



## A GAMIFIED WORDWALL APPROACH TO ARABIC LANGUAGE LEARNING EVALUATION: INTEGRATING THE MDA AND PBL FRAMEWORKS

Achmad Farouq Abdullah\*<sup>1</sup>, Tutik Lestari<sup>2</sup>, Sofwan Manaf<sup>3</sup>, Nesa Novrizal<sup>4</sup>,  
Ulfatun Wahidatun Nisa<sup>5</sup>

<sup>1,2,3,4</sup> Universitas Darunnajah, Indonesia

<sup>5</sup>Universidad de Sevilla, Spain

### Article Information

#### Article History:

Received : 25-December-2025  
Revised : 20-June-2026  
Accepted : 29-June-2026  
Published : 30-June-2026

#### Keywords:

Arabic evaluation management;  
MDA framework;  
Pesantren;  
Problem-based learning;  
Wordwall gamification.

#### Articles Available Online:



### ABSTRACT

Conventional Arabic assessment in pesantren remains dominated by memorisation-based, manually scored tests that limit student engagement and delay feedback. This study examines how a gamified Wordwall evaluation model, designed through the Mechanics–Dynamics–Aesthetics (MDA) framework and combined with Problem-Based Learning (PBL), can improve both the practice and the management of Arabic language learning evaluation. Using a two-cycle Classroom Action Research (CAR) design, the study involved 30 first-year santri of the TMI program at Pesantren Darunnajah. Data were collected through validated observation sheets, Wordwall-based achievement tests, and a perception questionnaire, and analysed using descriptive statistics, normalised gain (N-gain), and a paired-sample t-test. Learning activity rose from a pre-cycle baseline to 58.4% (Cycle I) and 82.2% (Cycle II); the mean achievement score increased from 72 to 86 and mastery from 63% to 90%, a statistically significant improvement (N-gain = 0.50, moderate). From a managerial perspective, automated scoring and real-time analytics reduced grading time and feedback latency and improved record accuracy. The novelty of the study lies in integrating Wordwall, MDA, and PBL into a single, data-driven evaluation model rather than treating gamification as a motivational add-on. The study concludes that the model offers a replicable, evidence-informed approach to modernising Arabic evaluation governance in Islamic boarding schools, within the limits of its single-site, small-sample design.



#### Copyright:

© 2026 by the author(s).

This open-access article is distributed under the terms and conditions of the Creative Commons Attribution-ShareAlike (CC BY-SA) license (<https://creativecommons.org/licenses/by-sa/4.0/>).

### CORRESPONDING AUTHOR:

Achmaf Farouq Abdullah,

Islamic Family Law,

Universitas Darunnajah, Jakarta

Jalan Ulujami Raya No. 56, RT 001 RW 007, Kelurahan Ulujami, Pesanggrahan, Kota Jakarta Selatan, Pesanggrahan, DKI Jakarta, Indonesia.

Email: [farouqabdullah@darunnajah.ac.id](mailto:farouqabdullah@darunnajah.ac.id)

#### How to Cite:

Abdullah, A. F., Lestari, T., Manaf, S., Novrizal, N., & Nisa, U. W. (2026). A Gamified Wordwall Approach to Arabic Language Learning Evaluation: Integrating the MDA and PBL Frameworks. *Ta'lim al-'Arabiyyah: Jurnal Pendidikan Bahasa Arab & Kebahasaaraban*, 10(1), 73–85. <https://doi.org/10.15575/jpba.v10i1.53070>

## INTRODUCTION

Digital transformation has reshaped the management of learning in Islamic educational institutions, particularly in how evaluation is planned, implemented, and utilized for decision-making. In this study, evaluation management is defined as the systematic organization of the assessment process, encompassing the design of instruments, the administration of tests, the recording and processing of results, the delivery of feedback, and the use of assessment data to support instructional improvement. Within the context of Technology-Enhanced Arabic Language Teaching, evaluation is therefore not merely a tool for measuring achievement but also a managerial mechanism for monitoring instructional effectiveness and promoting continuous quality improvement (Sa'diyah, 2021). For pesantren, strengthening this managerial dimension is essential as they strive to preserve their scholarly traditions while adapting to rapid technological change (Castillo-Parra et al., 2022).

Arabic occupies a strategic position in the pesantren curriculum as a gateway to classical Islamic texts, requiring santri to master vocabulary, grammatical structures, and textual comprehension. However, evaluation practices in many pesantren remain dominated by rote memorization tests and manually scored essays. Beyond merely describing this gap, it is important to consider its managerial implications. Manual scoring delays feedback, constrain continuous progress monitoring, and provides limited actionable data for teachers (Almelhes, 2024). Previous studies on interactive Arabic learning media (Abdullah and Rini, 2020) report improvements in student motivation, yet they are largely confined to content delivery and rarely examine how such media can transform the management of evaluation. A needs analysis conducted by the researchers at Pesantren Darunnajah, administered to Arabic teachers and first-year santri through a structured questionnaire validated by subject-matter experts, confirmed this pattern. Most teachers had already adopted digital platforms, many santri reported higher motivation when using digital assessment, and a substantial proportion of teachers expressed the need for faster and more efficient evaluation systems (Needs Analysis at Pesantren Darunnajah, 2024/2025).

Gamification has emerged as a promising approach by incorporating game elements to enhance motivation and participation (Kaur and Rai, 2026; Palomino et al., 2023; Castillo-Parra et al., 2022; Kuo et al., 2014). Empirical studies across a wide range of subjects and languages, including science, mathematics, English, Chinese, and Arabic, consistently report improvements in both engagement and learning outcomes (Richter and Kickmeier-Rust, 2025; Zhao and Jamaludin, 2026; Shi, 2025; Darmawansah et al., 2026). Wordwall, a widely adopted gamification platform, has been shown to increase engagement through interactive formats such as matching pairs, random wheels, and quizzes (Panjaitan et al., 2026), as well as to improve Arabic vocabulary mastery (Thongkoo et al., 2026). However, a critical examination of this body of literature reveals two recurring limitations. First, most studies treat Wordwall as an isolated motivational tool and focus primarily on learning outcomes, leaving its instructional design insufficiently theorized (Ahsanuddin et al., 2025). Second, they rarely address the managerial potential of the platform, particularly its capacity to automate scoring, accelerate feedback, and generate actionable progress data for teachers (Bachiri et al., 2023)..

To overcome the first limitation, this study designs Wordwall through the MDA Framework (Mechanics–Dynamics–Aesthetics), which aligns game mechanics, interaction dynamics, and aesthetic experience with specific language competencies (Hunicke, LeBlanc,

& Zubek, 2004; Putra & Yasin, 2021). To overcome the second, it embeds Problem-Based Learning (PBL), so that santri actively construct knowledge by solving authentic language problems before being assessed (Huang et al., 2022; Huang et al., 2023; Chinchua et al., 2022). Earlier work treats these approaches separately; the few studies that combine gamification with instructional design rarely do so within a managerial and pesantren-specific frame.

This combination defines the research gap. While gamification, the MDA framework, and Problem-Based Learning (PBL) are individually well documented, no prior study, to the authors' knowledge, has integrated all three into a single data-driven model for managing Arabic language evaluation in pesantren. The novelty of this study is therefore twofold. Conceptually, it reframes Wordwall from a mere motivational tool into a component of an accountable and replicable evaluation system. Contextually, it tests this integrated model within a pesantren setting, whose instructional culture differs significantly from that of formal schooling (Ismail et al., 2023).

Because Classroom Action Research (CAR) is oriented toward improving concrete classroom practice through reflective cycles, the research questions are deliberately limited to three practice-focused questions: (1) How does the implementation of the Wordwall–MDA–PBL model improve the practice and management of Arabic language evaluation across two action cycles? (2) To what extent does the model improve santri's learning activities and learning outcomes? and (3) How do santri perceive the gamified digital evaluation model? Answering these questions allows the study to connect measurable instructional gains with the broader aim of modernising evaluation governance in Islamic boarding schools.

## METHOD

### Research Design

This study employed a Classroom Action Research (CAR) design following the Kemmis and McTaggart spiral model, in which each cycle comprises four interrelated stages: planning, acting, observing, and reflecting. CAR was selected because the objective was not merely to measure an outcome but to improve the practice and management of Arabic language evaluation through systematic, reflective iteration (Kemmis, McTaggart, & Nixon, 2014). The study was conducted over two cycles, each consisting of three meetings, during the 2024/2025 academic year at Pesantren Darunnajah. The overall procedure is illustrated in Figure 1.



**Figure 1. Classroom Action Research Implementation Procedure**

## Participants

The participants were 30 first-year santri of the Tarbiyatul Mu'allimin al-Islamiyah (TMI) program at Pesantren Darunnajah, all aged 12–13 years. They were selected through purposive sampling on the grounds that this cohort had just entered formal Arabic instruction and represented the typical range of entry-level proficiency in the program. Their initial Arabic ability, established from the pre-cycle test described below, was predominantly in the low-to-moderate category, providing a relevant baseline for an intervention targeting foundational vocabulary and grammar. All participants and their guardians provided informed consent, and the study followed the ethical guidelines of the institution.

## Instruments

Three instruments were used. First, a *structured observation sheet* recorded learning activity across five indicators active participation in discussion, responsiveness to Wordwall, problem-solving ability, group collaboration, and focus and persistence each rated on a four-point scale by two independent observers. Second, a *Wordwall-based achievement test* assessed vocabulary mastery, grammatical understanding, and contextual language use, with items aligned to the lesson objectives. Third, a *perception questionnaire* of 5 items on a five-point Likert scale measured media attractiveness, ease of use, motivation, clarity of items, and relevance.

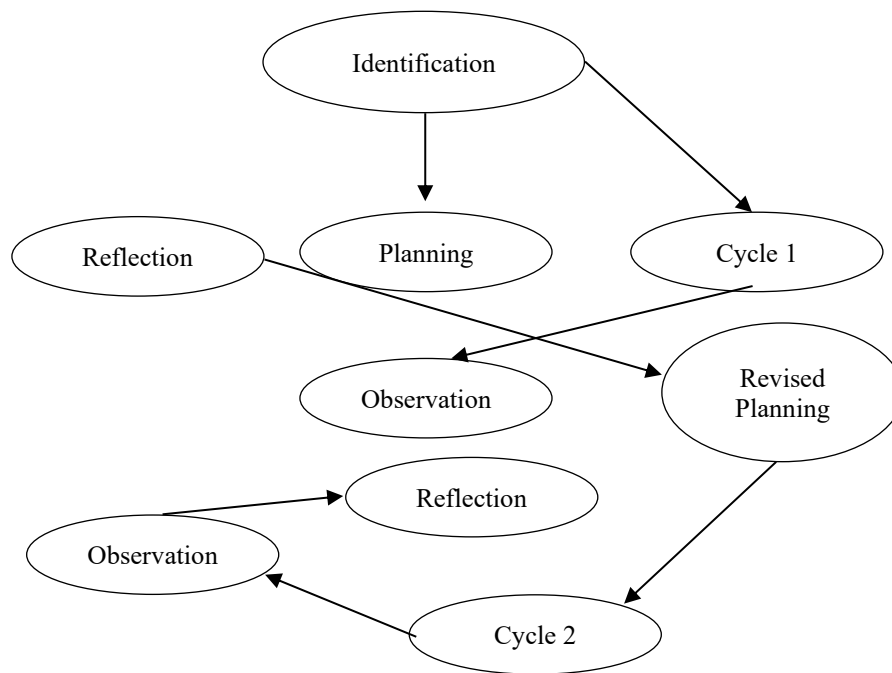
Content validity was established through expert judgement by a panel of subject-matter experts (specialists in Arabic education and educational evaluation) and quantified using the content validity index, yielding CVI values of 0.85–0.88, which is categorised as valid. Construct validity of the test items was examined through item analysis, and internal-consistency reliability was computed using Cronbach's alpha. The reliability coefficients, summarised in Table 1, indicate that all instruments met the accepted threshold of  $\alpha \geq 0.70$ .

**Table 1. Validity and Reliability of the Research Instruments**

Instrument	No. of Items	Validity (CVI)	Reliability ( $\alpha$ )
Observation sheet	5 indicators	0.85	0.82
Wordwall achievement test	Multiple items	0.88	0.86
Perception questionnaire	5 items	0.87	0.88

## Research Procedure

Before the first cycle, a pre-cycle observation and pre-test were conducted to document the initial levels of learning activity and achievement, serving as the baseline for subsequent comparison. During the planning stage of each cycle, the researcher and the teacher collaboratively developed PBL-oriented lesson plans and designed Wordwall-based learning media using the MDA framework (Savery, 2006). In the acting stage, the teacher implemented problem-based instruction and administered Wordwall-based evaluations, including matching pairs, quizzes, and random wheel tasks, at the end of each session. In the observing stage, two observers recorded students' learning activity, while Wordwall automatically compiled achievement scores. In the reflecting stage, the research team analysed the data and identified necessary refinements, including clearer instructions, greater variation in tasks, and more balanced group arrangements, which were then applied in the subsequent cycle. This process followed the spiral model illustrated in Figure 2.



**Figure 2. Stages of Classroom Action Research**

### Data Analysis Techniques

Quantitative and qualitative data were analysed in a complementary manner. Observation and questionnaire data were analysed using descriptive statistics (mean and percentage), with activity and perception scores converted to percentages and interpreted against predetermined criteria. Achievement data were analysed by comparing the mean score and mastery percentage across the pre-cycle, Cycle I, and Cycle II, and the magnitude of improvement was quantified using the normalised gain (N-gain) formula,  $g = (\text{post-test} - \text{pre-test}) / (\text{maximum score} - \text{pre-test})$ , interpreted as low ( $g < 0.30$ ), moderate ( $0.30 \leq g < 0.70$ ), or high ( $g \geq 0.70$ ) (Hake, 1998). To test whether the improvement between cycles was statistically significant, a paired-sample t-test was applied at the 0.05 significance level after the normality of the score distribution had been verified. Qualitative data from observation notes and teacher reflections were reduced, coded, and categorised to explain the factors underlying the quantitative changes.

### Indicators of Success

The action was considered successful if the following operational criteria were achieved by the end of Cycle II. First, the average learning activity score reached at least 80 percent, which corresponds to the high category. Second, classical mastery was attained by at least 85 percent of santri achieving the minimum mastery criterion (MMC). Third, the normalized gain of achievement scores fell within at least the moderate category. Fourth, the mean perception score reached a minimum of 4.0 on a five-point scale. In addition, managerial improvement was evaluated using three operational indicators, namely the reduction in scoring time, the reduction in feedback latency, and the accuracy of digital record-keeping, all of which were documented through teacher logs across the cycles

## RESULT AND DISCUSSION

### Result

#### Baseline Condition (Pre-Cycle)

Before the intervention, a pre-cycle observation and pre-test were conducted to establish the baseline. At this stage, Arabic evaluation relied on manually scored written tests, and learning activity was predominantly in the low category, with an average activity score of 41.6%. The pre-test mean was 60 with only 40% of santri reaching the minimum mastery criterion (MMC). These baseline figures, summarised in Table 2, provide the reference point against which the two action cycles are compared and confirm that the initial condition justified the intervention.

**Table 2. Pre-Cycle Baseline of Learning Activity and Achievement**

Aspect	Pre-Cycle	Cycle I	Cycle II
Average learning activity (%)	41.6	58.4	82.2
Mean achievement score	60	72	86
Mastery (%) reaching MMC	40	63	90

#### Design of the MDA and PBL Based Wordwall Media

Eight Wordwall activities were designed so that each game mechanic was deliberately mapped, through the MDA framework, onto a specific Arabic competency and embedded within a problem-based task. Rather than listing every screen, Table 3 summarises the media by activity type, the MDA element foregrounded, and the targeted competency; the full resources are available online via the links provided by the authors. This design ensured that evaluation was not a separate event but an integral, formative part of problem-based learning.

**Table 3. Summary of the MDA and PBL Based Wordwall Media**

Wordwall Activity	Targeted competency	MDA emphasis	PBL task
Mufradāt al-Madrasah (Matching Pairs)	School vocabulary	Mechanics–Aesthetics	Identify objects to solve a labelling problem
Tarkīb Muḥtada–Khabar (Ordering)	Basic sentence structure	Mechanics–Dynamics	Reconstruct a scrambled message
Al-‘Adad wa al-Ma‘dūd (Tap Tile)	Numerals	Dynamics–Aesthetics	Match quantities in a real context
Asmā’ al-Adawāt (Multiple Choice)	Vocabulary of tools	Mechanics–Dynamics	Decide the correct object for a task
Al-Alwān (Quiz)	Colour vocabulary	Aesthetics–Dynamics	Describe objects by colour
Ayna Qalamuka? (Quiz Challenge)	Prepositions (ḥurūf al-jarr)	Mechanics–Dynamics	Locate objects in a scene
Al-Jam‘ wa al-Mufrad (Matching)	Singular–plural morphology	Mechanics	Group words by morphological pattern
Murāja‘at al-Mufradāt (Open the Box)	Cumulative review	Dynamics–Aesthetics	Solve mixed problems competitively

### Improvement in Learning Activities

Learning activity improved consistently across the three stages. From a pre-cycle baseline of 41.6%, the average rose to 58.4% in Cycle I and 82.2% in Cycle II, an overall gain of 23.8 percentage points between the two cycles. Crucially, the largest gains occurred in problem-solving ability (58% to 82%) and responsiveness to Wordwall (60% to 85%), indicating that the improvement was driven specifically by the problem-based tasks and the interactive mechanics rather than by general novelty. Table 4 details the indicator-level results.

**Table 4. Improvement in Learning Activity by Indicator**

No	Activity indicator	Pre-Cycle (%)	Cycle I (%)	Cycle II (%)
1	Active participation in discussion	40	55	78
2	Responsiveness to Wordwall	43	60	85
3	Problem-solving ability	41	58	82
4	Group collaboration	44	62	86
5	Focus and persistence	40	57	80
<b>Average</b>		<b>41.6</b>	<b>58.4</b>	<b>82.2</b>

### Improvement in Learning Outcomes

Achievement, measured by the Wordwall-based test, rose from a mean of 72 in Cycle I to 86 in Cycle II, while classical mastery increased from 63% (19 santri) to 90% (27 santri). The normalised gain between the two cycles was  $g = (86 - 72) / (100 - 72) = 0.50$ , which falls within the *moderate* category. A paired-sample t-test confirmed that the improvement was statistically significant,  $t(29) = 8.50$ ;  $p < 0.05$ , indicating that the change is unlikely to be attributable to chance. Table 5 reports these results, and the significance of the gain substantiates the claim that the model strengthened, rather than merely accompanied, learning.

**Table 5. Achievement Scores, N-Gain, and Significance Test**

Component	Cycle I	Cycle II	Analysis
Mean score	72	86	N-gain = 0.50 (moderate)
Mastery (%)	63	90	+27 points
Santri reaching MMC	19	27	of 30
Paired-sample t-test	–	–	$t(29) = 8.50$ ; $p < 0.05$

### Santri's Perceptions of the Model

The perception questionnaire produced an overall mean of 4.5 on the five-point scale, placing the model in the *very good* category. The highest-rated aspects were motivation enhancement (4.7) and media attractiveness (4.6), while clarity of items (4.3), although lowest, still exceeded the 4.0 success threshold. These results, presented in Table 6, are consistent with the behavioural gains observed in Table 4 and suggest that affective acceptance accompanied measurable performance improvement.

**Table 6. Santri's Perceptions of the Wordwall-MDA-PBL Model**

No	Perception aspect	Mean (scale 1-5)
1	Media attractiveness	4.6
2	Ease of use	4.4
3	Motivation enhancement	4.7
4	Clarity of test items	4.3
5	Relevance to learning content	4.5
<b>Overall mean</b>		<b>4.5</b>

Because the central claim of this study concerns evaluation *management*, managerial indicators were documented alongside learning gains. Teacher logs showed that automated scoring substantially reduced the time needed to grade and compile a full class set compared with the manual pre-cycle process; feedback that previously took several days to reach santri was delivered immediately at the end of each session; and the accuracy of score records improved as the platform eliminated transcription errors. These observations provide qualitative evidence that the model improved the efficiency, timeliness, and accountability of evaluation, not only its learning outcomes.

Reflection across the cycles explains why the gains occurred. In Cycle I, several santri experienced difficulties with the digital interface and with independently identifying problems during the PBL stage, which limited their participation. The refinements introduced in Cycle II, including simplified instructions, a brief demonstration of Wordwall navigation, greater variation of items aligned with students' proficiency levels, and more balanced group arrangements, directly addressed these challenges. The consequence was visible: discussion became more dynamic, pacing improved, and every santri had more opportunity to contribute before assessment. From the teacher's perspective, the automatic compilation of results shifted evaluation from an administrative burden toward a reflective instrument that could be acted upon immediately, allowing rapid identification of learning gaps and remedial needs.

## Discussion

The findings show that integrating Wordwall, the MDA framework, and PBL improved learning activity (from 41.6% at baseline to 82.2%), achievement (mean 72 to 86; N-gain 0.50, significant at  $p < 0.05$ ), and evaluation management. The discussion below interprets these results critically, situating them against prior research rather than restating the numbers.

The managerial gains observed in this study extend beyond merely confirming earlier findings on Wordwall. Previous studies, such as Nenohai et al. (2022) and Alatas et al. (2024), report increased engagement and improved vocabulary mastery, but they remain largely limited to learning outcomes (Zekan et al., 2024; Adetunji & Ade-Ibijola, 2024; Kuswardayan et al., 2025; Skraparli et al., 2025). In contrast, the present study provides measurable evidence at the managerial level, including reduced scoring time, immediate feedback, and improved accuracy of record-keeping. In doing so, it responds to the call by Almelhes (2024) and Ismail et al. (2023) for pesantren to position digital tools not only as instruments of instructional delivery but also as mechanisms for learning governance. This distinction in emphasis is significant. Whereas prior research primarily positions Wordwall as a motivational tool, the findings of this study demonstrate its role as an integral component of

a data-driven evaluation system. This repositioning constitutes the study's primary contribution.

The significant normalized gain and the pattern observed at the indicator level support the claim by Putra and Yasin (2021) that game mechanics determine the quality of interaction. The most substantial improvement in problem-solving ability, rising from 58 percent to 82 percent, followed the deliberate alignment of game mechanics with targeted competencies. The dynamics dimension was reflected in increased positive competition and faster response rates, consistent with the findings of Miller and Josephs (2009), Landers (2014), and Plass, Homer, and Kinzer (2015). Meanwhile, the aesthetics dimension, as indicated by high ratings of attractiveness at 4.6 and motivation at 4.7, reinforces the motivational mechanisms described by Ryan and Deci (2020), and Rini (2020). The novelty of this study lies in the application of the MDA framework not merely to gamify content delivery, but to structure the assessment process itself. In this way, the evaluation tool is transformed into an integrated instructional design system.

The increase in collaboration from 62 percent to 86 percent and in discussion participation from 55 percent to 78 percent, together with the rise in mastery to 90 percent, indicates that Problem-Based Learning (PBL) functioned as the cognitive foundation for digital assessment. This finding is consistent with Kamba (2018). A plausible explanation for this synergy lies in the sequencing of instructional activities. Problem-solving prior to evaluation fostered students' conceptual readiness, which was subsequently verified efficiently and objectively through Wordwall. This interpretation, supported by reflective data, goes beyond the correlational claims commonly found in the gamification literature and suggests a more causally grounded relationship between instructional design and learning outcomes.

Concretely, this study differs from prior work in three ways: it integrates three previously separate approaches (Wordwall, MDA, PBL) into one model; it relocates gamification from the motivational to the managerial domain by reporting operational management indicators; and it tests the model in a pesantren, a context under-represented in the Arabic-technology literature (Abdullah et al., 2024; Almelhes, 2024). The model thus enriches the discourse on Arabic Language Teaching Technology by demonstrating how digital media can be pedagogically, cognitively, and managerially integrated (Alfadil, 2020; Gee, 2003; Bond et al., 2020).

Several limitations qualify these conclusions. The study was conducted at a single site with 30 first-year santri over two cycles, so the findings are context-bound and not statistically generalisable; the CAR design, by nature, prioritises practice improvement over experimental control, and the absence of a control group means causal claims rest on within-group comparison and reflective evidence. Reliance on platform-generated data and self-reported perceptions may also introduce measurement bias. Future research should test the model across multiple pesantren, with larger samples and, where feasible, a quasi-experimental design, and should track longer-term retention of Arabic competencies.

## CONCLUSION

This study aimed to examine how a gamified Wordwall model, designed using the MDA framework and integrated with Problem-Based Learning (PBL), can enhance both the practice and management of Arabic language evaluation in a pesantren context. Evidence from two action cycles indicates that the model successfully achieved this objective: students' learning activity, achievement, and perceptions all improved beyond the predetermined success criteria, and the improvement in achievement was statistically significant with a moderate normalized gain. Equally important, the model demonstrably strengthened evaluation management through faster scoring, immediate feedback, and more accurate record-keeping, thereby addressing the core problem that motivated the study.

Conceptually, this study contributes to the reconceptualization of gamification by shifting it from a mere motivational supplement to a component of a data-driven and accountable evaluation system. Theoretically, it demonstrates how the MDA framework can be applied to structure assessment processes rather than only content delivery, and how PBL can provide the cognitive foundation that is subsequently verified through digital assessment. Practically, it offers Arabic language teachers in Islamic boarding schools a concrete and transferable approach to integrating problem-based instruction with gamified, analytics-supported evaluation.

These findings should be interpreted in light of the study's limitations, including its single-site setting, small first-year cohort, two-cycle design, and the absence of a control group inherent in Classroom Action Research (CAR). Therefore, the model is not presented as a universally established solution, but rather as a promising, evidence-informed approach. Its broader applicability requires further investigation across multiple pesantren and larger samples, ideally using quasi-experimental designs that also examine the long-term retention of Arabic language competencies.

## ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to the leadership of Pesantren Darunnajah, the teachers, and the TMI students for their support and cooperation throughout the research process. Appreciation is also extended to colleagues who provided academic and administrative assistance. The authors gratefully acknowledge the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia (Kemdikristek) for the financial support that made this research possible.

## AUTHOR CONTRIBUTIONS STATEMENT

All authors made significant contributions to conceptualization, research design, data collection, analysis, and manuscript preparation. All authors have read and approved the final version of the manuscript.

### Funding

The authors express their highest appreciation to the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia (KEMDIKTISAINTEK) for funding this research through the 2025 research grant program.

### Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

## Disclaimer

The views and opinions expressed in this article are solely those of the authors and do not necessarily reflect the official positions of any affiliated institutions or funding bodies.

## REFERENCES

- Abdullah, A. F., & Rini, F. S. (2020). Utilization of visual learning-based Arabic learning multimedia to improve Arabic language skills of female students at University of Darussalam Gontor. *At-Ta'dib*, 15(2), 125–140.
- Abdullah, A. F., Rini, F. S., & Syarifah, S. (2024). Bridging the linguistic gap: Development of learning media for a special Indonesian–Arabic dictionary. *Halaqa: Islamic Education Journal*, 8(1), 1–7.
- Adetunji, R.O., & Ade-Ibijola, A. (2024). Unlocking Learning: Investigating the Replayability of Educational Games. *International Journal of Computer Games Technology*, 2024. <https://doi.org/10.1155/2024/5876780>
- Ahsanuddin, M., Ismail, Z., Thoriq, M.A., Riskiyah, F., Pradana, R.F., Pratama, A.W., & Ahsan, N.A.M. (2025). Development and Validation of a Construct 2-Based Gamified Assessment for Arabic Language Learning. *Asia Pacific Journal of Educators and Education*, 40(3), 671–706. <https://doi.org/10.21315/apjee2025.40.3.26>
- Alatas, F., Rahmawati, N., & Syafi'i, A. (2024). Gamification-based vocabulary learning for improving Arabic proficiency in Islamic schools. *Journal of Arabic Education Studies*, 6(1), 45–60.
- Alfadil, M. (2020). Effectiveness of virtual reality game in foreign language vocabulary acquisition. *Computers & Education*, 153, 103893. <https://doi.org/10.1016/j.compedu.2020.103893>
- Almelhes, S.A. (2024). Gamification for teaching the Arabic language to non-native speakers: a systematic literature review. *Frontiers in Education*, 9. <https://doi.org/10.3389/feduc.2024.1371955>
- Bachiri, Y.A., Mouncif, H., & Bouikhalene, B. (2023). Artificial Intelligence Empowers Gamification: Optimizing Student Engagement and Learning Outcomes in E-learning and MOOCs. *International Journal of Engineering Pedagogy*, 13(8), 4–19. <https://doi.org/10.3991/IJEP.V13I8.40853>
- Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: A systematic evidence map. *International Journal of Educational Technology in Higher Education*, 17(1), 2. <https://doi.org/10.1186/s41239-019-0176-8>
- Castillo-Parra, B., Hidalgo-Cajo, B.G., Váscenez-Barrera, M., & Oleas-López, J. (2022). Gamification in higher education: A review of the literature. *World Journal on Educational Technology: Current Issues*, 14(3), 797–816. <https://doi.org/10.18844/wjet.v14i3.7341>
- Chinchua, S., Kantathanawat, T., & Tuntiwongwanich, S. (2022). Increasing Programming Self-Efficacy (PSE) Through a Problem-Based Gamification Digital Learning Ecosystem (DLE) Model. *Journal of Higher Education Theory and Practice*, 22(9), 131–143. <https://doi.org/10.33423/jhetp.v22i9.5370>
- Darmawansah, D., Afrizal, M.C., & Yang, J.C. (2026). A gamified analytical thinking skills learning approach for young learners' Arabic language learning: effects on performance, motivation, engagement, and gender-based perceptions. *Computer Assisted Language Learning*. <https://doi.org/10.1080/09588221.2026.2673874>
- Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. Palgrave Macmillan.
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64–74. <https://doi.org/10.1119/1.18809>
- Huang, W., Li, X., & Shang, J. (2022). Gamified Project-Based Learning: A Systematic

- Review. In *Lect. Notes Comput. Sci.* (pp. 313–324). Springer Science and Business Media Deutschland GmbH. [https://doi.org/10.1007/978-3-031-08939-8\\_27](https://doi.org/10.1007/978-3-031-08939-8_27)
- Huang, W., Li, X., & Shang, J. (2023). Gamified Project-Based Learning: A Systematic Review of the Research Landscape. *Sustainability (Switzerland)*, 15(2). <https://doi.org/10.3390/su15020940>
- Hunicke, R., LeBlanc, M., & Zubek, R. (2004). MDA: A formal approach to game design and game research. In *Proceedings of the AAAI Workshop on Challenges in Game AI* (Vol. 4, No. 1, pp. 1–5). AAAI Press.
- Ismail, U.S., Makhtar, N.I., Chulan, M., & Ismail, N. (2023). A Model Framework for the Implementation of Gamification in Arabic Teaching in Malaysia. *Theory and Practice in Language Studies*, 13(11), 2800–2805. <https://doi.org/10.17507/tpls.1311.09>
- Kamba, A. (2018). Problem-based learning in Islamic education: A model for critical thinking development. *International Journal of Islamic Pedagogy*, 3(1), 33–47.
- Kaur, N., & Rai, M. (2026). Role of Gamification Techniques to Boost Students Motivation and Engagement in Classroom Learning. In *Smart Technologies for Sustainable Development Goals: Quality Education* (pp. 89–104). CRC Press. <https://doi.org/10.1201/9781003646075-6>
- Kemmis, S., McTaggart, R., & Nixon, R. (2014). *The action research planner: Doing critical participatory action research*. Springer. <https://doi.org/10.1007/978-981-4560-67-2>
- Kuo, M.S., Chuang, T.Y., Chuang, T.C., Chen, P.Y., & Lin, H.C. (2014). Gamification in academia practice - What motivate users most. In *Proc. Int. Conf. Comput. Educ., ICCE* (pp. 641–646). Asia-Pacific Society for Computers in Education.
- Kuswardayan, I., Yuhana, U.L., Fabroyir, H., & Shiddiqi, A.M. (2025). Enhancing User Learning Engagement Through Gamified Multiplayer Activities: A Case Study of the QuizBattle Application. In *Int. Conf. Smart Comput., IoT Mach. Learn., SIML*. Institute of Electrical and Electronics Engineers Inc.. <https://doi.org/10.1109/SIML65326.2025.11081137>
- Landers, R. N. (2014). Developing a theory of gamified learning: Linking serious games and gamification of learning. *Simulation & Gaming*, 45(6), 752–768. <https://doi.org/10.1177/1046878114563660>
- Miller, A. G., & Josephs, R. A. (2009). Emotional processes in learning environments: Applications of game-based mechanics and dynamics. In J. A. Greene & R. B. Anderson (Eds.), *Cognition and emotion in education* (pp. 1–25). Routledge.
- Nenohai, J. A., Naja, F. A., Makapedua, D. M., & Jalaru, M. R. (2022). Development of gamification-based Wordwall game platform on reaction rate materials. *Orbital: The Electronic Journal of Chemistry*, 14(2), 120–132. <https://doi.org/10.17807/orbital.v14i2.1679>
- Palomino, P.T., Rodrigues, L., & Toda, A. (2023). Gamification and motivation. In *Gamification Design for Educational Contexts: Theoretical and Practical Contributions* (pp. 15–35). Springer International Publishing. [https://doi.org/10.1007/978-3-031-31949-5\\_2](https://doi.org/10.1007/978-3-031-31949-5_2)
- Panjaitan, M.B., Siagian, A.F., Siagian, G., Judijanto, L., Sherly, S., Simanjuntak, H., & Herman, H. (2026). Leveraging WordWall Teaching Media as Tools to Improve Learning Outcomes in Natural Science Subject. *Journal of Curriculum and Teaching*, 15(2), 248–258. <https://doi.org/10.5430/jct.v15n2p248>
- Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist*, 50(4), 258–283. <https://doi.org/10.1080/00461520.2015.1122533>
- Putra, R. F., & Yasin, A. (2021). Penerapan MDA framework untuk desain gamifikasi pembelajaran. *Indonesian Journal of Informatics Education*, 3(2), 101–114.
- Richter, K., & Kickmeier-Rust, M. (2025). Gamification in Physics Education: Play Your Way to Better Learning. *International Journal of Serious Games*, 12(1), 59–81.

- <https://doi.org/10.17083/ijsg.v12i1.858>
- Rini, D. S. (2020). Pengembangan multimedia visual dalam pembelajaran bahasa Arab untuk meningkatkan motivasi belajar siswa. *Jurnal Alfa*, 8(2), 101–115.
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Sa'diyah, N. (2021). Quality assurance and evaluation system in Islamic boarding schools: A contemporary perspective. *Journal of Islamic Educational Management*, 3(1), 45–58.
- Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning*, 1(1), 9–20. <https://doi.org/10.7771/1541-5015.1002>
- Shi, Y. (2025). Leveraging digital literacy and gamification for English language acquisition: a comprehensive study of digital media's role in education. *International Journal of Inclusive Education*. <https://doi.org/10.1080/13603116.2025.2567431>
- Skraparli, G., Stefanidis, T., & Tsiatsos, T. (2025). Evaluating the Impact of Gamification in ePhos AR: A Comparison of Usability, Engagement, and Motivation. In *IEEE Global Eng. Edu. Conf., EDUCON*. IEEE Computer Society. <https://doi.org/10.1109/EDUCON62633.2025.11016547>
- Thongkoo, K., Li, F., Huang, X., & Daungcharone, K. (2026). Beyond Vocabulary Gains: Gamification, Digital Capital, and Learner Attitudes in Chinese Language Education. *International Journal of Sociology of Education*, 15(1), 64–81. <https://doi.org/10.17583/rise.18812>
- Zekan, S.B., Russo, A., & Roje, A. (2024). Leveraging Gamification Using Escape Rooms to Improve Students' Motivation and Learning Experience. In *Developing Managerial Skills for Global Business Success* (pp. 199–213). IGI Global. <https://doi.org/10.4018/979-8-3693-3057-9.ch013>
- Zhao, C., & Jamaludin, K.A. (2026). Role of gamification in chemistry learning classrooms: Enhancing student motivation through interactive learning approach. *International Journal of Education and Practice*, 14(2), 314–337. <https://doi.org/10.18488/61.v14i2.4897>