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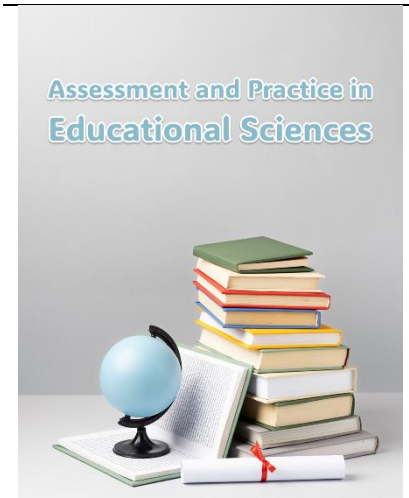

PLS-SEM Validation of a Game-Based Vocabulary Learning Model: Do Cinematic, Narrative, and Quest-Oriented Games Fit Iranian EFL Learners?

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ABSTRACT

This study aims to investigate a hypothesized model of vocabulary learning performance enhanced by three types of commercial game features: Cinematic, Narrative, and Quest-Oriented games, within Iran's EFL context. Given the growing role of digital games in language education, this research investigates how these game types assist in enhancing vocabulary learning performance. Knowing words is the first step to mastering a language. However, many students in Iran focus mainly on passing tests and don't get enough practice with real-world English. Educators in Iran are interested in game-based learning, but they need a reliable framework to know which game genres best teach vocabulary. A variance-based structural equation modeling approach (PLS-SEM) was applied to test the measurement model (reliability and validity) and the structural model (predictive paths). Bootstrapping techniques were applied in PLS software to stabilize estimates. The analysis confirmed the model, and findings indicate that cinematic, narrative, and quest-oriented games are positively associated with vocabulary gains in the Iranian EFL context, with notable implications for teachers and curriculum developers aiming to adopt game-based methodologies in language instruction. Also, narrative and quest-oriented games showed comparatively larger effects than cinematic games. Findings recommend incorporating these specific genres of games into Iranian EFL curricula to enhance vocabulary learning.

Keywords: Bootstrapping, Cinematic, Narrative, and Quest-Oriented Games, Partial Least Squares, Vocabulary Learning Performance, Structural Equation Modeling

Introduction

Vocabulary knowledge constitutes the backbone of second and foreign language proficiency, underpinning learners' ability to comprehend input, express meaning, and engage effectively in communicative contexts. Extensive research has established that lexical competence is a decisive predictor of overall language performance, particularly in English as a Foreign Language (EFL) contexts where learners often experience limited exposure to authentic linguistic input beyond formal instruction (1, 2). Despite its centrality, vocabulary learning remains a persistent challenge in many EFL settings, as traditional instructional

practices frequently rely on decontextualized memorization, translation-based exercises, and test-oriented approaches that insufficiently support long-term retention and meaningful use of lexical items (3, 4).

In response to these limitations, digital technologies have increasingly been integrated into language education to foster engagement, contextualization, and learner autonomy. Among these innovations, digital game-based language learning (DGBLL) has emerged as a prominent pedagogical approach capable of transforming vocabulary instruction by embedding lexical input within interactive, goal-driven, and multimodal environments (5, 6). Games provide learners with repeated encounters with vocabulary in meaningful contexts, encourage active participation, and create emotionally engaging experiences that support deeper cognitive processing (7, 8). Consequently, game-based approaches have been increasingly recognized as viable alternatives or complements to conventional vocabulary teaching methods.

Empirical evidence consistently demonstrates the positive effects of game-based learning on vocabulary acquisition and retention. Early experimental studies showed that learners exposed to digital or online games significantly outperformed those taught through traditional methods in vocabulary tests and displayed higher motivation and sustained engagement (4, 9). Subsequent classroom-based investigations further confirmed that games facilitate both intentional and incidental vocabulary learning by integrating lexical items into problem-solving tasks, narratives, and interactive challenges (3, 10). These findings are reinforced by meta-analytic and systematic reviews indicating that digital games, when pedagogically aligned, exert a moderate to strong positive effect on vocabulary learning outcomes across age groups and proficiency levels (8, 11).

The effectiveness of game-based vocabulary learning is closely tied to principles from cognitive and multimedia learning theories. Dual Coding Theory and Multimedia Learning Theory posit that information presented through coordinated verbal and visual channels enhances comprehension and memory by reducing cognitive load and supporting meaningful integration of new knowledge (12). Digital games naturally operationalize these principles by combining text, audio, imagery, and interaction within coherent learning environments. Moreover, repeated exposure to vocabulary through gameplay aligns with well-established models of lexical development that emphasize frequency, retrieval, and contextual diversity as core mechanisms of vocabulary acquisition (1, 2).

Beyond cognitive considerations, motivational and affective factors play a critical role in vocabulary learning success. Games are uniquely positioned to address motivational deficits commonly observed in EFL classrooms by incorporating challenge, feedback, autonomy, and enjoyment into learning activities (5, 13). Research has shown that learners engaged in game-based environments report higher levels of flow, intrinsic motivation, and sustained attention, which in turn positively influence vocabulary uptake and retention (10, 14). These motivational affordances are particularly salient in contexts where learners experience anxiety, boredom, or low confidence in traditional language classrooms.

Recent scholarship has moved beyond the general effectiveness of games to examine how specific game genres and design features shape language learning outcomes. Contemporary reviews emphasize that not all games are pedagogically equivalent; rather, learning gains depend on how game mechanics, narratives, goals, and audiovisual elements interact with instructional objectives (15, 16). Cinematic games, narrative-driven games, and quest-oriented games represent three influential categories that differ in their emphasis on immersion, storytelling, and goal-directed problem solving. Each of these genres offers distinct affordances for vocabulary learning and warrants systematic investigation.

Cinematic games are characterized by high-quality audiovisual presentation, scripted dialogues, and emotionally engaging storylines. These features provide rich, contextualized input that supports inferencing and memory consolidation, making them particularly suitable for vocabulary learning through immersive exposure (6, 12). Narrative games, by contrast, center on story progression, character interaction, and decision-making, encouraging learners to process vocabulary within coherent discourse structures and meaningful communicative situations (7, 17). Quest-oriented games emphasize tasks, missions, and challenges

that require learners to actively apply language knowledge to achieve specific goals, thereby reinforcing vocabulary through use, repetition, and feedback (8, 18).

Systematic and bibliometric analyses indicate a growing global interest in these genre-specific approaches to language learning. Recent reviews highlight that narrative and quest-based designs tend to produce stronger learning effects due to higher levels of learner agency and interaction, while cinematic elements enhance emotional engagement and contextual richness (16, 19). Empirical studies in diverse contexts have reported positive vocabulary gains from digital simulations, massively multiplayer online games, and educational game platforms that integrate narrative and quest mechanics (20, 21). These findings suggest that examining game genres separately, rather than treating games as a homogeneous category, can yield more precise pedagogical insights.

In parallel with advances in game-based learning, technological developments such as artificial intelligence, adaptive systems, and advanced language models are reshaping digital learning environments. While large-scale language models and intelligent systems demonstrate remarkable linguistic capabilities, their pedagogical value depends on how they are integrated into meaningful learning contexts rather than serving as passive sources of information (22). Games remain uniquely positioned to contextualize such technologies within experiential, learner-centered environments that support vocabulary development through interaction rather than imitation alone.

Despite the growing international literature, significant contextual gaps remain. In many developing and EFL-dominant contexts, including Iran and comparable educational settings, vocabulary instruction continues to be constrained by exam-oriented curricula, limited technological integration, and insufficient exposure to authentic language use (23, 24). Iranian EFL learners, in particular, often experience restricted opportunities for meaningful vocabulary practice outside the classroom, making innovative, technology-enhanced approaches especially valuable (14). However, most local studies have focused on small-scale interventions or isolated game applications without examining broader structural relationships among game features and learning outcomes.

Methodologically, there is also a need for more robust analytical frameworks capable of modeling complex relationships between instructional variables and learning performance. Recent studies increasingly employ structural equation modeling to validate theoretical models of technology-enhanced learning, allowing researchers to simultaneously assess measurement quality and predictive relationships among latent constructs (25, 26). In the context of game-based vocabulary learning, such approaches can clarify how different game genres contribute uniquely and jointly to learning outcomes, offering evidence-based guidance for curriculum design and instructional decision-making.

Taken together, existing research underscores the promise of digital game-based learning for vocabulary development while also highlighting unresolved questions regarding genre-specific effects, contextual applicability, and model validation. There is a clear need for studies that integrate theoretical insights from vocabulary acquisition, multimedia learning, and game-based pedagogy with rigorous empirical modeling in underexplored EFL contexts. Addressing these gaps can advance both theoretical understanding and practical implementation of game-enhanced vocabulary instruction.

Accordingly, the aim of the present study is to develop and validate a structural model examining the effects of cinematic, narrative, and quest-oriented digital games on vocabulary learning performance among Iranian EFL learners.

Methods and Materials

The present study utilized a quantitative, correlational, and predictive research framework implementing PLS-SEM to test the hypothesized relationships among cinematic, narrative, and quest-oriented game engagement and vocabulary learning performance among Iranian EFL learners. The study's design was guided by both theoretical assumptions from constructivist

learning theory and empirical practices in applied linguistics research, aiming to validate a proposed model tailored to the socio-educational context of Iranian EFL classrooms.

To assess the model validity in a systematic way, the study employs SEM based on PLS, which is a suitable method for theory testing and predictive modeling in social sciences (27). Construct validity and the magnitude of hypothesized relationships will be assessed by testing critical fit indices such as t-values and standardized factor loadings (28). Moreover, bootstrapping procedures in PLS programs will offer reliability and statistical stability to the results by generating confidence intervals and significance tests through resampling (29).

This study involved 120 Iranian learners of English as a Foreign Language (EFL), aged between 22 and 26. They were picked from two language institutes in Evaz and Lar. The Oxford Placement Test (OPT) was administered to learners at the outset to determine proficiency. Those whose scores fell within one standard deviation of the mean were included. All participants with a similar starting level of English, including 60 participants (30 women and 30 men), were selected. Prior to the instruction, the researcher got the consent forms from the participants, and their involvement was voluntary and anonymous.

Four main measures were developed and piloted for the study:

1) **Cinematic Game Engagement Questionnaire (CGEQ):** A 4-item Likert-scale that measures participants' perceived engagement and vocabulary learning experience during interaction with cinematic game materials.
   - How much has the graphic quality of games influenced your language learning?
   - To what extent have the music and sound effects in games contributed to the attractiveness of your learning?
   - Do games with low graphic quality decrease your motivation to learn?
   - Have games with high visual quality increased your focus during learning?
2) **Narrative Game Engagement Questionnaire (NGEQ):** A 4-item Likert-scale that assesses learners' cognitive and affective engagement with story-based games and their vocabulary learning achievement in these contexts.
   - Have game stories made you think more about the learning content?
   - How much have engaging game stories motivated you to learn more?
   - Has the complexity of game stories increased your motivation to learn the language?
   - Have game stories encouraged you to interact more with other language learners?
3) **Quest-Oriented Game Engagement Questionnaire (QOGEQ):** A 4-item Likert-scale questionnaire to measure learner experience, motivation, and use of vocabulary in quest-type game activities.
   - Have game narratives made you think more about the learning content?
   - To what extent have engaging game narratives motivated you to learn more?
   - Has the complexity of game narratives increased your motivation to learn the language?
   - Have game narratives encouraged you to interact more with other language learners?
4) **Vocabulary Learning Performance Test (VLPT):** A test developed by the researcher with 40 multiple-choice and matching items to address the target vocabulary embedded in the game activities. The vocabulary items were pre-screened based on frequency and relevance to game stories and tested with expert validation.

Reliability and validity of the questionnaires were maintained through pilot testing with 30 EFL learners and again confirmed through PLS-SEM analysis utilizing Cronbach's alpha, CR, and AVE. The results from this pilot showed that our vocabulary test was reliably consistent, with a Cronbach’s alpha of 0.78.

The experiment was conducted for eight weeks. Participants played a specially selected set of cinematic, narrative, and quest-oriented games, each of which was created to include thematic vocabulary activities. During weeks one and two, students

engaged with cinematic games, then narrative games for weeks three and four, and quest-based games for weeks five and six. A combination of cinematic, narrative, and quest-oriented games was dedicated for weeks seven and eight (Some games, especially commercial entertainment games, have these three elements together). Each gaming session was 60 minutes long and took place twice weekly under a controlled computer lab setting and LMS platforms. Upon finishing each gaming module, students completed the corresponding engagement questionnaire and short vocabulary quiz to track their progress. The vocabulary items learned through the gaming sessions at the end of the eight-week intervention were taken by all the participants on the Vocabulary Learning Performance Test.

Digital games were selected based on three essential principles: suitability for students' age, cultural background, and teaching method. Each game was chosen to represent a specific genre researchers wanted to study. Most importantly, games were sought that would provide students with numerous opportunities to see and use the new vocabulary.

Key selection criteria included:

- Providing frequent and contextual encounters with target vocabulary.
- Offering straightforward gameplay suitable for a classroom environment.
- Representing a wide range of non-violent, narrative-driven experiences.

For the cinematic part, professionally voiced games were used to model natural, emotionally nuanced English dialogue.

For the narrative part, story-rich games were chosen that highlighted idiomatic expressions through everyday character interactions.

For the quest-oriented part, exploration and puzzle games were utilized that encouraged problem-solving and the practical application of vocabulary.

Games were edited into short video clips to be used for a classroom format. The content was manageable for class time, allowing students to focus on and review key concepts over multiple sessions.

The gathered data were then examined using SmartPLS (v4) software. The assessment included checking a model of measurement to evaluate the reliability of indicators, their internal consistency, convergent validity, and discriminant validity. A structural model was utilized to check the proposed connections. The path coefficients ($\hat{I}^2$), t-values, and R^2 values were estimated using a bootstrapping method with 5,000 samples. F^2 and Q^2 are also calculated to compute the strength of the relationships in the model and their ability to predict outcomes. This design enabled us to accurately measure and test the model's predictive accuracy for the impact of game-based learning on English vocabulary learning.

Findings and Results

Using the results from the number-based study (scores before and after the test for the experimental group) and the survey responses, a simple model was made and shown using SmartPLS. The picture illustrates two components: the outer model, which measures hidden variables, and the inner model, which explains the relationships among those hidden variables. Yellow boxes show individual questions, and blue circles represent research variables. After building the model and adding the questionnaire data, we checked if the model worked well. We used three levels of models—the measurement model, the structural model, and the overall model—to assess their fit.

To check how well the items in our survey tool match the main ideas, the researcher used the partial least squares (PLS) method. The researcher tested some important factors: how well different things relate to each other (convergent validity), how well they are different from each other (discriminant validity), and measures of reliability like Cronbach's alpha, CR, and the Rho coefficient. According to Hulland (1999), a key way to measure how strongly an item is related to a concept is by looking

at the factor loading. For the measuring model to be trustworthy, the factor loadings should usually be 0.4 or more. The factor loadings for all items shown in the figure below were checked as the first step in the analysis.

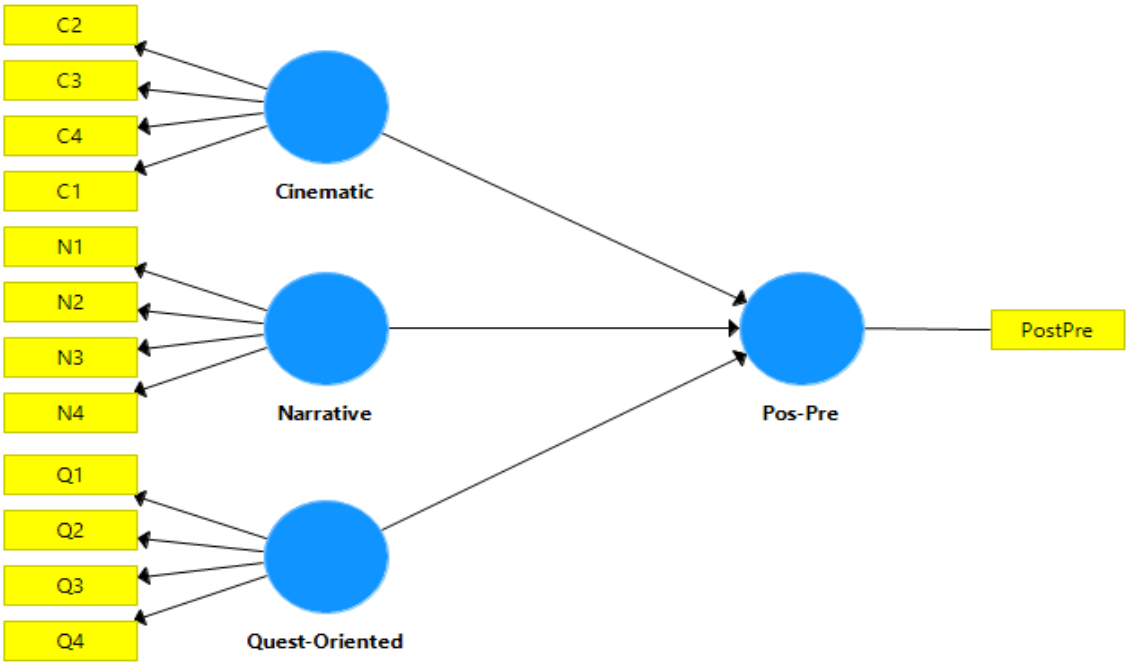

Figure 1. Measurement (outer) model

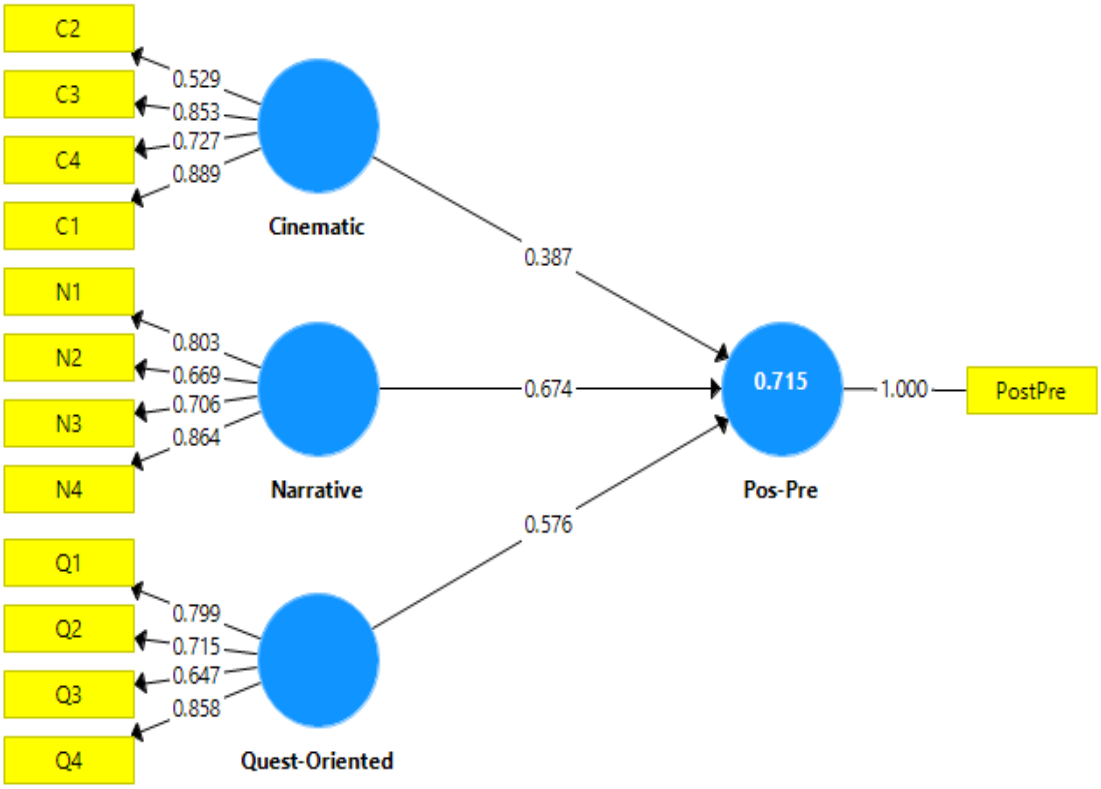

Figure 2. The Factor Loadings for each item in Post and Pre (Structural (inner) model)

Based on the information, as shown in the figure, all indicators loaded are greater than 0.4. Therefore, the assumption holds. The values related to Cronbach's alpha, Rho coefficient, CR, and AVE are as follows.

Table 1. Cronbach's Alpha

Dimension	Cronbach's Alpha	rho_A	CR	AVE
Cinematic	0.780	0.874	0.843	0.582
Narrative	0.760	0.780	0.848	0.584
Pos-Pre	1.000	1.000	1.000	1.000
Quest-Oriented	0.769	0.882	0.843	0.576

The table indicates that all necessary conditions for the measurement model to be valid are met. These are a CR of greater than 0.7, an AVE of greater than 0.5, and a CR greater than AVE. This implies that the measurement model is reliable. The image indicates that all the connections are below 0.9. It suggests that the model has been able to easily distinguish between various concepts, implying that the underlying factors are distinct and do not blend.

Table 2. Validity of the Games

	Cinematic	Narrative	Pos-Pre	Quest-Oriented
Cinematic				
Narrative	0.801			
Pos-Pre	0.334	0.715		
Quest-Oriented	0.396	0.496	0.742	

In PLS, we look at the interrelation of various factors by the calculation of three: the R^2 value, the F^2, and the Q^2 Stone-Geisser index.

Coefficient of Determination (R^2): This is one of the measures to look at how well the factors that we can control explain the variation in the thing we are trying to measure. Values of 0.19 are low, 0.33 are moderate, and 0.67 are high. This number shows the likelihood that there will be some future association between the independent variable and the dependent variable. In SmartPLS software, there is another number displayed as adjusted R^2, which shows how well the model fits the data. The difference between the two measures is that R^2 measures the overall effect of all independent variables on the dependent variable, while adjusted R^2 measures the impact of the actual independent variables on the dependent variable. Moreover, adjusted R^2 values are considered more accurate.

Stone-Geisser Q^2 Index: This index estimates the strength of the coefficient of determination, R^2, in predicting outcomes. If the index indicates a positive number, then the factors are influencing one another sufficiently, and this is conducive to the research hypotheses. Moreover, the model is formulated correctly and predicts outcomes sufficiently well.

SmartPLS software employs the PLS method for obtaining R^2 and adjusted R^2 values, and the blindfolding method for obtaining the Stone-Geisser Q^2 index.

Table 3. Stone-Geisser Q^2 index.

	R^2	Adjusted R^2	Q2
Post-Pre	0.715	0.7	0.653

The statistics in the table show a high correlation for the variable at hand. Moreover, the Q^2 index is positive for all variables, indicating that the model can predict well.

The F^2 measure displays the degree to which an independent variable affects a dependent variable by comparing how much the power of prediction for the model declines when the variable is taken away. The index is calculated in terms of the R^2 value.

Based on Cohen's recommendations, F^2 values of 0.02, 015, and 035 are indicative of weak, moderate, and strong effects, respectively.

Table 4. Effect Size

	Cinematic	Narrative	Pos-Pre	Quest-Oriented
Cinematic			0.196	
Narrative			0.541	
Post-Pre				
Quest-Oriented			0.924	

The table data show us that the F^2 of the three independent factors is large based on the post-pre test scores of the experimental group differences. Based on these three indicators, the model is well-fitted.

Goodness of Fit Index: The GOF index assesses the extent to which both the measurement model and the structural model fit. It is the most critical indicator of the accuracy of the PLS method. 0.1, 0.025, and 0.036 are considered weak, moderate, and strong for the GOF index. The GOF index was computed to be 0.699 with formula (3-1), presenting a good fit of the model to the data.

$$\text{GOF} = \sqrt{0.685 \times 0.715} = 0.699$$

All processes were done with the aim of testing whether hypotheses could be tested. The aim of hypothesis testing is to test whether a researcher's assumptions are correct or not. Thus, we look at t-values and standard factor loadings. Thus, bootstrapping is used in PLS software.

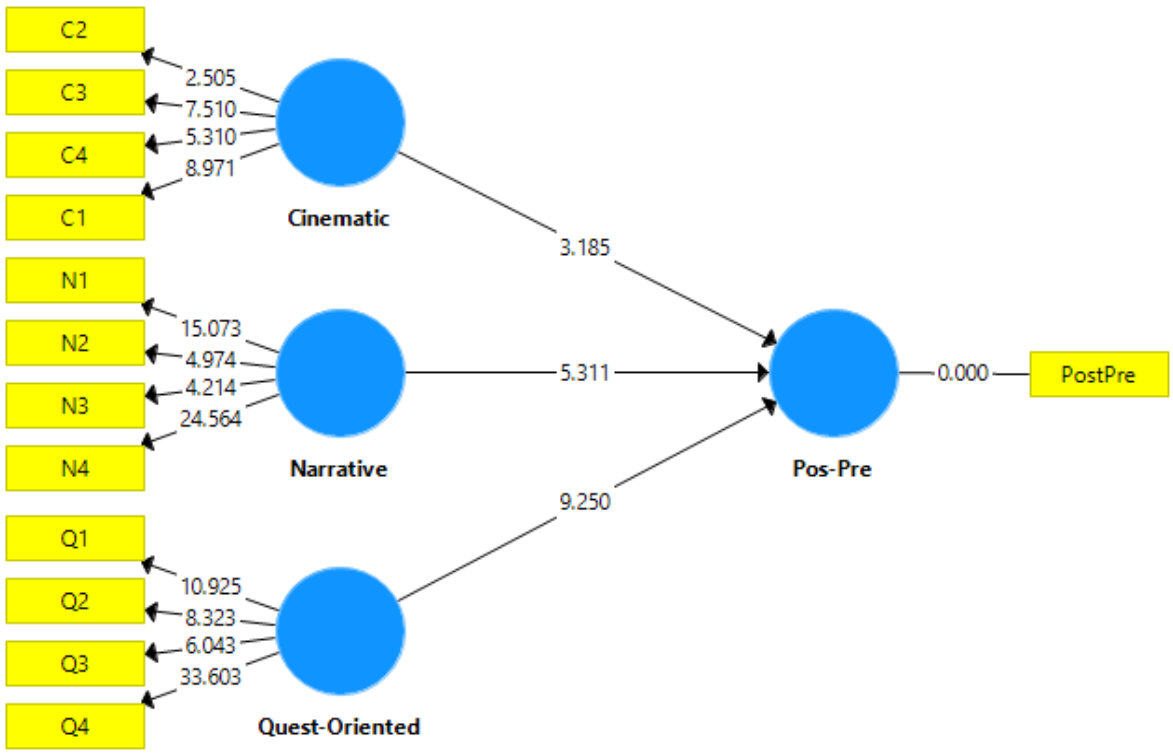

Figure 3. Additional diagnostic/fit graphic

T-values: In the case of two variables, the value should be greater than 1.96 to support the research hypothesis at a 95% confidence level. However, in this research, p-values are also mentioned. P-values show how likely it would be to get the test

results if the assumption we are evaluating (the null hypothesis) is accurate. The smaller the p-value, the better the results, and we reject the null hypothesis.

Standardized factor loadings (path coefficients): These factor loadings represent the extent to which the dependent variable changes when the independent variable changes. The larger its value, the stronger it is. If it is negative, it shows an unfavorable effect between the variables.

Table 5. Path Coefficients

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Cinematic → Pos-Pre	0.387	0.343	0.122	3.185	0.002
Narrative → Pos-Pre	0.674	0.644	0.127	5.311	0.000
Quest-Oriented → Pos-Pre	0.576	0.574	0.062	9.250	0.000

According to the table above, all three independent variables strongly affect the dependent variable, with p-values below 0. 05 Because the model works well at all three levels (how well it measures things, how the parts relate to each other, and how it performs overall). It has been shown that the independent variables have an effect on the dependent variable; the suggested research model is a good choice.

Discussion and Conclusion

The present study sought to validate a structural model of vocabulary learning performance enhanced through cinematic, narrative, and quest-oriented digital games in the Iranian EFL context. The findings derived from the PLS-SEM analysis provide robust empirical support for the proposed model, demonstrating that all three game genres exert statistically significant and positive effects on learners' vocabulary learning performance. More specifically, the results indicated that while cinematic games contributed meaningfully to vocabulary gains, narrative and quest-oriented games displayed comparatively stronger predictive power. These outcomes not only confirm the overall effectiveness of digital game-based language learning for vocabulary development but also underscore the importance of distinguishing among game genres when evaluating pedagogical impact.

The positive effect of cinematic games on vocabulary learning can be explained through principles of multimedia learning and dual coding. Cinematic games typically integrate high-quality visuals, audio narration, and emotionally engaging storylines, which facilitate deeper cognitive processing of lexical items. According to multimedia learning theory, presenting information through coordinated verbal and visual channels enhances comprehension and retention by reducing extraneous cognitive load and fostering meaningful integration of new knowledge (12). The significant path coefficient observed for cinematic games in the current model aligns with previous studies showing that rich audiovisual input in digital games supports contextualized vocabulary learning and improves recall (5, 6). Moreover, the emotional engagement elicited by cinematic elements may enhance attention and motivation, thereby increasing learners' willingness to process and retain new lexical items (14).

However, the findings also reveal that cinematic games, while beneficial, exert a relatively weaker effect on vocabulary learning compared to narrative and quest-oriented games. This result suggests that passive exposure to rich audiovisual input alone may not be sufficient to maximize vocabulary gains unless accompanied by higher levels of learner agency and interaction. Similar conclusions have been drawn in previous reviews indicating that design features promoting active decision-making and problem solving tend to yield stronger learning outcomes than purely presentational elements (11, 15). Thus,

cinematic features appear most effective when integrated with interactive mechanics that require learners to actively engage with vocabulary.

Narrative games emerged as a particularly strong predictor of vocabulary learning performance in the validated model. This finding is consistent with theoretical perspectives emphasizing the role of narrative context in language acquisition. Narrative games embed vocabulary within coherent storylines, character interactions, and evolving plot structures, which allow learners to infer meaning, notice form–meaning connections, and encounter lexical items repeatedly in varied but related contexts. Such conditions closely correspond to established principles of vocabulary learning that highlight the importance of contextual richness, repetition, and meaningful use (1, 2). Empirical research has similarly shown that story-driven digital games promote incidental vocabulary learning and enhance retention by situating words within memorable narrative frameworks (7, 17).

The strong effect of narrative games also aligns with findings from recent systematic reviews and bibliometric analyses, which report that narrative coherence and character engagement significantly contribute to learner motivation and sustained attention in game-based language learning environments (16, 19). In EFL contexts such as Iran, where learners often lack exposure to authentic discourse outside the classroom, narrative games may serve as valuable substitutes by providing simulated yet meaningful communicative experiences. Previous Iranian studies have likewise emphasized that learners benefit from instructional approaches that move beyond isolated word lists and instead promote contextualized, discourse-level engagement with vocabulary (14, 23). The present findings therefore reinforce the pedagogical value of narrative-driven game designs for vocabulary instruction in similar contexts.

Quest-oriented games demonstrated the strongest effect on vocabulary learning performance among the three game genres examined. This result highlights the critical role of goal-directed interaction, problem solving, and immediate feedback in fostering effective vocabulary acquisition. Quest-oriented games typically require learners to complete missions, solve challenges, and make strategic decisions using available linguistic resources. Such mechanics encourage repeated and purposeful use of vocabulary, which is a key condition for durable lexical learning (1). The significant and substantial path coefficient for quest-oriented games supports prior evidence suggesting that task-based and challenge-driven game designs promote deeper cognitive involvement and stronger learning outcomes than less interactive formats (8, 18).

From a motivational perspective, quest-oriented games align closely with theories emphasizing autonomy, competence, and feedback as drivers of sustained engagement. By allowing learners to control their progress and receive immediate responses to their actions, quest-based designs may enhance learners' sense of agency and achievement, which in turn supports persistence and effort in vocabulary learning tasks (5, 13). Empirical studies across diverse educational contexts have similarly reported that learners participating in mission-based or simulation games exhibit higher motivation and more consistent vocabulary gains than those engaged in more linear instructional activities (20, 21). The present study extends these findings by demonstrating the strong predictive power of quest-oriented games within a structural model tailored to the Iranian EFL context.

The overall explanatory power of the validated model further strengthens the contribution of this study. The R^2 value for vocabulary learning performance indicates that a substantial proportion of variance in learners' vocabulary outcomes can be explained jointly by cinematic, narrative, and quest-oriented game engagement. This level of explained variance is consistent with, and in some cases exceeds, those reported in previous quantitative studies of game-based language learning (11, 30). The positive Stone–Geisser Q^2 index also confirms the model's predictive relevance, suggesting that the proposed relationships are not only statistically significant but also practically meaningful.

Methodologically, the use of PLS-SEM allowed for simultaneous evaluation of the measurement and structural components of the model, ensuring that the observed effects are grounded in reliable and valid constructs. This approach responds to recent calls in educational technology research for more rigorous modeling techniques capable of capturing the complexity of

technology-enhanced learning environments (25, 26). By validating a genre-specific model of game-based vocabulary learning, the present study contributes to a growing body of research advocating for theory-driven and methodologically robust investigations in digital language learning.

Taken together, the findings of this study corroborate and extend prior research on digital game-based vocabulary learning by demonstrating that not all game types contribute equally to learning outcomes. While cinematic games enhance vocabulary learning through rich multimedia input, narrative and quest-oriented games appear to offer greater benefits by combining contextualization with active learner engagement. These results are consistent with contemporary reviews emphasizing that pedagogical effectiveness in game-based learning depends less on the mere presence of games and more on the alignment of game mechanics with learning objectives (15, 16). In the Iranian EFL context, where learners face structural and motivational challenges in vocabulary acquisition, the validated model provides empirically grounded guidance for selecting and designing game-based instructional interventions.

Despite its contributions, the present study is subject to several limitations that should be acknowledged. First, the sample was drawn from a limited number of language institutes, which may constrain the generalizability of the findings to other educational settings or proficiency levels. Second, the study relied partly on self-report measures of game engagement, which may be influenced by response bias or learners' subjective perceptions. Third, the intervention period was relatively short, limiting conclusions about the long-term effects of cinematic, narrative, and quest-oriented games on vocabulary retention. Finally, the absence of a traditional non-game control group restricts direct comparison between game-based and conventional instructional approaches.

Future studies could extend the present research by employing longitudinal designs to examine the durability of vocabulary gains associated with different game genres over time. Expanding the sample to include learners from diverse regions, age groups, and proficiency levels would enhance the external validity of the model. Researchers may also investigate potential moderating variables, such as learner motivation, digital literacy, or prior gaming experience, to better understand individual differences in game-based vocabulary learning. Additionally, experimental comparisons between game-based and non-game-based instructional methods could provide clearer evidence of the relative effectiveness of different pedagogical approaches.

From a practical standpoint, language teachers and curriculum designers are encouraged to integrate game-based activities strategically rather than treating games as supplementary or purely motivational tools. Emphasizing narrative and quest-oriented games can help create learning environments that promote active engagement, meaningful vocabulary use, and sustained motivation. Teachers should receive appropriate training to align game mechanics with instructional objectives and to facilitate reflection and follow-up activities that reinforce vocabulary learning. At an institutional level, investment in suitable technological infrastructure and thoughtful curriculum integration can support the effective and sustainable use of digital games in EFL vocabulary instruction.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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