Assessing The Effectiveness Of FPS Gamification In Arabic Acquisition for Integrated Islamic Elementary Schools Students

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Abstract
This study investigates the effectiveness of 3D First-Person Shooter (FPS) gamification on Arabic learning for Integrated Islamic elementary school (SDIT) students. The primary goal is to assess how this interactive learning medium improves students' Arabic language proficiency and to evaluate the satisfaction levels of both students and teachers. Utilizing a mixed-methods approach, the research combines qualitative and quantitative data collection techniques. Pretest-posttest assessments are used to measure students' progress before and after engaging with the gamified media, while questionnaires capture satisfaction and feedback from participants. Results show a significant improvement in students' Arabic vocabulary, with average scores increasing from 74.1 in the pre-test to 89.2 in the post-test. A paired sample t-test confirmed the improvement as statistically significant ($p < 0.001$). The results of surveys showed high satisfaction levels, with students expressing motivation and enthusiasm for learning and teachers recognizing the game's relevance and effectiveness in classroom settings. These findings suggest that 3D FPS-based gamification enhances Arabic language learning in Islamic elementary schools. The study recommends further exploration of gamification techniques in Arabic education at various academic levels.
Keywords: 3D FPS Gamification; Arabic Learning; Integrated Islamic Elementary Schools; Mixed-Methods Approach; Student Satisfaction.

INTRODUCTION

The Arabic language is central to Islamic education, serving as the primary medium for engaging with sacred texts such as the Quran and Hadith and accessing a vast body of Islamic scholarship (Hendro & Talqis, 2021; Suryadarma et al., 2024). In Islamic schools, proficiency in Arabic is crucial for students to fully comprehend religious doctrines and contribute to intellectual and spiritual growth within the Muslim community (Umi et al., 2023). Despite its importance, Arabic language instruction often faces challenges, particularly when it comes to vocabulary acquisition and retention (Naif & Saad, 2017; Suryadarma, Ismail, et al., 2023). Traditional teaching methods, which predominantly rely on rote memorization and grammar translation, are widely regarded as ineffective in fostering long-term retention and student engagement (Bailey et al., 2021). These conventional approaches typically fail to address diverse learning styles, leading to limited practical language skills and disengaged students, particularly in non-Arabic speaking regions (Turg`unova & Abdurahimovna, 2023).

In response to these challenges, the role of educational technology in enhancing language learning has gained significant attention (Adolph et al., 2015; Muriyatmoko et

al., 2018; Suryadarma, Nurcholis, et al., 2023). Recent advancements in gamification, which applies game-design elements such as scoring, feedback, and challenges to non-game contexts, have shown considerable promise in promoting active learning and improving student motivation (Hakak et al., 2019). Gamified environments offer dynamic, student-centered learning experiences that increase engagement and facilitate deeper learning by situating the target language in interactive and immersive contexts (Legault et al., 2019). Within this framework, 3D First-Person Shooter (FPS) games have emerged as an innovative tool, enabling students to practice and reinforce their vocabulary acquisition in real-time, simulated environments (Pratiwi & Taurusta, 2023). By incorporating such immersive tools, Islamic schools can overcome the limitations of traditional methods and provide more effective, engaging ways for students to master the Arabic language (Akmaliyah et al., 2021).

Although the potential of gamification in language education is widely acknowledged, there is a notable gap in empirical research specifically assessing the effectiveness of 3D FPS games in Arabic language acquisition (Abdeen & Albiladi, 2021). Arabic, with its complex grammatical structure, orthography, and extensive vocabulary, poses unique challenges to learners, especially in non-Arabic speaking contexts such as Indonesia (Said et al., 2016). While traditional methods of instruction may struggle to engage students and facilitate retention, 3D FPS games offer a promising alternative by allowing students to apply new vocabulary in meaningful, contextualized scenarios (Herumurti et al., 2020). Through interactive gameplay, students actively engage with the target language, enhancing both their comprehension and retention.

However, despite the increasing use of educational technologies in language instruction, few studies have rigorously evaluated the impact of 3D FPS games on Arabic language learning outcomes. This gap is particularly significant in the context of Integrated Islamic Elementary Schools in East Java, Indonesia, where Arabic is a core component of the curriculum (Hidayatullah, 2024). Without empirical evidence, it remains unclear whether these tools can effectively improve student performance and engagement. Addressing this gap is essential, as it will provide educators and policymakers with a clearer understanding of how to integrate innovative technologies into traditional classroom settings and maximize their educational potential (Weiss et al., 2018).

This study aims to evaluate the effectiveness of 3D FPS games in improving Arabic vocabulary acquisition among students in East Java Integrated Islamic Elementary Schools as well as satisfaction surveys from both students and teachers. This research will assess the extent to which 3D FPS games can enhance language proficiency and foster greater engagement. The findings of this study will offer valuable insights into how 3D FPS games can be integrated into Arabic language curricula, contributing to both theoretical and practical discussions on educational technology in Islamic contexts.

METHOD

Utilizing a mixed-methods research design, data were collected through both quantitative and qualitative methods (Creswell & Creswell, 2018; Tashakkori et al., 2021). This study was conducted across five Integrated Islamic Elementary Schools in East Java, specifically in Ponorogo, Malang, and Surabaya, from July to September 2024. The participating schools—SDIT Qurrota A'yun, SD Muhammadiyah Terpadu in Ponorogo, SDI Al-Umm in Malang, SDI Nurul Izzah in Malang, and SDI Al-Azhar 35 in

Surabaya—share common features in their curricula, which integrate Islamic education, *tahfidz* (Qur'an memorization), and Arabic language teaching. While not all schools held the official Islamic elementary school designation, their educational approach was consistent in fostering Arabic language proficiency within an Islamic context.

Data Collection and Analysis

Quantitative data collection included pre-test-post-test assessments used to measure the effectiveness of 3D First-Person Shooter (FPS) games on Arabic vocabulary acquisition among Integrated Islamic Elementary Schools students. And Qualitative data collection was taken from the result of questionnaires from students and teachers. A total of 100 students were involved, selected based on their basic proficiency in Arabic to focus the study on vocabulary enhancement rather than language introduction. Seven teachers also participated, ensuring that all participants consented and were motivated throughout the study. Classroom observations supplemented this by providing real-time insights into the pedagogical application of the gamified learning platform. This design allowed for a comprehensive analysis of the tool's effectiveness in fostering Arabic language proficiency.

The study was divided into three main phases. The initial phase involved administering a pre-test to students to assess their baseline Arabic vocabulary knowledge, covering terms that would later be reinforced during the intervention phase. The pre-test results provided a benchmark for evaluating the impact of the subsequent game-based learning intervention (Tashakkori et al., 2021) . Secondly, in the intervention phase, students engaged with a specially designed 3D FPS game aimed at immersing them in a virtual environment where they could practice and reinforce their Arabic vocabulary. The gameplay involved interactive tasks, object interactions, and solving context-based puzzles, spread over several sessions to provide adequate exposure and learning opportunities. The immersive and engaging nature of the game was intended to foster deeper vocabulary learning.

After the gameplay phase, students took a post-test that was identical to the pre-test to measure improvements in their vocabulary comprehension and retention. Surveys were distributed to both students and teachers to collect qualitative data on their experiences after doing the post-test. These surveys used *Likert-scale* questions to gauge engagement, motivation, and the perceived educational value of the game, while teachers provided feedback on the game's curriculum relevance and potential for classroom use.

Data analysis was conducted using inferential and descriptive statistics. A paired sample t-test was performed to identify significant differences between pre-test and post-test scores (Campbell & Stanley, 2011), confirming the effectiveness of the 3D FPS game on vocabulary improvement. Descriptive statistics, including means, standard deviations, and frequency distributions, summarized the survey responses to present a clear understanding of participants' experiences and satisfaction levels. This phase also acted as a verification stage within the waterfall model, ensuring that the developed game met user expectations and could be effectively integrated into classroom learning (Bassil, 2012).

After all the required data had been collected, the researcher proceeded to the data analysis stage. In this phase, a quantitative analysis method was employed. For data analysis, the researcher used statistical software called JASP (JASP Team, 2023), applying a paired sample T-test.

Descriptive Analysis

The first step in data analysis is Descriptive Analysis, a branch of statistics focused on describing the general characteristics of data. The purpose of this analysis is to determine the mean score for each test (Abdullah & Suryadarma, 2023). The researcher presents the descriptive analysis results of the pre-test and post-test in the following tables and figures.

Table 1 Descriptive Analysis Results of Pre-Test and Post-Test Scores

Descriptive Statistics	Pre-test	Post-test
Valid	100	100
Missing	0	0
Median	80.000	95.000
Mean	74.100	89.200
Std. Deviation	19.853	12.608
Minimum	10.000	45.000
Maximum	100.000	100.000

Table 1 above clearly shows a significant difference between the pre-test and post-test scores, with an average pre-test score of 74.1 compared to an average post-test score of 89.2, indicating a difference of approximately 15.1 points. This descriptive analysis demonstrates that the average post-test result in the experimental class (89.2) is higher than the average pre-test result (74.1). This suggests that the use of the 3D-FPS Arabic game in Arabic language learning across five SDIT schools in East Java has the potential to positively enhance students' understanding of Arabic vocabulary.

After conducting the descriptive analysis, the second step is normality test. In this test researcher used the Shapiro-Wilk test. The normality test results for the pre-test and post-test scores in the following table:

Table 2. Test of Normality (Shapiro-Wilk)

		W	p
Pre-test	Post-test	0.983	0.210

Note. Significant results suggest a deviation from normality.

Based on the table above, if the significance value (p-value) from the normality test is less than 0.05, the results are considered non-normal. If the significance value (p-value) is greater than 0.05, the results are considered normal. From the table above, it can be identified that the normality test values for both the pre-test and post-test are 0.210, which is greater than 0.05 ($p > 0.05$), indicating that the data distribution for both the pre-test and post-test can be categorized as normal.

RESULTS AND DISCUSSION

This research explores the effectiveness of utilizing 3D First-Person Shooter (FPS) gamification on Arabic learning for Integrated Islamic elementary school (SDIT) students. The primary goal is to assess how this interactive learning medium improves students' Arabic language proficiency and to evaluate the satisfaction levels of both students and teachers. Pretest-posttest assessments are used to measure students' progress before and after engaging with the gamified media, while questionnaires capture the satisfaction and feedback from participants.

Effectiveness of 3D First-Person Shooter (FPS) Gamification on Arabic Learning

After carrying out pre-test activities, practice using 3D PFS on Arabic vocabularies' acquisition, and Post-test as well as giving satisfaction questionnaires for students and teachers, researchers conducted data analysis starting from the analysis description, normality test and Hypothesis Test using the JASP application regarding Paired sample T-Test. This is because the normality value of the data is normal, so it uses parametric statistics, not non-parametric statistic. The result of Paired Sample T-Test in the following table.

Table 3. Paired Samples T-Test

Measure 1		Measure 2	t	df	p	Cohen's d	SE Cohen's d	95% CI for Cohen's d	
								Lower	Upper
Pre-test	-	Post-test	7.075	99	< .001	-0.707	0.142	0.925	0.487

Based on the data presented above, a significance value (p-value) of 0.001 was obtained, which is less than 0.05. The null hypothesis (Ho) is rejected, indicating a significant difference between the pre-test and post-test scores in the experimental class. This suggests that the use of the 3D FPS-based Arabic game in Arabic language learning across five SDIT schools in East Java is highly effective and has a positive impact on enhancing students' understanding of Arabic vocabulary.

Satisfaction Questionnaires For Students And Teachers

The satisfaction questionnaires for students and teachers were conducted in five SDIT schools across East Java, involving 100 students and 7 teachers. These assessments were structured through a satisfaction questionnaire distributed after the students and teachers engaged with an interactive 3D FPS-based Arabic learning game. The primary aim of this evaluation was to gather comprehensive insights into the perspectives, responses, and satisfaction levels of both groups regarding the educational game, ultimately determining its feasibility and overall effectiveness in the learning process. The satisfaction assessment for students focused on three main aspects: Motivation, Learning, and Game Design. The results of each aspect are discussed below:

a. Motivation Aspect

The evaluation of student motivation consisted of three main questions, with students providing their feedback on their enjoyment, enthusiasm, and desire to play the game again. The results are summarized in Table 4:

Table 4. Results from Motivational Aspects

No	Assessment	Score	Average
1	I enjoyed playing this game	439	4.3
2	This game made me more excited to learn Arabic	402	3.94
3	I would like to play this game again in the future	427	4.19
Total		1268	12.43
Average			**4.14**

The average score for the motivation aspect was 4.14, indicating that students found the game engaging and motivating, which fell into the "Good" category. The highest score was for the statement expressing a desire to play the game again, suggesting that the game effectively retained students' interest.

b. Learning Aspect

The learning aspect focused on the clarity, retention of new vocabulary, and the alignment of game content with school curricula. The findings are outlined in Table 5:

Table 5. Results from Learning Aspects

No	Assessment	Score	Average
4	The Arabic content in this game is easy to understand	416	4.08
5	This game helps me remember new Arabic vocabulary	407	3.99
6	The content in the game matches what I learn at school	376	3.69
	Total	1199	11.75
	Average		**3.92**

The learning aspect received an average score of 3.92, which was categorized as "Good." The highest score was attributed to the ease of understanding the content, demonstrating that the game's language material was accessible and supportive of the students' learning needs.

c. Game Design Aspect

The design of the game was evaluated based on audio clarity, visual appeal, ease of gameplay, and technical performance. The results are presented in Table 6:

Table 6. Results from Design Aspects

No	Assessment	Score	Average
7	The audio in this game is clear	383	3.75
8	I like the visuals and colors in the game	437	4.28
9	This game is easy to play	448	4.39
10	The game runs smoothly and quickly without any issues	410	4.02
	Total	1678	16.45
	Average		**4.11**

The game design aspect achieved an average score of 4.11, which fell into the "Very Good" category. The highest score was given for ease of gameplay, indicating that students found the game user-friendly and enjoyable. The clear audio and attractive visuals also contributed positively to the overall gaming experience.

d. Results of Student Questionnaires

The comprehensive analysis of student satisfaction is shown in Table 7:

Table 7. Analysis Results of Student Assessment

No.	Aspect of Assessment	Average Score	Category
1	Motivation Aspect	4.14	Good
2	Learning Aspect	3.92	Good
3	Design Aspect	4.11	Very Good
	Overall Average	**4.06**	**Good**

The overall average score for student satisfaction was 4.06, which places it in the "Good" category. These results indicate that the interactive 3D FPS-based Arabic game was well-received by students, particularly in terms of motivation and design. The slightly lower score in the learning aspect suggests room for further enhancement to align the educational content more closely with students' learning needs and school curricula.

The assessment provided valuable insights into the effectiveness of the game as a learning tool. The positive feedback, especially in the areas of motivation and design, underscores the game's potential for engaging students in language learning. Future improvements should focus on enhancing the educational content to further align with curricular goals and reinforce vocabulary retention.

Based on the data from each aspect of student assessment, an analysis was conducted to evaluate the overall satisfaction quality as a percentage. This approach allows for a clear understanding of the extent to which students provided positive feedback on the 3D FPS-based interactive Arabic game. Using percentages offers a more comprehensive view of student success and acceptance of the game in Arabic language learning. The satisfaction quality percentage result 81%, indicating a strong level of positive response.

Across the three satisfaction aspects, the overall average satisfaction score reported by students was 4.06, categorized as "Good." Thus, students rated the game with a high level of satisfaction, supported by the 81% satisfaction rate. A closer inspection reveals that students expressed particularly high satisfaction with the Motivation and Design aspects, rating these very well, while the Learning aspect received a "Good" rating.

e. Teacher Satisfaction Results

In contrast, teacher satisfaction results encompassed four aspects: *Learning, Design and Interactivity*, *Motivation and Student Engagement,* and *Technical and Audio-visual.* Details for each aspect are provided in the table below.

Table 8. Teacher Assessment Results from Learning Aspects

No	Assessment Item	Total Score	Average Score
1	The Arabic material presented in the game aligns with the Arabic learning curriculum at school	33	4.7
2	The Arabic material presented in the game meets the learning needs of students	34	4.9
3	The Arabic material is written clearly and is easy for students to understand	34	4.9
4	The content in the game supports the objectives of Arabic learning in class	33	4.7
5	The use of vocabulary in the game matches the students' proficiency level	33	4.7
Total		**167**	**23.9**
	Average Score		**4.8**

The results from Table 8 show that teachers provided high ratings across various aspects of the game's content and alignment with educational standards. They rated the game's consistency with the Arabic curriculum, its suitability for students' learning needs, clarity and comprehensibility of the content, support for classroom learning objectives, and vocabulary appropriateness. Each aspect scored between 4.7 and 4.9, culminating in an overall average score of 4.8. This indicates strong approval of the game's educational relevance and clarity, highlighting its effectiveness as a supportive tool for Arabic language learning in schools.

Table 9. Teacher Assessment Results from Design and Interactivity

No	Assessment Item	Total Score	Average Score
1	The visual display and 3D graphics in the game are attractive and appropriate for the students' age	32	4.6
2	Students can easily operate and navigate the game	31	4.4
3	The game encourages active interaction and student engagement in Arabic learning	35	5.0
4	The layout and interface design of the game are good and appealing	32	4.6

5	The instructions given in the game are clear and easy for students to understand	31	4.4
Total		**161**	**23**
	Average Score		**4.6**

The teacher assessment results for the design and interactivity aspect of the game indicate positive feedback, with an overall average score of 4.6. This evaluation focused on factors such as visual appeal, ease of use, and the ability to promote active student participation. The game received the highest rating (5.0) for encouraging active interaction and engagement in Arabic learning, demonstrating its effectiveness in capturing students' interest and participation. Other high scores included the attractiveness and appropriateness of 3D graphics (4.6) and the appealing layout and interface design (4.6). The slightly lower scores for ease of operation (4.4) and clarity of instructions (4.4) suggest minor areas for improvement, but overall, the game was deemed successful in supporting student motivation through its design and interactivity.

Table 10. Teacher Assessment Results from Aspects of Student Motivation and Engagement

No	Assessment Item	Total Score	Average Score
1	The game is interesting and enjoyable for students	34	4.9
2	The game can enhance students' motivation to learn Arabic	34	4.9
3	The game helps students achieve their Arabic learning objectives	34	4.9
4	The game motivates students to learn more about Arabic outside class hours (e.g., in the computer lab)	34	4.9
5	The game encourages students to learn Arabic independently	35	5.0
Total		**171**	**24.4**
Average Score			**4.9**

The teacher assessment results for student motivation and engagement aspects show that the game was highly effective, receiving an impressive overall average score of 4.9. Teachers rated various elements, including the game's ability to interest and engage students, enhance their motivation to learn Arabic, help them achieve learning goals, and encourage further learning outside of class, consistently at 4.9. The highest score (5.0) was given for the game's capacity to promote independent learning, highlighting its strong potential to foster autonomy in students' language studies. These high scores indicate that the game was seen as a valuable tool in motivating students and supporting both classroom and self-directed learning.

Table 11. Teacher Assessment Results from Technical and Audio-visual Aspects

No	Assessment Item	Total Score	Average Score
1	The game runs smoothly without frequent disruptions or crashes	32	4.6
2	The game's loading time is quick and does not make students bored while waiting	31	4.4
3	The game's menu and interface are easy for students to navigate	33	4.7
4	The game motivates students to learn more about Arabic outside class hours (e.g., in the computer lab)	33	4.7
5	The game encourages students to learn Arabic independently	33	4.7
Total		**162**	**23.1**
Average Score			**4.6**

The teacher assessment results for the technical and audio-visual aspects of the game reveal strong overall approval, with an average score of 4.6. Teachers rated the game highly for its smooth operation (4.6), indicating minimal disruptions or crashes, and

for the ease with which students could navigate its menu and interface (4.7). Although the loading time received a slightly lower score of 4.4, it still reflected a satisfactory performance that did not bore students. Notably, teachers gave high scores (4.7) for the game's ability to motivate students to continue learning Arabic outside of class and to encourage independent study. These results emphasize the game's effectiveness in creating a seamless, user-friendly experience that supports both structured and self-motivated learning.

Based on the overall assessment data from the seven respondents, who were classroom or Arabic language teachers from each school, the researcher mapped the results according to each aspect and used the respondent score validation guide as a reference. The following is the respondent score validation guide and the score for each aspect.

Table 12. Student Assessment Analysis Results

Assessment Aspect	Average Score	Category
Learning Aspect	4.8	Very Good
Design and Interactivity Aspect	4.6	Very Good
Student Motivation and Engagement Aspect	4.9	Very Good
Technical and Audio-visual Aspect	4.6	Very Good
Overall Average	**4.7**	**Very Good**

The analysis of teacher's assessments across various aspects of the game shows consistently high ratings, with an overall average score of 4.7, placing it in the "Very Good" category. The highest-rated aspect was *Student Motivation and Engagement* with an impressive average score of 4.9, reflecting the game's strong ability to capture student interest and foster active learning. The *Learning Aspect* also received a high score of 4.8, indicating that the game effectively supports educational objectives. Both the *Design and Interactivity* and *Technical and Audio-visual* aspects scored 4.6, demonstrating that the game provides a user-friendly and technically reliable experience. Overall, these results highlight the game's success in delivering an engaging, well-designed, and educationally effective tool for students.

Based on the assessment data for each aspect evaluated by teachers, an analysis was conducted to assess the overall satisfaction quality, resulting in a percentage score of 94.4%. This approach enables a better understanding of the extent to which teachers provided satisfaction ratings for the 3D FPS-based interactive Arabic game. Using percentages provides a more comprehensive view of the game's effectiveness and acceptance by students in Arabic language learning.

From the data above, it can be seen that across the four satisfaction aspects, the overall average satisfaction score reported by teachers is 4.7, which is classified as "Very Good." This rating reflects that, according to the teachers, the game provides a high level of satisfaction and promotes enthusiasm among students for learning Arabic vocabulary, further demonstrated by the satisfaction quality percentage of 94.4%. A deeper look into the four aspects shows that teachers found the 3D FPS-based Arabic game highly effective in motivating students and encouraging maximum student engagement, evidenced by the highest satisfaction score of 4.9 in these areas.

The findings of this research align with the growing body of literature on the positive effects of gamification in educational settings, particularly in language learning (Dehghanzadeh et al., 2024). Recent studies suggest that 3D FPS-based gamification enhances learner engagement and creates immersive environments that significantly

improve language retention and motivation (Nacional, 2024; Zainuddin et al., 2020). In this context, the study highlights the effectiveness of such tools in Arabic language instruction, which is especially relevant in Islamic elementary schools where language acquisition is critical (Yahaya et al., 2019).

The marked improvement in post-test scores, along with high levels of satisfaction reported by both students and teachers, underscores the potential of 3D FPS gamification to transform Arabic language teaching. This interactive and motivating approach allows learners to engage with content through gamification that promotes active learning, cognitive processing, and skill retention (Costello, 2020). Cognitive load theory says that gamified learning environments make working memory less busy, which helps students understand and remember language structures better (Smiderle et al., 2020). Data from this study reveals that 3D FPS gamification is particularly effective for students who initially struggled with the Arabic vocabularies, with significant gains observed in the schools. These findings resonate with existing research indicating that gamification may be especially beneficial for learners with lower baseline proficiency, as it enhances motivation and provides an adaptive learning pace (Zhang & Huang, 2024).

The improvements in both protest and post-test scores show that the implementation of 3D FPS gamification in Arabic language instruction across several Islamic elementary schools in East Java has produced significant results. While gamified learning enhances student engagement and boosts language acquisition, the varying impacts across different student groups reveal both the promise and the limitations of this approach. These insights provide a foundation for further exploration of gamification in language education, particularly in diverse educational contexts (Lampropoulos et al., 2022). The data from all schools clearly demonstrate the positive impact of the FPS gamified Arabic learning tool, with each institution showing an average increase in post-test scores. This data reveals the effectiveness of gamification in creating an interactive and immersive learning tool, particularly for Arabic. This finding align with existing literature, which emphasizes that gamified learning platforms can bridge gaps in traditional language teaching methods by offering dynamic, engaging experiences that promote deeper learning (Kalogiannakis et al., 2021). The results strongly suggest that 3D FPS gamification holds significant potential for enhancing Arabic language proficiency in Islamic elementary schools.

Beside the aforementioned, the data clearly indicate that FPS gamification was highly effective in promoting mastery of Arabic language acquisition. Across the schools, numerous students achieved perfect or near-perfect post-test scores with scored 100 on the post-test. These outcomes suggest that the gamified learning experience was particularly engaging and conducive to mastering the material. Research supports that immersive, interactive learning environment, like 3D FPS games, enhance comprehension and retention by encouraging active participation in problem-solving and language application (Chainilwan, 2023). The ability of the 3D FPS game to sustain high levels of student engagement likely played a critical role in these improved outcomes. Students appeared more motivated to participate and enjoyed the learning process, as reflected in the significant improvements in their test scores. Related study indicate that the interactive elements of gamification make the learning experience more stimulating and enjoyable, reducing the monotony often associated with traditional methods like rote memorization or lecture-based teaching (Al-Jamili et al., 2024). These findings highlight the potential of gamification to not only enhance engagement but also significantly boost Arabic language acquisition.

The positive outcomes of this study suggest that 3D FPS gamification can be a valuable tool for enhancing language instruction, particularly in Arabic, where interactive methods are essential for maintaining student engagement. However, the findings also highlight the importance of ongoing assessments to adapt the gamified approach to individual learner needs. Regular pre-test and post-test evaluations could identify students who may require additional support or alternative instructional strategies to maximize the benefits of gamified learning (Sezgin & Yüzer, 2022). This aligns with current research advocating for personalized learning pathways in technology-enhanced education (Rodrigues et al., 2021).

Implications for Arabic Language Education

The use of 3D FPS games in Arabic language education offers a promising solution to some of the challenges faced in traditional instruction. These tools not only improve vocabulary acquisition but also increase student motivation and engagement, which are crucial for successful language learning. The data from the teacher and student assessments highlight several key implications for Arabic language education. The high scores across various aspects indicate that 3D FPS games can be an effective tool for enhancing language learning experiences. Specifically, the *Learning Aspect* receiving an average score of 4.8 reflects the game's strong alignment with educational objectives, suggesting that integrating such games into the curriculum can support and reinforce traditional teaching methods. The positive feedback on *Student Motivation and Engagement* (average score of 4.9) underscores the game's potential to increase student interest and active participation, crucial for sustained language learning and retention.

The scores for *Design and Interactivity* (4.6) and *Technical and Audio-visual* aspects (4.6) show that the game's user-friendly design and technical reliability play significant roles in maintaining student engagement and ensuring a seamless learning experience. These findings imply that Arabic language educators should consider incorporating interactive and visually appealing digital tools to create immersive learning environments. Additionally, the high ratings for motivation and independent learning suggest that such tools can promote autonomous learning, encouraging students to practice and explore the language beyond classroom settings.

These results advocate for the strategic inclusion of educational games in Arabic language programs. They highlight the importance of selecting or developing games that align with curricular goals, offer clear instructions, and are technically robust to maximize their educational impact. Implementing game-based learning tools could lead to more dynamic, engaging, and effective Arabic language education, ultimately enhancing students' learning outcomes and fostering greater interest and proficiency in the language.

CONCLUSION

This study has demonstrated that 3D First-Person Shooter (FPS) games can serve as an effective tool for enhancing Arabic vocabulary acquisition among students in Integrated Islamic Elementary Schools. The Significant improvements in test scores across multiple schools, ranging from 74.1 to 89.2 points, supported by high student and teacher satisfaction ratings, indicates that these interactive, game-based learning environments foster both engagement and comprehension. The immersive nature of 3D FPS games facilitates deeper learning by situating vocabulary practice in meaningful, context-rich scenarios. Students reported greater enthusiasm for language learning, and

teachers acknowledged the potential of these games to align with educational goals and improve learning outcomes.

The result findings suggest that incorporating such educational technologies into the classroom can bridge the gap between traditional methods and modern learning needs. The positive impact on motivation and the promotion of independent learning further underline the adaptability of 3D FPS games as supplementary teaching tools. However, future studies should explore long-term effects, scalability, and integration strategies to ensure sustained benefits. This research advocates for the thoughtful inclusion of gamified tools in Arabic language curricula, offering a compelling case for educators to modernize instructional practices and enrich students' learning experiences.

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REFERENCES

Abdeen, F. H., & Albiladi, W. (2021). Gamification and Technology-Based Learning: Uncovering the Potential of Using Games in Language Teaching and Learning. *Journal of Studies in Education*, *11*(2), 62. https://doi.org/10.5296/jse.v11i2.18339

Abdullah, A. F., & Suryadarma, Y. (2023). *Metode Penelitian Media Pembelajaran Bahasa Arab (Contoh-Contoh Penelitian dengan Pendekatan Praktis)*. UNIDA Gontor Press.

Adolph, J., Liane, W., Katherine, M., & Kimberly, O. (2015). *Educational technology: A review of the integration, resources, and effectiveness of technology in K-12 classrooms.*

Akmaliyah, A., Hudzaifah, Y., Ulfah, N., & Pamungkas, M. I. (2021). Child-Friendly Teaching Approach for Arabic Language in Indonesian Islamic Boarding School. *International Journal of Language Education*, *5*(1), 501–514. https://doi.org/10.26858/ijole.v5i1.15297

Al-Jamili, O., Aziz, M., Mohammed, F., Almogahed, A., & Alawadhi, A. (2024). Evaluating the efficacy of computer games-based learning intervention in enhancing English speaking proficiency. *Heliyon*, *10*(16), e36440. https://doi.org/10.1016/j.heliyon.2024.e36440

Bailey, D., Almusharraf, N., & Hatcher, R. (2021). Finding satisfaction: Intrinsic motivation for synchronous and asynchronous communication in the online language learning context. *Education and Information Technologies*, *26*(3), 2563–2583. https://doi.org/10.1007/s10639-020-10369-z

Bassil, Y. (2012). A Simulation Model for the Waterfall Software Development Life Cycle. *International Journal of Engineering & Technology (iJET)*, *2*(5).

Campbell, D. T., & Stanley, J. C. (2011). *Experimental and quasi-experimental designs for research*. Houghton Mifflin Company. https://www.sfu.ca/~palys/Campbell&Stanley-1959-Exptl&QuasiExptlDesignsForResearch.pdf

Chainilwan, J. (2023). *Does immersion affect cognitive transfer in FPS games? : A study of cognitive abilities transfer of engaging in first-person shooter games through immersion experiences* [University of Skövde]. https://urn.kb.se/resolve?urn=urn:nbn:se:his:diva-22667

Costello, R. (2020). Gamification Strategies for Retention, Motivation, and Engagement in Higher Education: Emerging Research and Opportunities. In *Https://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/978-1-7998-2079-6*. IGI Global. https://www.igi-global.com/gateway/book/235480

Creswell, J. W., & Creswell, J. D. (2018). *Research Design Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications, Inc.

Dehghanzadeh, H., Farrokhnia, M., Dehghanzadeh, H., Taghipour, K., & Noroozi, O. (2024). Using gamification to support learning in K-12 education: A systematic literature review. *British Journal of Educational Technology*, *55*(1), 34–70. https://doi.org/10.1111/bjet.13335

Hakak, S., Noor, N. F. M., Ayub, M. N., Affal, H., Hussin, N., ahmed, E., & Imran, M. (2019). Cloud-assisted gamification for education and learning – Recent advances and challenges. *Computers & Electrical Engineering*, *74*, 22–34. https://doi.org/10.1016/j.compeleceng.2019.01.002

Hendro, W., & Talqis, N. (2021). *Arabic Language Learning Reconstruction as a Response To Strengthen Al-Islam Studies at Higher Education*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3791177

Herumurti, D., Yunanto, A. A., Senna, G. A., Kuswardayan, I., & Arifiani, S. (2020). Development of First-Person Shooter Game with Survival Maze Based on Virtual Reality. *2020 6th Information Technology International Seminar (ITIS)*, 81–86. https://doi.org/10.1109/ITIS50118.2020.9321076

Hidayatullah, A. D. (2024). The Dynamics Of Arabic Curriculum Management: Concepts, Characteristics, And Study Area. *Jurnal Multidisiplin Sahombu*, *4*(02), Article 02.

JASP Team. (2023). *JASP (Version 0.18.1)[Computer software]* (Version 0.18.1) [Computer software]. University of Amsterdam. https://jasp-stats.org

Kalogiannakis, M., Papadakis, S., & Zourmpakis, A.-I. (2021). Gamification in Science Education. A Systematic Review of the Literature. *Education Sciences*, *11*(1), Article 1. https://doi.org/10.3390/educsci11010022

Lampropoulos, G., Keramopoulos, E., Diamantaras, K., & Evangelidis, G. (2022). Augmented Reality and Gamification in Education: A Systematic Literature Review of Research, Applications, and Empirical Studies. *Applied Sciences*, *12*(13), Article 13. https://doi.org/10.3390/app12136809

Legault, J., Zhao, J., Chi, Y.-A., Chen, W., Klippel, A., & Li, P. (2019). Immersive Virtual Reality as an Effective Tool for Second Language Vocabulary Learning. *Languages*, *4*(1), Article 1. https://doi.org/10.3390/languages4010013

Muriyatmoko, D., Abdullah, A. F., & Musyafa‟, Z. A. (2018). Durus Al-Lughah Gontory: Interactive Arabic Mobile Learning for Beginners. *IJITEE (International Journal of Information Technology and Electrical Engineering)*, *2*(1), Article 1. https://doi.org/10.22146/ijitee.36641

Nacional, R. B. (2024). Gamifying Education: Enhancing Student Engagement and Motivation. *Puissant*, *5*, 1511–1524.

Naif, A., & Saad, N. (2017). Language Learning Strategies Use and Challenges Faced by Adult Arab Learners of Finnish as a Second Language in Finland. *English Language Teaching*, *10*(4), 111–111.

Pratiwi, F., & Taurusta, C. (2023). *The Design Of The First Person Shooter Game "TB CARE" Using Unity3D: Perancangan Game First Person Shooter "TB CARE" dengan Menggunakan Unity3D*. https://doi.org/10.21070/ups.738

Rodrigues, L., Palomino, P. T., Toda, A. M., Klock, A. C. T., Oliveira, W., Avila-Santos, A. P., Gasparini, I., & Isotani, S. (2021). Personalization Improves Gamification: Evidence from a Mixed-methods Study. *Proc. ACM Hum.-Comput. Interact.*, *5*(CHI PLAY), 287:1-287:25. https://doi.org/10.1145/3474714

Said, A., Mostafa, A.-E., & Khaled, Shaalan. "A survey of lexical functional grammar in the A. context. (2016). *A survey of lexical functional grammar in the Arabic context*.

Sezgin, S., & Yüzer, T. V. (2022). Analysing adaptive gamification design principles for online courses. *Behaviour & Information Technology*, *41*(3), 485–501. https://doi.org/10.1080/0144929X.2020.1817559

Smiderle, R., Rigo, S. J., Marques, L. B., Peçanha de Miranda Coelho, J. A., & Jaques, P. A. (2020). The impact of gamification on students' learning, engagement and behavior based on their personality traits. *Smart Learning Environments*, *7*(1), 3. https://doi.org/10.1186/s40561-019-0098-x

Suryadarma, Y., Aldini, A., Pradhana, F. R., & Yani, A. (2024). Implementation of Video Animation to Increase the Interest and Result of Students in Muthala'ah at Islamic Boarding School/ تنفيذ وسائط التعليم الفيديو في مادة المطالعة لترقية رغبة تعلم الطلاب ونتيجتهم بالمعهد العصري. *ALSUNIYAT: Jurnal Penelitian Bahasa, Sastra, dan Budaya Arab*, *7*(1), Article 1. https://doi.org/10.17509/alsuniyat.v7i1.67141

Suryadarma, Y., Ismail, M., & FahrulRozi, M. (2023). Musykilah At-Thulab fi Ta'alum Al-Lughah Al-Arabiyah Li al-Fashl At-Tahdiri bi Jamiah Darussalam Gontor / Student Problems in Learning Arabic In the Matriculation Class at Darussalam Gontor University. *Loghat Arabi : Jurnal Bahasa Arab dan Pendidikan Bahasa Arab*, *4*(2), Article 2. https://doi.org/10.36915/la.v4i2.123

Suryadarma, Y., Nurcholis, A., & Pikri, A. H. (2023). The Effectiveness of Using the Media Game Jumping Word Circles in Teaching Arabic Vocabulary. *IJAS: Indonesian Journal of Arabic Studies*, *5*(2), Article 2. https://doi.org/10.24235/ijas.v5i2.14960

Tashakkori, A., Johnson, R. B., & Teddlie, C. (2021). *Foundations of Mixed Methods Research* (second). SAGE Publications.

Turg`unova, F., & Abdurahimovna, R. S. (2023). DEVELOPING SKILLS IN STUDENTS IN ALL AREAS TO IMPROVE LANGUAGE SKILLS. *Journal of Foreign Languages and Linguistics*, *5*(5), Article 5. https://fll.jdpu.uz/index.php/fll/article/view/7915

Umi, R., Riko, A., Muhlasin, M., & Jihan, F. Rozanie. "Unlocking T. S. to A. F. E. T. C. R. of L. E. in M. A.-S. O. (2023). *Unlocking The Secret to Arabic Fluency: Exploring The Critical Role of Language Environment in Maximizing Arabic-Speaking Outcomes*.

Weiss, D., Rydland, H. T., Øversveen, E., Jensen, M. R., Solhaug, S., & Krokstad, S. (2018). Innovative technologies and social inequalities in health: A scoping review of the literature. *PLOS ONE*, *13*(4), e0195447. https://doi.org/10.1371/journal.pone.0195447

Yahaya, H., Sardi, J., Radzi, M., Abdelhamid, I. Y., & Islam, F. P. (2019). Development of a Mobile Application in Arabic Language Learning in Malaysia: An Overview. *International Journal of Academic Research in Business and Social Sciences*, *9*(7), 1366–1376.

Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. *Educational Research Review*, *30*, 100326. https://doi.org/10.1016/j.edurev.2020.100326

Zhang, Z., & Huang, X. (2024). Exploring the impact of the adaptive gamified assessment on learners in blended learning. *Education and Information Technologies*. https://doi.org/10.1007/s10639-024-12708-w