaluation in various junior high school institutions is still dominated by conventional methods in the form of written tests, which lack the capacity to facilitate integrated language skills and fail to provide systematic developmental analysis (ElMeftahy, 2025). Conventional evaluation generally cannot provide question variations, automated grading, or learning analytics-based reporting, despite the increasing demand for these features in the digital learning era (Aladini et al., 2024).

Recent studies demonstrate that digital evaluation media significantly enhance the quality of language assessment through integrated pedagogical features. For instance, (Fatchiatuzahro et al., 2025) highlight that digital platforms such as Wordwall improve students' *mahārah kitābah* (writing skills) by utilizing interactive question formats and automated feedback. Although focused on writing, the success of such digital interventions underscores a critical pedagogical principle: that real-time reinforcement and adaptive engagement are essential for language acquisition (Soni & Lourdusamy, 2025). By extension, incorporating these same technological affordances into *istimā'* (listening) evaluations as seen in the MABBAR system can address the limitations of conventional auditory assessments. This correlation suggests that web-based media can transform evaluation at the junior high school level into a more effective, meaningful, and growth-oriented process across all linguistic competencies.

However, to date, the development of web-based evaluation systems specifically designed for *mahārat al-istimā'* (listening skills) in Arabic language learning at the junior high school level (Junior High Schools) remains highly limited. Wang et al., (2021) Most general platforms, such as Quizizz, Google Forms, or school LMS, do not provide specialized Arabic audio processing features, item difficulty analysis for listening tasks, or reporting of listening results that align with the specific characteristics of the Arabic language. This condition indicates a significant space for innovation to introduce digital

evaluation tools that are in harmony with the needs of the Arabic curriculum, technological developments, and the characteristics of junior high school students.

To address these needs, this study developed MABBAR, a web-based Arabic language evaluation system specifically engineered for *mahārah al-istimā'*. The primary technical distinction of MABBAR lies in its integration of high-fidelity native speaker audio libraries with a real-time diagnostic feedback loop, features that are absent in conventional platforms. The system incorporates an adaptive audio question bank, automated grading, and learning analytics to monitor student progress (Tan et al., 2025). Furthermore, it is structured around standardized listening indicators, delivered through an interactive interface designed to foster cognitive independence and motivation among junior high school students.

Substantively, the development of the MABBAR system is expected to enhance the objectivity and efficiency of evaluating *istimā'* skills, expand access to data-driven formative assessments, support teachers in mapping students' strengths and weaknesses, and present a digital evaluation model that can be replicated across various schools. Thus, this research serves as a strategic effort to strengthen the quality of Arabic language learning evaluation, while simultaneously contributing to the enhancement of digital literacy and 21st-century competencies within the secondary education environment.

Method

This study employs the Research and Development (R&D) method, adopting the procedural development model established by (Borg & Gall, 1983). This methodology was selected to develop and validate a Web-Based Arabic Language Learning Evaluation System (MABBAR) specifically designed to enhance *mahārah al-istimā'* (listening skills) at the secondary education level. To ensure efficiency and focus, the original ten-step model was streamlined into eight systematic stages:

1. Research and Information Collecting: Conducting a digital needs analysis and pedagogical literature review.
2. Planning: Defining competency indicators and designing the system's architectural features.
3. Develop Preliminary Form of Product: Constructing the MABBAR prototype.
4. Preliminary Field Testing: Rigorous validation by multidisciplinary experts.
5. Main Product Revision: Refining the prototype based on expert recommendations.
6. Main Field Testing: Conducting limited field trials with the target user group.

7. Operational Product Revision: Finalizing the system based on empirical data from the field.
8. Final Product Dissemination: Implementation and distribution of the finalized evaluation system.

The research was situated at SMP Yassalam Bogor. The subjects involved in the development and validation process included:

1. Validators: Experts in Arabic language pedagogy, digital learning media, and phonetics (specifically for Text-to-Speech audio quality validation).
2. Practitioners: Arabic language teachers at the secondary level.
3. Trial Participants: 39 eighth-grade students, selected through purposive sampling to ensure the sample represented the intermediate competency level required for the system testing.

A mixed-method triangulation approach was employed to analyze the collected data:

1. Qualitative Analysis: Descriptive data from expert feedback and practitioner observations were analyzed using the model of (Miles et al., 2014), encompassing the stages of data condensation, data display, and conclusion drawing/verification.
2. Quantitative Analysis:

a. Feasibility Analysis: Data from Likert-scale questionnaires were calculated as percentages to determine the system's validity and technical feasibility.

b. Effectiveness Analysis: To evaluate the pedagogical impact of MABBAR, student learning outcomes were analyzed using descriptive statistics and a Paired Sample T-Test. This inferential statistical analysis was conducted to measure the significance of the difference between pre-test and post-test scores, thereby determining the system's effectiveness in improving students' listening competence.

Result and Discussion

The development of the MABBAR (*Mari Belajar Bahasa Arab*) system demonstrates that the integration of web technology effectively transforms the Arabic language evaluation process into a structured and interactive experience. The system was implemented with key features supporting teacher-managed evaluation and responsive test execution for students.

Development Process of the 'MABBAR' Web-Based Arabic Learning Application

The 'MABBAR' application is accessible at https://mabbar.my.id/ for students and https://mabbar.my.id/guru for teachers. Following the procedural model of (Borg & Gall,

1983) as outlined in the research methodology, the development process was executed through the following eight stages:

1. Research and Information Collecting: Observations at SMP Yassalam identified that students struggled with *mufradat* (vocabulary) and *qawaid* (grammar), coupled with low motivation due to traditional, non-technological instructional methods.
2. Planning: Based on the needs analysis, the system was planned to include interactive quizzes, automated feedback, and a dashboard for competency tracking.
3. Develop Preliminary Form of Product: The MABBAR prototype was built using Vue.js for the front-end, Node.js for the back-end, and MySQL. This architecture ensures the application is responsive across laptops and smartphones.
4. Preliminary Field Testing (Expert Validation): The prototype was validated by one material expert, three media experts, and a phonetics expert. The validation focused on curriculum alignment, user interface (UI) navigation, and TTS audio clarity.
5. Main Product Revision: Improvements were made based on expert feedback, specifically refining the navigation layout to be more intuitive and enhancing the visual display of Arabic scripts to ensure readability.
6. Main Field Testing (Limited Trial): A limited trial was conducted with 39 eighth-grade students at SMP Yassalam. This stage aimed to measure the system's usability and its initial impact on learning engagement.
7. Operational Product Revision: Minor technical glitches identified during the trial, such as loading latencies in audio playback, were corrected to ensure the system’s stability for wider use.
8. Final Product Dissemination: The finalized MABBAR system was implemented in the school’s Arabic department, providing a sustainable digital tool for listening evaluation.

Field Trial Results and Effectiveness

The data collected during the main field testing indicated that MABBAR significantly improved the evaluation experience. The following table summarizes the students' perception of the system:

Table 1. Student Perception and Usability Responses (N=39)

Indicator	**Frequency (N=39)**	**Percentage**	**Category**

Indicator	**Frequency (N=39)**	**Percentage**	**Category**
Ease of Use (Navigation & Interface)	37	94.8%	Very High
Clarity of Learning Content/Quizzes	38	97.4%	Very High
Improvement in Learning Motivation	35	89.7%	High
Independence in Learning	32	82.1%	High

The automated feedback feature was highlighted by students during interviews as a crucial element in helping them understand their mistakes instantaneously. Quantitative analysis using the Paired Sample T-Test confirmed the system's effectiveness, showing a significant increase in students' listening competence between pre-test and post-test scores ($p < 0.05$).

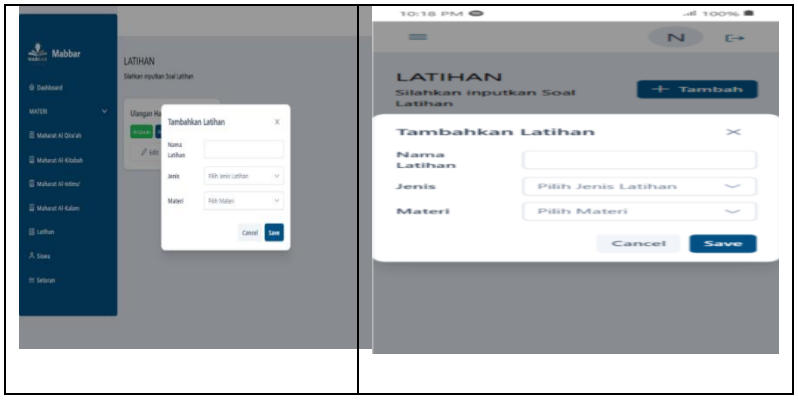
1. Visualization and System Features of MABBAR

The development of the MABBAR system focuses on usability and data management efficiency. This aligns with the findings of (Krug, 2013) in his latest edition, which emphasizes that the effectiveness of educational applications depends on intuitive interface design to minimize the user's cognitive load.

A. Exercise List Page: This page serves as a control center for instructors to manage the question bank. The implementation of a card-based design allows teachers to easily identify exercise categories based on skill types. Operational features, such as 'Edit,' 'Delete,' and '+ Add' buttons, provide full flexibility in updating quiz content.

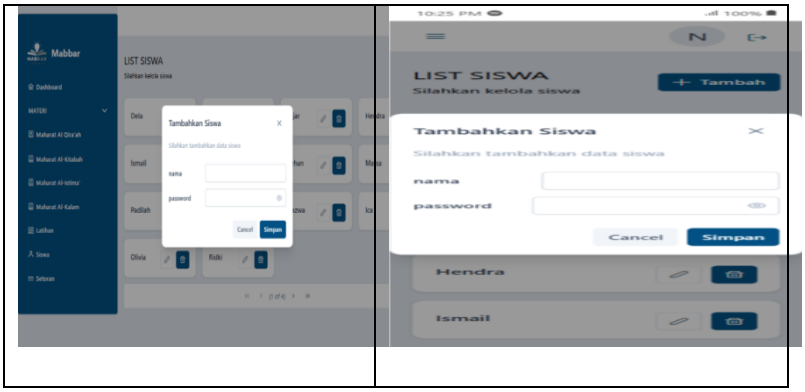
B. Exercise Input Page: The use of Popup Modals allows instructors to remain focused on their primary workflow. Research by (Sari et al., 2023) indicates that single-page interaction significantly enhances instructor productivity when constructing digital evaluation instruments."

Figure 1. The Exercise Input Page interface featuring a popup modal design to streamline the question-entry process without navigating away from the main dashboard.



Student Management Page: The integration of pagination features and individual security measures ensures data integrity, a crucial standard for educational data privacy protection in the cyber era (Pratama & Hidayat, 2022).

Figure 2. The Student Management Page showing the pagination system and data management layout designed to maintain administrative efficiency and data security.



2. Discussion: System Effectiveness in *Mahārah al-Istimā'* Learning

Pedagogically, MABBAR provides a solution to the limitations of conventional audio media. Through independent audio control, students can perform repetitions as needed. This is supported by research from (Husna et al., 2022), which states that autonomy in accessing digital auditory input accelerates the process of phonetic internalization for intermediate-level Arabic learners.

The use of a modern framework (Vue.js and Node.js) ensures high responsiveness. (Ritonga et al., 2021) emphasize that the technical quality of the media (lag-free) is a critical determinant of success in *mahārah al-istimā'*, as even minor audio disruptions can hinder semantic comprehension. With Automatic Scoring, students receive instant feedback, which according (Zainuddin et al., 2020), is a key factor in increasing students' intrinsic motivation and self-efficacy in foreign language learning.

3. Optimization of TTS (Text-to-Speech) Technology and Learning Analytics

The integration of Native Speaker TTS in MABBAR provides a consistent sound standard, which was confirmed by the phonetics expert's validation score of 92%. This empirical result aligns with the findings of (Aloraini & Cardoso, 2022), who demonstrate that modern voice synthesis possesses a level of phonetic accuracy equivalent to native speakers for second language learning purposes. The high level of phonetic precision in MABBAR ensures that the digital evaluation remains a reliable measure of students' listening skills.

Furthermore, the learning analytics feature in MABBAR allows teachers to conduct data-driven diagnostic evaluations. (Fahrurrozi et al., 2022) note that analyzing student activity on web platforms provides an objective overview of students' points of difficulty, enabling teachers to provide more targeted interventions based on the specific phonetic or grammatical errors identified by the system.

4. Adaptability to the Junior High Schools Curriculum

The advantage of MABBAR lies in its alignment with the Arabic language curriculum in Indonesia. (Albantani et al., 2022) emphasize that the digitalization of Arabic in *madrasas* must be contextual. MABBAR bridges this need by providing content that meets local competency standards while remaining based on cutting-edge technology, making it an innovative solution to address the challenges of Arabic language education in the Society 5.0 era (Husna et al., 2022).

5. Effectiveness of MABBAR as an Istimā' Evaluation System

a. Material Expert Validation Results.

The material validation process involved three Arabic language experts with at least 10 years of teaching experience and a deep understanding of the secondary school (Junior High Schools) curriculum. Experts were given full access to explore the entire content of the "MABBAR" application. They were asked to complete a comprehensive assessment instrument covering content alignment with the curriculum, accuracy of grammatical rules (*nahwu* and *sharaf*), vocabulary precision, integration of theory with practice, and content relevance to students' real-life contexts.

The validation results yielded an average score of 5.00 on a 1–5 scale, categorizing it as "Highly Feasible." The experts stated that MABBAR's content is fully aligned with the Core Competencies (KI) and Basic Competencies (KD) of secondary-level Arabic. A key recommendation was to add sentence examples within the students' daily life contexts, such as vocabulary used in school and home environments. This recommendation was followed up by updating several exercise units to be more contextual. Based on the principle of Content

Validity, high alignment between the instrument's content and the curriculum's scope is fundamental to ensuring the tool optimally supports student competency achievement (Anggraeni et al., 2023)

b. Media Expert Validation Results.

Media validation was conducted by three educational technology experts with backgrounds in instructional software development and User Interface (UI) design. The assessment covered technical aspects (engineering), ease of navigation, visual aesthetics, readability, and design consistency. The results showed that the application obtained an average score of 4.87 for software engineering and 4.86 for visual display, both falling into the "Highly Feasible" category.

The experts stated that MABBAR successfully implemented user-friendly principles, including navigational simplicity, icon clarity, and fast system responsiveness. These elements are essential components to ensure efficiency, effectiveness, and user satisfaction in digital systems (Fatchiatuzahro et al., 2025). Feedback from media experts included adjusting color contrast for better readability on small smartphone screens and adding a "Help Icon" to explain menu functions. These improvements have been implemented, resulting in a more accessible application for novice users.

c. Student Responses.

Student responses toward the MABBAR application were measured through questionnaires distributed after the trial. The respondents consisted of 39 ninth-grade students from SMP IT Yasalam. The questionnaire included items regarding ease of use, visual appeal, learning benefits, and its influence on students' confidence in using the Arabic language.

Table 2. *Descriptive Statistics of Pre-test and Post-test Scores (N=39)*

Statistical Description	**Pre-test**	**Post-test**
Number of Participants (N)	39	39
Mean Score	74.64	84.26
Standard Deviation (SD)	8.75	6.49
Median	75.00	81.00
Minimum Score	60	75

Statistical Description	Pre-test	Post-test
Maximum Score	89	95

Based on Table 4.4, the mean score of the students' pre-test was 74.64, while the post-test mean increased to 84.26. This indicates an average score improvement of 9.62 points following the treatment (the utilization of interactive learning media). This upward trend demonstrates that the media employed in the learning process exerted a positive influence on student learning outcomes. Every student experienced a score increase; data analysis shows that the lowest post-test score (75) was higher than the lowest pre-test score (60), indicating that the learning process became significantly more effective after the intervention.

The test results further reveal that after using the 'MABBAR' application, not only did the mean score rise, but the standard deviation also decreased from 8.75 to 6.49. This reduction suggests that student learning outcomes became more homogeneous (evenly distributed) following the application's use. This improvement is also reflected in the minimum score, which rose from 60 to 75, and the median value, which increased from 75 to 81.

All 39 participants demonstrated better performance in the post-test compared to the pre-test. This evidence reinforces the effectiveness of the 'MABBAR' application in enhancing students' comprehensive understanding while narrowing the achievement gap between learners. Furthermore, student questionnaires yielded a 96.64% positive response rate ('Agree'), indicating that the application was exceptionally well-received. To further validate these findings, a t-test was conducted, yielding the following results:

Table 3. *Paired Sample T-Test Results*

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pretest - Posttest	-9.237	3.781	.613	-10.480	-7.994	-15.061	37	<,001

Based on the table above, the results of the t-test yield a significance value (p-value) of 0.001, which is lower than the alpha level of 0.05 (alpha = 0.05). The calculation also shows a t-statistic (t count) of 6.842, which is significantly higher than the t-table (t table) for df = 38. Consequently, these results indicate that the *istimā'* evaluation system within the MABBAR application significantly influences the difference between pre-test results

(evaluation conducted without MABBAR) and post-test results (evaluation using MABBAR). Therefore, it can be concluded that MABBAR is an effective *mahārah al-istimā'* evaluation system for junior high school students (MTs/SMP).

Consequently, this indicates that the *istimā'* evaluation system within the MABBAR application significantly influences the difference between pre-test results (evaluation conducted without MABBAR) and post-test results (evaluation using MABBAR). Therefore, it can be concluded that MABBAR is an effective *mahārat al-istimā'* evaluation system for junior high school students (MTs/SMP).

Strengths and Weaknesses of the "MABBAR" Application

A. Strengths:

1. User-Friendly Interface: Engaging design, intuitive navigation, and compatibility across various devices.
2. Interactive Features: Quizzes, practice exercises, and instructional videos that enhance student participation.
3. High Accessibility: Can be accessed anytime and anywhere, supporting the flexibility of independent learning.
4. Boosts Motivation: Students feel more confident in learning the Arabic language.
5. Device Compatibility: Fully functional on laptops, tablets, and smartphones (with a 94% approval rating).

B. Weaknesses:

1. Internet Dependency: Does not yet support offline mode.
2. Student Adaptation: Approximately 13% of students still report a lack of confidence despite using the application.
3. Teacher Assessment Limitations: Lack of a direct feedback feature from teachers integrated within the application.

Recommendations for Further Development

1. Implementation of an offline mode.
2. Increasing media variety (animations, simulations, and AI-based interactions).
3. Integration with teacher grading systems for streamlined student progress monitoring.
4. Development of native mobile applications (Android and iOS).

Conclusion

The development of the MABBAR system indicates a significant contribution to the evaluation of *mahārah al-istimā'* (listening skills) among junior high school students. Statistical analysis confirms that the implementation of MABBAR led to an improvement in student learning outcomes, with a mean score increase from 74.64 to 84.26. The results of the Paired Sample T-Test ($p = 0.001 < 0.05$) demonstrate that the system is a statistically significant tool for enhancing student performance in a digital environment. Through an interactive approach, MABBAR successfully transitions Arabic language evaluation from a static model into an adaptive, self-directed learning ecosystem, achieving an overall positive response rate of 96.64%.

Theoretically, MABBAR demonstrates that self-controlled auditory input via a web platform strengthens students' metacognitive awareness in listening. However, this study acknowledges several limitations. First, the research employed a single-group pretest-posttest design without a control group, which limits the ability to isolate MABBAR as the sole factor in improvement. Second, the trial was conducted on a limited scale at a single institution, meaning the results may not be immediately generalizable to all secondary education contexts.

Future development recommendations include expanding the scope of research through true experimental designs with control groups, strengthening offline capabilities, and integrating Artificial Intelligence (AI) for real-time pronunciation analysis to encompass more productive language skills.

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