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The Effectiveness of Construct 2-Based Educational Games in Enhancing Arabic Vocabulary Acquisition and Listening Skills Among Junior High School Students

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ABSTRACT

Secondary-school Arabic teachers frequently report low student involvement, limited vocabulary growth, and weak listening comprehension when instruction relies mainly on lectures. To address these issues, the present study investigated whether instructional games developed with the Construct 2 engine could enhance vocabulary and listening skills among junior high learners. Adopting a quasi-experimental, non-equivalent control-group pre-test and post-test design, the research arranged participants into three sections: an experimental group taught with Construct 2 games, a positive control group enriched traditional lessons, and a negative control group exposed solely to lecture delivery. ANCOVA analysis uncovered a statistically significant group effect, $F(2, 26) = 65.14$, $p = .021$, accompanied by a large $\eta^2 = 0.95$. Follow-up post hoc comparisons showed that the experimental group ($M = 75.6$) outpaced both control sections ($M = 68.9$ and $M = 67.2$, $p < .001$). Overall, results indicate that game-based learning can reliably enhance receptive language abilities and warrants further adoption in Arabic classrooms. These findings speak directly to how teachers and administrators might structure courses and introduce new techniques, especially where money and materials are scarce.

1. Introduction

In the field of language learning, vocabulary mastery and listening skills are often regarded as the fundamental pillars of language acquisition. For learners of Arabic as a foreign language, these two components not only support linguistic competence but also comprehensively strengthen communicative skills (Zhang, 2014). Together, these receptive abilities help learners make sense of what they read and hear and, in turn, inform more visible skills like speaking and writing

(Kassem, 2018). Yet many middle-school classrooms outside the Arabic-speaking world still see students falter on both fronts, falling short of the word range and listening speed needed for everyday communication (Helvich et al., 2023). Traditional teaching, which often relies on lists to memorize and leaves most of the talking to the teacher, has struggled to yield the lasting change that educators hope for (Bilic & Thai, 2023). The situation becomes more challenging when lessons lack the real-world settings and emotional hooks that enable students to think deeply about the language (Hsu et al., 2019). To ease these problems, many teachers are now turning to technology, with interactive digital tools taking the lead. Educational games have emerged as a promising approach to engaging students and providing practice that feels both enjoyable and purposeful (Çakıroğlu et al., 2017; Lampropoulos & Sidiropoulos, 2024). Construct 2, a user-friendly platform, enables teachers to create engaging, interactive games that cater to diverse learning styles and help students retain words and sounds.

Although Construct 3 has been released as the successor to Construct 2, this study intentionally employs Construct 2 for several pedagogical and technical reasons. First, Construct 2 remains lightweight, license-free for educational use, and compatible with older school hardware, which is common in many Indonesian junior high contexts. Construct 3, while more advanced, often requires paid licenses and higher system specifications that are unavailable in most rural or low-budget institutions. Thus, Construct 2 offers a more inclusive and accessible platform for game-based Arabic learning in resource-limited schools (Cockerham, 2024; Dahalan et al., 2024).

Drawing on its distinctive affordances, Arabic language teaching game-based can be reconceptualized to boost learner motivation while simultaneously reinforcing vocabulary retention and auditory processing abilities (Almelhes, 2024; Barz et al., 2024). This study investigates the classroom potential of Construct 2-driven educational games for advancing vocabulary acquisition and listening skills in junior high school learners of Arabic (Alzamil, 2021; Kazu & Kuvvetli, 2023; Wang & Li, 2024).

While educators agree that vocabulary knowledge and listening skills are central to mastering a new language, many junior high students in Indonesia still find both areas particularly challenging when learning Arabic as a foreign language (Asadi, 2020). Books full of isolated word lists do little to help them remember terms, and fast, everyday speech too often sounds like a blur that knocks their confidence even lower (Al-Nofaie, 2020). In many classrooms, teachers rely on drills and quizzes rather than conversations and stories, a strategy that turns words into bits of information instead of living language. At the same time, opportunities to use apps, videos, or collaborative tools that invite students to play, experiment, and speak often remain unused because such activities require extra training, time, and resources that most schools do not have

(Shortt et al., 2023). Across secondary education, several promising digital options exist; yet, for Arabic, they remain on the shelf, leaving learners with the same tired paper exercises they already know (Kazu & Kuvvetli, 2023). Due to the mismatch between how teens engage with technology and the static methods still prevalent in lessons, important learning goals are often left unaddressed (Videnovik et al., 2023). An investigation of lightweight, online approaches-everything from word puzzles to short narratives built in game engines like Construct 2-might show whether play can turn vocabulary and listening practice into a more effective, enjoyable part of learning Arabic at the junior high level (Abbott, 2019).

Given the persistent difficulties junior high students face in acquiring Arabic vocabulary and listening skills, this study explores the effectiveness of Construct 2-based educational games as an alternative approach in the classroom. More precisely, it seeks to determine whether placing interactive digital games at the center of lessons can enhance learners' vocabulary retention and listening comprehension when Arabic is taught as a foreign language (Metruk, 2024). By incorporating language practice into play contexts that emphasize curiosity, provide immediate feedback, and convey real-life meaning, the intervention is believed to foster deeper cognitive processing and more enduring motivation (Dahalan et al., 2024). The project will also measure how actively students engage with the games and how they feel about learning inside a playful digital space. The work aims to provide credible data on the educational value of Construct 2-driven games and their capacity to enhance receptive language skills in a secondary school setting.

Existing investigations typically center on broad language acquisition, or narrow vocabulary growth alone, and overlook how multiple receptive skills-listening, vocabulary, and reading-might evolve together within an integrated instructional design (Mahmud et al., 2020). Equally, empirical work addressing secondary students outside the Arab world, where learners face unique cognitive, cultural, and motivational hurdles, remains scarce, leaving teachers with few evidence-based strategies to draw upon (Gay et al., 2011). Game-authoring platforms, such as Construct 2, promise flexible and immersive learning environments; however, their use in middle-school Arabic classes has not been systematically mapped or measured, thereby hindering informed adoption by educators (Méndez-Giménez et al., 2022). Taken together, these omissions highlight an urgent need for methodologically sound research that connects interactive gameplay to tangible language gains and sustained learner engagement in real-world teaching contexts (Boytchev & Boytcheva, 2020). To fill this void, the current study investigates curriculum-aligned games built in Construct 2, tracking changes in vocabulary size, listening accuracy, and motivation while gathering student feedback that will inform future course design and broader language policy decisions.

In relation to earlier studies using Construct 2, most focused on STEM or general ICT training

(Boytchev & Boytcheva, 2020; Çakıroğlu et al., 2017) rather than Arabic as a foreign language. None explored how Construct 2 could strengthen both vocabulary and listening comprehension simultaneously in a middle-school Arabic curriculum. Therefore, this research makes a unique contribution by integrating Construct 2-based gameplay with receptive Arabic skills, emphasizing its contextual relevance and classroom practicality.

2. Method

The present investigation employed a quasi-experimental framework, featuring a non-equivalent control group pre-test and post-test structure, to assess whether Construct 2-based educational games improve students' Arabic vocabulary and listening abilities. This arrangement enabled researchers to compare outcomes between an experimental group exposed to game-based instruction and a control group receiving conventional teaching, while covariate analysis adjusted for pre-existing differences (Tashakkori & Teddlie, 2010).

Participants were drawn from all seventh-grade students attending MTs Maarif NU, a school located in Malang, Indonesia. Using purposive sampling, the team identified Class 7, which included two intact groups-one marked as experimental and the other as a control-to serve as the study sample. Similar demographic and academic characteristics in both classes helped establish baseline equivalence before the intervention began.

The intervention lasted four weeks and was woven into the standard Arabic curriculum, with a primary aim of improving vocabulary and listening skills. For the experimental group, lessons featured interactive games made in Construct 2, a visual platform that produces simple, web-friendly learning apps. Each game was purposely designed to contain key Arabic words and match audio clips that aligned with the specific lesson goals.

The Construct 2-based game used in this research was co-designed by the researcher and a small team of Arabic-language teachers under the guidance of instructional media experts from Universitas Negeri Malang. The design process followed an ADDIE model (Analysis, Design, Development, Implementation, Evaluation), ensuring that vocabulary and listening tasks aligned with the seventh-grade Arabic curriculum at MTs Ma'arif NU Malang. Game use unfolded in three clear phases:

1) Introductory Phase: Teachers presented the objectives and walked students through basic controls for the Construct 2 games (as shown in Figure 1).

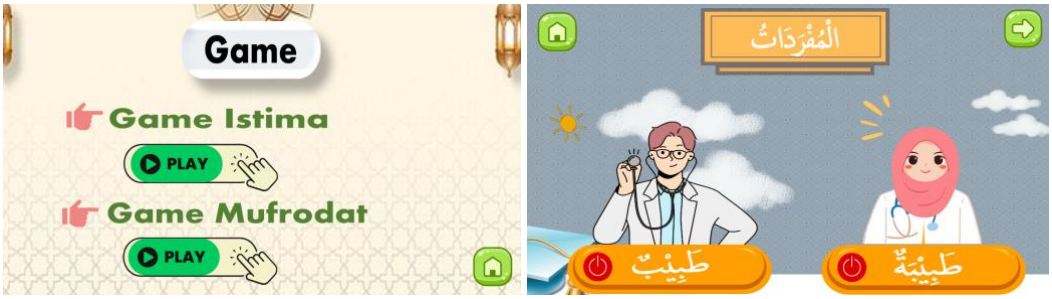

Figure 1. Construct 2 games.

2) Engagement Phase: Within each class, learners took part in vocabulary matching, contextual listening, and audio-driven tasks. Activity was either solo on tablets or in small groups using laptops projected on a classroom screen.
3) Reflection Phase: After gameplay, brief talks and quick quizzes reinforced learning and gave real-time feedback.

The control group, by contrast, followed traditional methods: teachers explained, textbooks guided drills, and audio exercises practiced listening; digital games were not used at all.

To ensure comprehensive data acquisition, this study employed four distinct techniques. A Vocabulary Comprehension Test, consisting of multiple-choice and fill-in-the-blank items, was administered to assess the improvement in students' ability to utilize vocabulary meaning and usage before and after the intervention. Observation Sheets were utilized to systematically record students' classroom activities and participation levels throughout the learning process. These observations were substantiated by Field Notes, which documented significant pedagogical occurrences, explicitly focusing on students' responses to the interactive media. Finally, interviews were conducted with selected participants to elicit deeper qualitative insights regarding their specific learning experiences utilizing Construct 2-based media.

To estimate the effect of the Construct 2-based intervention while controlling for pre-existing between-group differences, ANCOVA was employed. Pre-test scores served as covariates, adjusting post-test means and increasing comparability. Analyses were conducted using SPSS version 26, with tests for homogeneity of regression slopes and normality performed prior to the main ANCOVA.

ANCOVA results indicated that Arabic vocabulary growth and listening comprehension varied significantly across the three teaching groups, $F(2, 26) = 65.14$, $p = 0.021$, suggesting that the instructional method had a meaningful impact on student performance. With an effect size of $\eta^2 = 0.95$, almost 95% of the post-test score variation can be attributed to the treatment, a value that far exceeds the thresholds typically considered significant in educational research. Together, these statistics support the idea that the Construct 2 game intervention outperformed both traditional

classes and the no-game control condition.

A follow-up pair-wise comparison using the Least Significant Difference (LSD) showed that students who learned through the Construct 2-based educational games (M 75.6, SD 5.2) scored noticeably higher on the post-test than those in the positive control group, taught mainly with traditional methods plus some digital media (M 68.9, SD 4.8), and then those in the negative control group, who sat through lectures only (M 67.2, SD 6.1). The gap between the experimental group and each control group reached conventional levels of significance ($p < 0.001$), confirming that game-based learning outperformed the other approaches. These findings suggest that adding interactive digital games to Arabic language classes can boost junior high students' vocabulary skills and listening comprehension in meaningful, measurable ways.

3. Results and Discussion

Table 1. Descriptive Statistics of Post-test Scores by Group

Group	N	Mean (M)	Standard Deviation (SD)
Experimental (Construct 2)	10	75.6	5.2
Control Positive (Conventional Enriched)	10	68.9	4.8
Control Negative (Lecture-Based)	10	67.2	6.1

Table 1 summarizes the average post-test scores and related statistics for each of the three teaching groups. Students in the experimental cohort, exposed to games based on Construct 2, recorded the highest mean ($M = 75.6$, $SD = 5.2$); the positive-control section, which experienced the enriched conventional approach, followed with $M = 68.9$, $SD = 4.8$; while the negative-control group, subjected exclusively to lectures, posted the lowest mean score ($M = 67.2$, $SD = 6.1$).

To examine whether these disparities were statistically meaningful, an analysis of covariance (ANCOVA) was performed with pre-test results treated as a covariate. As detailed in Table 2, the ANCOVA revealed a significant main effect for instructional method, $F(2, 26) = 65.14$, $p = .021$, and a partial eta-squared value of $\eta^2 = .950$, indicating a substantial practical effect. This finding suggests that approximately 95 percent of the variance in post-test scores can be attributed to the specific teaching strategy employed.

Table 2. ANCOVA Results for Post-test Scores

Source	df	F	p-value	Partial η^2
Between Groups	2	65.14	0.021	0.950
Error	26	—	—	—
Total	**28**			

Follow-up comparisons, conducted using the Least Significant Difference (LSD) post hoc test, are summarized in Table 3 showing that learners who used the Construct-2 game scored higher than either of the control groups. The experimental group outperformed the positive control by 6.7 points ($p < 0.001$) and the negative control by 8.4 points ($p < 0.001$), with both gains classified as statistically significant. In contrast, the score gap between the two control groups remained

non-significant (p > 0.05). Together, these results support the conclusion that using the Construct-2-based game significantly enhances students' Arabic vocabulary and listening comprehension.

Table 3. Post Hoc LSD Test Results: Pair-wise Comparisons

Group Comparison	Mean Difference	p-value	Significance
Experimental vs. Control Positive	6.7	< 0.001	Significant
Experimental vs. Control Negative	8.4	< 0.001	Significant
Control Positive vs. Control Negative	1.7	> 0.05	Not Significant

To evaluate how three teaching methods independently influenced learners' post-test scores while controlling students' initial vocabulary knowledge, an ANCOVA was performed. Results summarized in Table 2 show that the instructional grouping had a robust main effect on post-test performance, F (2,26) = 65.14, p = .021, indicating that students learned Arabic vocabulary and listening skills differently depending on the treatment they received.

In addition, the ANCOVA produced a partial eta squared value of .950, indicating a large effect size according to Cohen's benchmarks, which suggests that roughly 95 percent of the score variance is attributed to the interventions rather than to untreated error; such a magnitude is rare in educational research.

Taken together, these results demonstrate that the type of instruction, rather than background differences, drove variation in learners' performance, reinforcing the case for adopting a game-centered curriculum in secondary school Arabic programs.

To examine the substantial group differences revealed by the earlier ANCOVA, researchers followed up with a Least Significant Difference (LSD) test, the results of which are summarized in Table 3. This post hoc analysis showed that students in the experimental condition, who learned with Construct 2 educational games, outperformed both control groups: one that used enhanced instruction and the other that relied on standard lectures.

The mean score for the experimental group lay 6.7 points higher than that of the positive control and 8.4 points above the negative control. Both of these comparisons showed p-values below .001, indicating that the advantages were statistically reliable at the strictest level. By contrast, the mean difference between the two control groups was only 1.7 points and did not reach significance (p > .05).

Taken together, these results support the view that the game-based intervention offered through Construct 2 led to meaningful gains in Arabic vocabulary and listening skills, gains that conventional teaching, whether enriched or lecture-style, failed to achieve.

The post-test results speak decisively: students who practiced with the Construct 2 game scored higher than every control group. ANCOVA produced F (2, 26) = 65.14, p = .021, and the η^2 of .95 indicates that the choice of method accounts for nearly all remaining variation. Such a significant effect marks game-enhanced lessons as an effective catalyst for vocabulary recall and

listening comprehension. Subsequent post hoc tests confirmed superiority (LSD, $p < .001$), in line with Mayer's Cognitive Theory of Multimedia Learning, which posits that presenting words and images simultaneously fosters a deeper understanding. Regular play also aligns with Constructivist Learning Theory, as learners actively manipulate content rather than passively absorbing information. Moreover, the game's design, with steady audio cues, immediate feedback, and vocabulary embedded in a clear context, reflects Krashen's Input Hypothesis by providing comprehensible input in a low-anxiety setting.

Taken together, these significant gains are based on robust statistics and established theory that champion meaningful engagement, relevant context, and active interaction.

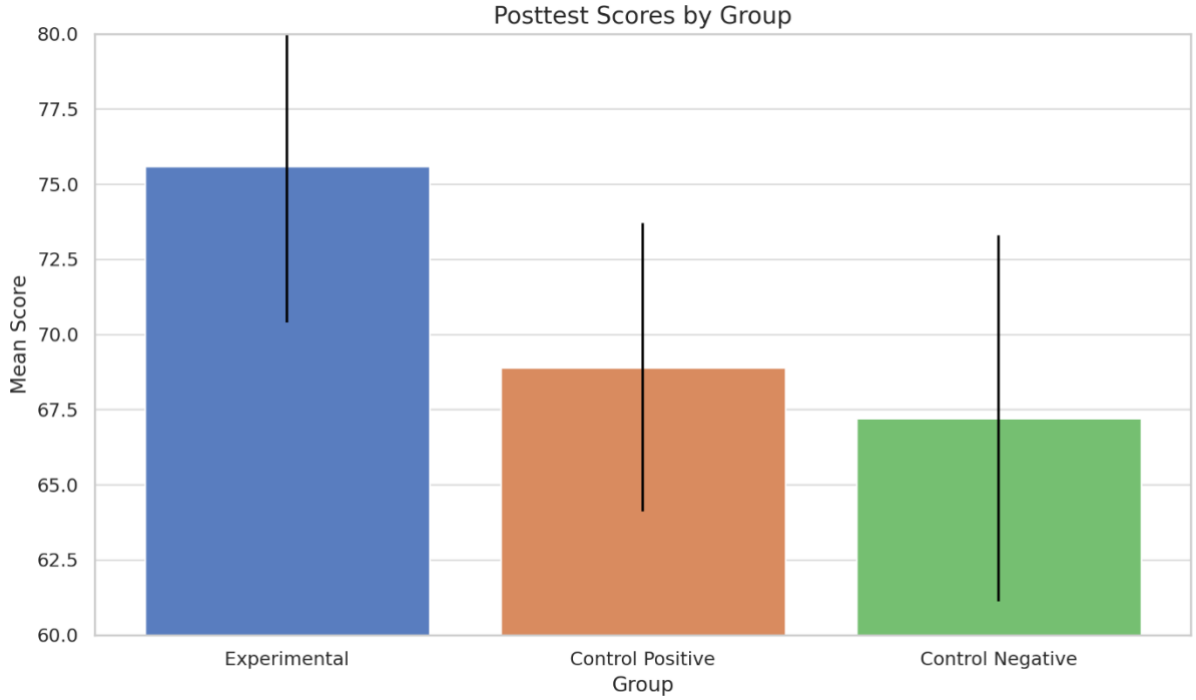

Figure 2. Illustrates the comparative mean performance across experimental and control groups.

The diagram, as shown in Figure 2 illustrates the comparative mean performance across experimental and control groups, confirming a clear improvement in post-test scores for the Construct 2 group. The upward trend visualized in the chart supports the statistical outcomes reported through ANCOVA and post hoc tests, emphasizing the pedagogical effectiveness of digital games.

The findings of this investigation add a significant new dimension to the literature on game-based learning by demonstrating that these techniques can be effective in Arabic classes, a subject that scholars have largely overlooked so far. Earlier research has focused on lessons in English or STEM fields, such as science and math. The present study provides real-world evidence that the same game-centered design principles can be applied to languages considered less common,

including Arabic (Barz et al., 2024). From a theoretical perspective, the results provide additional support for Engagement Theory and Situated Learning Theory, both of which argue that learners benefit when schoolwork is authentic, interactive, and socially relevant (Rodríguez-Ferrer et al., 2023). On the practical side, the evidence provides teachers and curriculum planners with clear steps to follow in updating language lessons in junior high classrooms (Chan & Lo, 2024). By using Construct 2, a user-friendly and flexible game-building platform, the school does not need a complex technical setup or a large budget to be innovative (Cockerham, 2024). Educators can replicate the same game-based model and design activities that engage students while enhancing their language skills. Even schools in rural or resource-poor areas can adopt free or low-cost digital tools, allowing Arabic programs to stay current without losing pedagogical integrity (Tabacu et al., 2023).

Although the study presents strong evidence supporting the use of Construct 2-based educational games, essential caveats must be considered before drawing sweeping conclusions. To begin with, data were gathered at a single institution, MTs Ma'arif NU in Malang, and the sample consisted solely of seventh graders. Therefore, readers should temper expectations about how well the findings apply to students in other regions, cultures, or school systems (González Alonso et al., 2025). The intervention also lasted only four weeks, a period that may be too brief to capture the complete language E-learning process, especially when evaluating how well students retain knowledge and apply it in new contexts over the long term (Buckmaster et al., 2024). Furthermore, while the analysis relied on solid quantitative measures, the absence of qualitative evidence-such as student journals or teacher field notes, means that nuances in engagement, thinking strategies, and shifting motivation during game play remain largely unexplored (Shortt et al., 2023). Finally, the study cannot discount the novelty effect; students may have scored higher simply because they were enthusiastic about a fresh digital experience, rather than exclusively due to the pedagogical strengths of the game (Zhou, 2024).

Awareness of these constraints is crucial for judging the results wisely and for shaping larger, more detailed investigations down the road. Regarding implementation, teachers at MTs Ma'arif NU Malang are not yet fully capable of independently developing Construct 2 games. To ensure sustainability, the research team has initiated capacity-building workshops and created a digital training module that enables teachers to modify existing games and integrate them into future lessons. Furthermore, collaboration with the Arabic Language Education Department at Universitas Negeri Malang continues to support mentoring and game adaptation. This step ensures that game-based Arabic learning remains viable and expandable even after the research phase concludes.

Building on the present results and mindful of their limitations, future investigations into

game-based learning for Arabic-language instruction should adopt more varied and expansive designs (Pérez-Jorge et al., 2025). One promising avenue involves longitudinal protocols that follow learners over months or years, enabling researchers to measure not only immediate test scores but also retention, transfer to unpracticed tasks, and persistent motivation (González Alonso et al., 2025). Expanding participant pools to include students from different schools, grade levels, and social or linguistic backgrounds would strengthen the external validity of the findings and facilitate meaningful demographic comparisons. In tandem, mixed-methods approaches that combine qualitative sources, such as student think-aloud, teacher journals, and video-based observations, with quantitative metrics can elucidate the affective and metacognitive processes that standardized tests often overlook (Buckmaster et al., 2024). Systematic experimentation with diverse game architectures-narrative-driven, asynchronous multiplayer, or adaptive-along with platform variations beyond Construct 2, will clarify which designs produce the strongest learning gains (Subhash & Cudney, 2018). Finally, studies that embed emerging tools such as mobile augmented reality, immersive virtual environments, or AI-powered feedback loops promise to reveal how next-wave technologies might amplify or reshape game-enabled Arabic pedagogy in secondary classrooms (Tahir & Wang, 2024).

Using Construct 2 games in Arabic lessons does more than refresh teaching; it also enhances learning. It also raises important social and ethical questions. From a social standpoint, the approach shows how tech-backed learning can level the playing field in schools that lack resources and still rely on Chalk-and-Talk (Fütterer et al., 2023). When teachers adopt easy-to-use digital tools, they open the door to richer language practice for every pupil, taking a small yet meaningful step toward broader inclusion and stronger regional dialects (Rodríguez-Ferrer et al., 2023). In addition, classroom games create a lively space for learners who struggle with standard drills, easing their fear, boosting their confidence, and accommodating a range of learning styles at once (Cockerham, 2024).

Ethically, the rollout of educational games demands thoughtful oversight at every step. Although clever interactivity and playfulness can strengthen learners' attention, leaning too heavily on digital badges and points can crowd out face-to-face chat and push screen time past recommended hours for younger children (Nguyen et al., 2023). Teachers thus need to confirm that a game-backed lesson reinforces the curriculum instead of diverting focus, and that every activity aligns with guidelines that match the learner's stage of growth. Online or networked titles also raise fresh questions about privacy, so transparent data notices, limited file storage, and strong encryption must be built in from the start rather than added later (Guan et al., 2023). Keeping educators in the driver's seat and monitoring content choices along the way will protect student dignity, safeguard schools' resources, and free the pedagogy to gain real value from game-

based learning.

4. Conclusion

This study demonstrates that Construct 2 video games effectively aid junior high students in learning Arabic words and enhance their listening skills. Students who played these games performed significantly better than both control groups, with a substantial and meaningful score difference ($\eta^2 = 0.95$). These results contribute to the idea that fun, tech-rich lessons keep kids engaged and can significantly enhance language learning. They are also back central ideas from multimedia theory and constructivist teaching by showing that mixed, real-world input sparks both thinking and motivation. Finally, this work opens new ground by proving that game-based learning is effective for Arabic topic teachers, a field that has been studied far less than English or other languages.

Because early results look promising, teachers and curriculum planners are encouraged to incorporate game-based tools like Construct 2 into Arabic classes for high school students. New professional-development workshops for language instructors should focus on how to design and utilize these games, ensuring that learning remains active and puts students at the center. School leaders and policymakers, especially in poorer or remote areas, should channel funds toward creating and sharing digital Arabic resources that every classroom can access. Looking ahead, researchers should plan long-term, multi-school studies to assess the lasting benefits and determine whether game-based learning also enhances speaking and writing skills. At the same time, any rollout must be ethical, with careful limits on screen time, strong data-protection rules, and teachers guiding the process. Hence, technology enhances learning without harming students' social or emotional wellbeing.

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