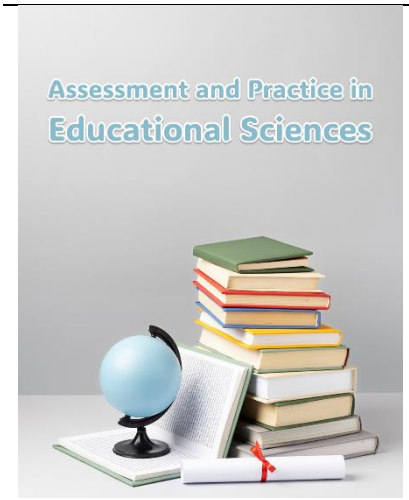
Assessment and Practice in Educational Sciences



Development and Validation of an ELT Game-based Material Development Scale

1. Ali. Abbasi Aram: Department of English Language & Literature, Faculty of Literature and Humanities, Ilam University, Ilam, Iran
2. Reza. Khany*: Department of English Language & Literature, Faculty of Literature and Humanities, Ilam University, Ilam, Iran (Email: r.khany@ilam.ac.ir)

Article type:
Original Research

Article history:
Received 21 July 2024
Revised 14 October 2024
Accepted 24 October 2024
Published online 10 December 2024

How to cite this article:
Abbasi Aram, A., & Khany, R. (2025). Development and Validation of an ELT Game-based Material Development Scale. *Assessment and Practice in Educational Sciences*, *3*(3), 1-14. https://doi.org/10.61838/japes.3.3.14

ABSTRACT

With the expansion of educational technologies, the development of aligned online materials is of paramount significance. Despite this importance, little effort, if any, has been made to yield standard frameworks within which Ed-tech assisted materials could be developed and evaluated. Therefore, this study aims to develop and validate an ELT game-based material development scale. To this end, based on a systematic literature review and analysis of game- based material development models, a three-factor model comprising three main constructs and 24 sub-constructs was developed. This model then informed the creation of an initial item pool of 88 items. After expert evaluation, the original item pool was reduced to a final selection of 70 items. Through AMOS (version 26), confirmatory factor analysis was run to test the conceptual model of the study. The study was piloted by 340 participants. The developed scale can be used by ELT practitioners, researchers, material developers, and teachers in the field.

Keywords: Game-based Material Development; English Language Teaching; Gamification; Learner Engagement; Educational Technology; Scale Validation

Introduction

The integration of gamification and digital games into English Language Teaching (ELT) has become one of the most innovative developments in the past two decades, reshaping how language learning materials are conceptualized, designed, and evaluated. Traditional ELT materials were often designed with a grammar-translation or structuralist orientation, emphasizing teacher-centered approaches. However, the growing demand for learner-centered pedagogies and the rapid expansion of educational technologies have shifted the focus toward interactive, immersive, and gamified environments that enhance engagement, motivation, and linguistic performance (1, 2). This transformation highlights the critical importance of developing validated frameworks for game-based material development in ELT, particularly as such materials increasingly influence both classroom-based and autonomous learning.

Gamification, defined as the application of game design elements in non-game contexts, has been shown to positively affect motivation, engagement, and achievement in diverse educational fields (3). Within language education, digital game-based learning (DGBLL) provides learners with opportunities to practice vocabulary, grammar, and communication skills in authentic, simulated contexts (4, 5). Theories of gamified learning emphasize not only extrinsic motivators such as points and badges but also intrinsic drivers like autonomy, competence, and relatedness {Sailer, 2020 #266450. As such, game-based ELT materials must be carefully designed to align pedagogical principles with learners' cognitive, social, and cultural needs.

Recent systematic reviews have provided comprehensive evidence for the effectiveness of gamification in ELT. For example, research indicates that gamified formative assessment tools support English language learning by scaffolding learner autonomy and providing real-time feedback (6). Contextualized models have also been proposed to align gaming experiences with cultural and pedagogical environments, highlighting the need for a retrospective and prospective understanding of contextualized game-based language learning (7). Similarly, reviews of theories and principles underpinning DGBLL have identified core elements such as feedback, interactivity, collaboration, and cultural integration as fundamental for designing effective materials (8). These findings converge on the idea that the development of game-based ELT materials requires a principled framework that integrates both theoretical rigor and empirical validation.

Vocabulary acquisition, a key area of ELT, has been one of the most widely researched domains in relation to gamification. Studies reveal that digital game-based vocabulary learning enhances retention, fosters motivation, and provides learners with opportunities to engage in repeated exposure to new lexical items in meaningful contexts (9, 10). For example, Bayesian meta-analyses confirm that video game-based instruction yields significant gains in vocabulary acquisition among English language learners, suggesting that the integration of game dynamics is both effective and scalable (10). Similarly, research on entertainment games for language learning has emphasized their potential to sustain motivation and promote incidental vocabulary acquisition through immersive gameplay (11, 12). These findings highlight the dual role of games as both pedagogical tools and sources of entertainment, underscoring the importance of balancing educational and motivational design.

The role of authenticity and social interaction in game-based learning environments has also received considerable attention. MMORPGs, for example, have been studied for their ability to provide authentic contexts for communication, peer collaboration, and cultural exchange (13). Research demonstrates that learners engaged in such online communities not only improve their linguistic competence but also develop intercultural awareness and critical thinking skills. These immersive, socially interactive environments align closely with sociocultural theories of language learning, which emphasize the role of context and collaboration in constructing meaning (7, 14).

Alongside social and cultural dimensions, technological integration remains central to the efficacy of gamified ELT materials. Serious games, mobile applications, and virtual reality platforms have been found to improve learner outcomes across vocabulary, grammar, and oral communication (15, 16). Systematic reviews confirm that gamified tools not only increase learner motivation but also promote sustained engagement through adaptive and interactive designs (17). At the same time, frameworks such as the Pedagogical Design Framework stress the importance of aligning technological affordances with clear pedagogical goals, ensuring that technology enhances rather than overshadows learning outcomes (18).

Personalized gamification is another emerging dimension of game-based ELT. Scholars argue that tailoring gamified tools to learners' profiles, preferences, and cultural backgrounds significantly improves their flow experience, enjoyment, and motivation (19, 20). The Personalized Gamification Design Model (PeGaM) and studies on aesthetic personalization demonstrate that customizable features such as avatars, badges, and narratives positively affect learner experiences and foster deeper engagement (21). These findings reveal the need for scalable frameworks that integrate personalization without compromising pedagogical coherence.

Despite these advances, challenges remain in establishing validated frameworks and assessment tools for game-based ELT materials. Conceptual ambiguity persists, with multiple competing definitions and inconsistent applications of gamification across studies (22). Systematic reviews of higher education contexts highlight the lack of standardized instruments for evaluating the impact of gamified interventions, limiting the comparability and generalizability of findings (23). Without coherent conceptual models and validated tools, the field risks fragmentation, making it difficult for educators and researchers to identify best practices. Recent studies emphasize the urgency of creating psychometrically sound instruments that can reliably measure the multidimensional nature of gamified learning (6).

The literature also underscores the tension between intrinsic and extrinsic motivation in gamified ELT. While points, badges, and leaderboards can effectively encourage participation, overreliance on extrinsic motivators risks undermining intrinsic learning goals (24, 25). Balanced frameworks, such as Becker's Four Pillars model, stress the integration of gameplay, educational content, teacher support, and balance (26). Similarly, conceptual models such as GameFlow emphasize the importance of aligning challenge and skill to maintain engagement and enjoyment (27, 28). These frameworks suggest that successful game-based materials must carefully balance motivational design with pedagogical depth.

In parallel, research on extramural English learning and informal contexts reveals how learners engage with entertainment games, online communities, and interactive media outside the classroom to develop linguistic competence (5). Studies demonstrate that such informal, game-based interactions foster willingness to communicate, build vocabulary, and promote learner autonomy (29, 30). However, concerns remain about issues such as cognitive overload, the use of non-standard language, and disparities in access to technology (31, 32). These concerns highlight the importance of designing materials that are accessible, contextually relevant, and pedagogically aligned.

Scholars have also begun to analyze the methodological challenges of researching language learning in digital games. Frameworks for analyzing in-game language use and learner interactions reveal both opportunities and constraints for empirical investigation (32). Studies stress the importance of multi-method approaches that combine qualitative insights with quantitative measures, enabling comprehensive assessments of learner outcomes. This methodological rigor is essential for validating frameworks and ensuring the reliability of findings in diverse ELT contexts (4, 33).

Overall, the literature converges on the need for a standardized, validated framework to guide the development and evaluation of ELT game-based materials. While existing studies highlight numerous benefits—such as enhanced motivation, engagement, authenticity, and intercultural competence—there remains a gap in terms of psychometrically robust instruments for evaluating these materials. Addressing this gap is essential not only for advancing theory but also for providing practical tools to educators, material developers, and policymakers.

The present study responds to this need by developing and validating an ELT Game-Based Material Development Scale (GBMDS).

Methods and Materials

This study employed a three-phase research design to develop and validate ELT Game-based Material Scale (GBMDS). The first phase, construct definition, involves identifying and delineating the core theoretical constructs underpinning the model. The second phase, item pool development, focuses on creating a comprehensive set of items that are aligned with the defined constructs. The third and final phase, validation, which involves confirmatory factor analysis (CFA) using Structural Equation Modeling (SEM) application to establish validity and reliability of scale based on quantitative data. This triadic approach ensures that the model is both theoretically grounded and empirically robust, contributing to the advancement of game- based learning in ELT.

Phase One: Construct Definition

A thorough review of the literature on GBMD requirements informed the identification of a comprehensive framework comprising three primary constructs: Content and Delivery, Learner Engagement, and Teaching and Learning Potential. Each construct includes multiple sub- constructs critical to shaping the overall framework, as detailed in Figure 1 and Table 1. These sub-constructs were meticulously delineated to ensure theoretical grounding and practical relevance.

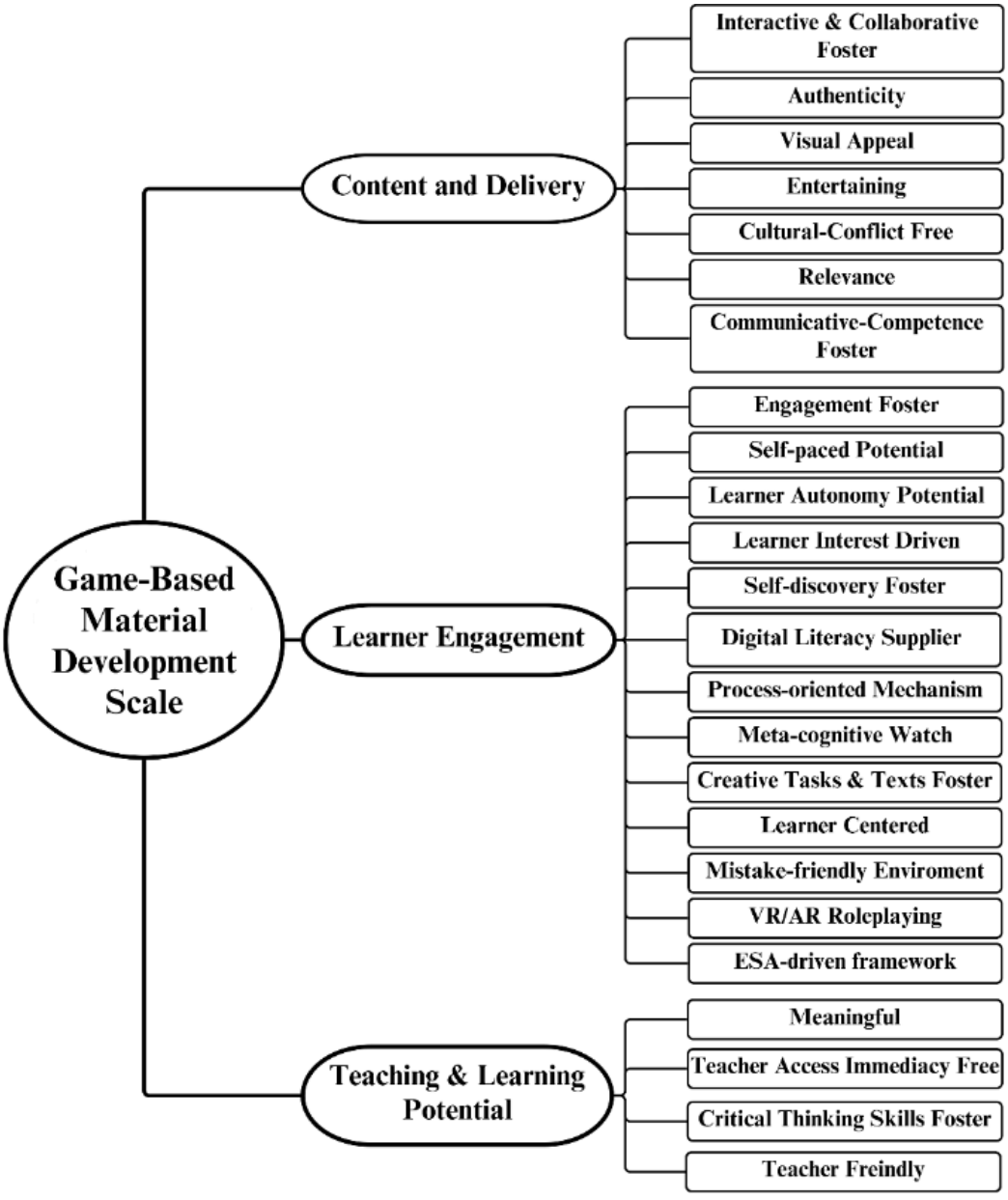


Figure 1. The net of the scale constructs

Table 1. Construct's underlying ELT GBMDS

Main Constructs	Sub-constructs
I. Content & Delivery	1. Interactive & Collaborative Foster 2. Authenticity 3. Visual Appeal 4. Entertaining 5. Cultural-Conflict Free

		6. Relevance
		7. Communicative-competence Foster
II.	2. Learner Engagement	8. Engagement Foster
		9. Self-paced Potential
		10. Learner Autonomy Potential
		11. Learner Interest Driven
		12. Self-discovery Foster
		13. Digital Literacy Supplier
		14. Process-oriented Mechanism
		15. Meta-cognitive Watch
		16. Creative Tasks & Texts Foster
		17. Learner-Centered
		18. Mistake-friendly Environment
		19. VR/AR Roleplaying
		20. ESA-driven Framework
III. Potential	3. Teaching and Learning	21. Meaningful
		22. Teacher Access Immediacy Free
		23. Critical Thinking Skills Foster
		24. Teacher Friendly

The first main construct of ELT GBMDS is Content and Delivery which refers to the systematic and purposeful design and delivery of educational content that optimizes learner engagement and linguistic development through multifaceted design elements. First, the subconstruct of Interactive and Collaborative Foster emphasizes active learner participation, peer collaboration, and the exchange of ideas, fostering a dynamic learning environment where students engage with tasks and build on each other's contributions. Second, Authenticity ensures that the games and materials reflect real-world situations and interactions, enhancing situational and interactional relevance. Third, Visual Appeal, focuses on the aesthetic and structural clarity of the materials, utilizing engaging colors, clear layouts, and diverse visual elements to capture attention and support learning. The next subconstruct, Entertaining, highlights the importance of intrinsically motivating and enjoyable experiences, balancing accomplishment with manageable challenge to sustain learner interest. Moreover, Cultural- Conflict Free underscores the need for materials to promote intercultural understanding and use respectful, inclusive language suitable for diverse learners. Furthermore, Relevance aligns the materials with authentic contexts, curriculum goals, and learners' personal experiences, ensuring practical applicability. Finally, Communicative-Competence Foster emphasizes the development of learners' ability to use language effectively in real-world scenarios through interactive and communicative activities, such as dialogues and role-playing, aligning with established models of communicative competence.

The second main construct of ELT GBMDS is Learner Engagement, which fosters sustained, self-directed, and meaningful interaction with the learning process, empowering learners to take ownership of their linguistic development. The first subconstruct, Engagement Foster, emphasizes compelling materials that encourage voluntary participation, promote active involvement for better retention, and include diverse tasks to sustain interest. Next, Self-paced Potential ensures materials accommodate individual learning styles, offering flexibility to address diverse needs. The following subconstruct, Learner Autonomy Potential, promotes independence by fostering a sense of ownership and self-direction in the learning experience. Moreover, Learner Interest Driven connects materials to learners' personal interests and existing knowledge, creating a positive and enjoyable learning ambiance. The fifth subconstruct, Self-discovery Foster, promotes exploration and self-awareness, enabling learners to identify strengths, address weaknesses, and take accountability for their progress. Then, Digital Literacy Supplier enhances learners' ability to navigate and utilize digital tools effectively, fostering professional digital competence and personalized learning. In addition, the seventh subconstruct, Process-oriented Mechanism, aligns materials with structured learning approaches, guiding learners through strategies for language acquisition. The eighth subconstruct, Meta-cognitive

Watch, supports self-regulation and goal-setting, equipping learners with tools to monitor their progress. Also, Creative Tasks & Texts Foster encourages innovative application of knowledge through engaging activities. The tenth subconstruct, Learner-Centered, underscores the prioritization of student autonomy, exploration, and individualized tasks. The eleventh subconstruct, Mistake-friendly Environment, creates a safe space for experimentation, reducing stress and encouraging communication practice. The twelfth subconstruct, VR/AR Roleplaying, which focuses on Virtual Reality (VR) and Augmented Reality (AR) games, leverages immersive simulations to enhance real-world language application. Lastly, the ESA-driven Framework structures learning through engagement, focused study, and active language use, ensuring clear progression and activation of prior knowledge.

The third and final main construct of ELT GBMDS is Teaching and Learning Potential. It refers to the capacity of GBMs to enhance educational outcomes by fostering meaningful engagement, critical thinking, and effective teacher-student interactions within language learning contexts. Crucially, this construct is comprised of several key dimensions. First, Meaningfulness emphasizes relevant and authentic tasks and texts that bridge classroom learning with real-life language use. Second, Teacher Access Immediacy highlights materials designed to engage teachers in classroom practice, foster positive student-teacher interactions, and motivate students' easy access to educators. Furthermore, Critical Thinking Skills Foster focuses on developing higher-order cognitive abilities through tasks that promote analysis, synthesis of diverse information sources, and reflective thinking. Finally, Teacher Friendliness is characterized by well-organized materials with logical flow, clear learning goals, multiple formats (digital and print) for easy integration, and tasks catering to diverse learning styles without requiring extensive teacher adaptation.

Phase Two: Item Pool Development

Building upon the identified constructs and their respective subconstructs, an initial item pool was developed and revised. The subconstructs and their corresponding items were systematically aligned with the three main constructs and their associated subscales. Each item was carefully crafted to encapsulate the core features of its respective subconstruct, prioritizing clarity and relevance. The items were designed utilizing a Likert-type scale, ranging from 6 (strongly agree or highly likely) to 1 (strongly disagree or highly unlikely). An initial pool of 88 items was generated based on the literature and construct definitions. Following expert review, 18 items were removed, resulting in a refined set of 70 items. A pre-review by field experts confirmed the inclusion of all 70 items in the final scale, covering the three dimensions and 24 subscales. Item distribution across subscales is as follows: Interactive & Collaborative Foster (3), Authenticity (3), Visual Appeal (3), Entertaining (3), Cultural-Conflict Free (3),

Relevance (3), Communicative-Competence Foster (3), Engagement Foster (3), Self-paced Potential (3), Learner Autonomy Potential (2), Learner Interest Driven (3), Self-discovery Foster (3), Digital Literacy Supplier (3), Process-oriented Mechanism (3), Meta-cognitive Watch (3), Creative Tasks & Texts Foster (3), Mistake-friendly Environment (3), VR/AR Roleplaying (2), ESA-driven Framework (3), Meaningful (3), Teacher Access Immediacy Free (2), Critical Thinking Skills Foster (3), and Teacher Friendly (4).

Phase Three: Scale Validation

Participants

340 English language teachers participated in the study, who were deliberately selected using stratified sampling to ensure a balanced representation of gender and to reflect the demographic diversity. Participants came from different regions of the

country and were from various universities, institutions, and professional development workshops. Of these participants, 110 (32.4%) were male and 230 (67.6%) were female. The sample was stratified into four age groups: 18–25, 26–35, 36–50, and 51–70 years. Educationally, the majority held a bachelor's degree (77.9%) or a master's degree (15%), with 7.1% enrolled as doctoral students. Regarding teaching experience, 240 participants (70.6%) reported 0–5 years, 60 (17.6%) had 5–10 years,

20 (5.9%) had 10–15 years, and 20 (5.9%) had over 15 years of experience. Cross-tabulations of participant demographics, including gender, age, education level, and teaching experience, are presented in Table 2.

Table 2. Frequency distribution of demographic data of teachers. (N=340)

Variable	Components	Frequency	Percent
Gender	Male	110	32.4
	Female	230	67.6
Age	18-25	189	55.6
	26-35	84	24.7
	36-50	49	14.4
	51-70	18	5.3
Degree	B.A.	265	77.9
	M.A.	51	15.0
	PhD	24	7.1
Teaching Experience	0-5 years	240	70.6
	5-10 years	60	17.6
	10-15 years	20	5.9
	Above 15 years	20	5.9

Procedure

The ELT GBMDS was administered to participants through a dual-channel approach, utilizing both online and offline platforms to collect quantitative data. This methodological strategy was deliberately designed to maximize accessibility and inclusivity. The online administration was facilitated by sharing Google forums link with participants which allowed them to complete the scale at their convenience, minimizing geographical and logistical constraints. Concurrently, offline administration was conducted using printed versions of the ELT GBMDS, distributed during in-person sessions at educational institutions, like universities and institutions, and professional development workshops. To maintain consistency, standardized instructions were provided across both modalities, and measures were implemented to ensure data integrity, including secure storage and anonymization protocols. The process of gathering the quantitative data took several months for its completion to reach the acceptable number of participants for data analysis. The combination of online and offline data collection methods was instrumental in achieving a representative sample, thereby strengthening the generalizability of the study's findings.

Data Analysis and Validation

Validation of the ELT GBMDS was conducted through SEM and CFA each comprising specific procedures to establish the instrument's validity and reliability in accordance with scholarly standards for psychometric evaluation. The CFA phase, conducted using SPSS software (Version 26), confirmed the factor structure by employing Pearson correlation coefficients to assess the strength and direction of relationships between latent variables, ranging from -1 (strong negative correlation) to +1 (strong positive correlation), with significance levels evaluated to substantiate associations among scale dimensions. Extending

the analysis, SEM was conducted using AMOS (Version 26) to validate the theoretical model and examine construct relationships, incorporating techniques such as path analysis and CFA to enable multiple regression analyses of factors, as outlined by Ullman and Bentler (2012). SEM facilitated a robust examination of relationships between independent and dependent variables, represented as latent constructs or measured variables, with model fit assessed through indices such as the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). This integrated analytical approach, supported by SPSS and SPSS AMOS, provided comprehensive evidence of the ELT GBMDS's psychometric properties and structural integrity, ensuring a thorough evaluation of its theoretical and empirical validity.

Findings and Results

This section presents the empirical findings from the development and validation of the ELT GBMDS. Drawing on data collected from 340 ELT professionals, CFA and SEM were employed to assess model fit, internal consistency, and construct validity. The results are organized to highlight the strength and coherence of the three core constructs—Content and Delivery, Learner Engagement, and Teaching and Learning Potential—thereby providing robust support for the GBMDS as a valid and reliable tool for evaluating game-based instructional materials in ELT settings.

After administering the scale and collecting quantitative data, the validation process continued through the application of SEM and CFA to rigorously assess the construct's factor structure and ensure the scale's psychometric properties accurately reflected the intended measurement model.

CFA was performed to verify the number of identified factors. The maximum likelihood method in AMOS version 26 was used for calculations. As shown in Table 3, all standardized factor loadings exceeded the recommended threshold of 0.5 (Hair et al., 2006), and the t-values for these loadings were found to be statistically significant ($p > 0.05$). Additionally, the fit indices for the single-factor structures were above the acceptable levels for all factors (Table 3). The minimum cut-off values for CFI, NFI, and RFI were 0.9, while the RMSEA cut-off was

0.05 (Sharma, 1996).

Consequently, convergent validity was achieved for all constructs at the observation level of the outer models. To further assess the convergent validity at the latent variable level, the Average Variance Extracted (AVE) index was calculated, with a threshold value of 0.5. The AVE values exceeded the threshold level of 0.05, confirming the n statistical validity of all latent variables in the model. The goodness of fit indices, summarized in Table 3, indicated that the model was appropriate and thus confirmed. The model is shown in Figure 2.

As shown in Table 3, eight criteria were used to evaluate the model's fit. The results confirm that all indices met the acceptable thresholds for the model ($\chi^2/df < 5$-, RMSEA ≤0.05 -, GFI >0.9 -, AGFI >0.850 -, NFI >0.90 -, CFI >0.90 -, IFI >0.90 -).

Table 3. Model fit indices of the Model

Fit Indices	Value	Optimal range	Results
X^2/df	2.580	$0<x^2/df< 5$	Accepted
RMSEA	0.002	RMSEA<0.05	Accepted
RMR	0.280	RMR≥ 0	Accepted
GFI	0.998	GFI>0.9	Accepted
AGFI	0.977	AGFI>0.85	Accepted
NFI	0.990	NFI>0.9	Accepted
CFI	0.995	CFI>0.9	Accepted
IFI	0.952	IFI>0.9	Accepted

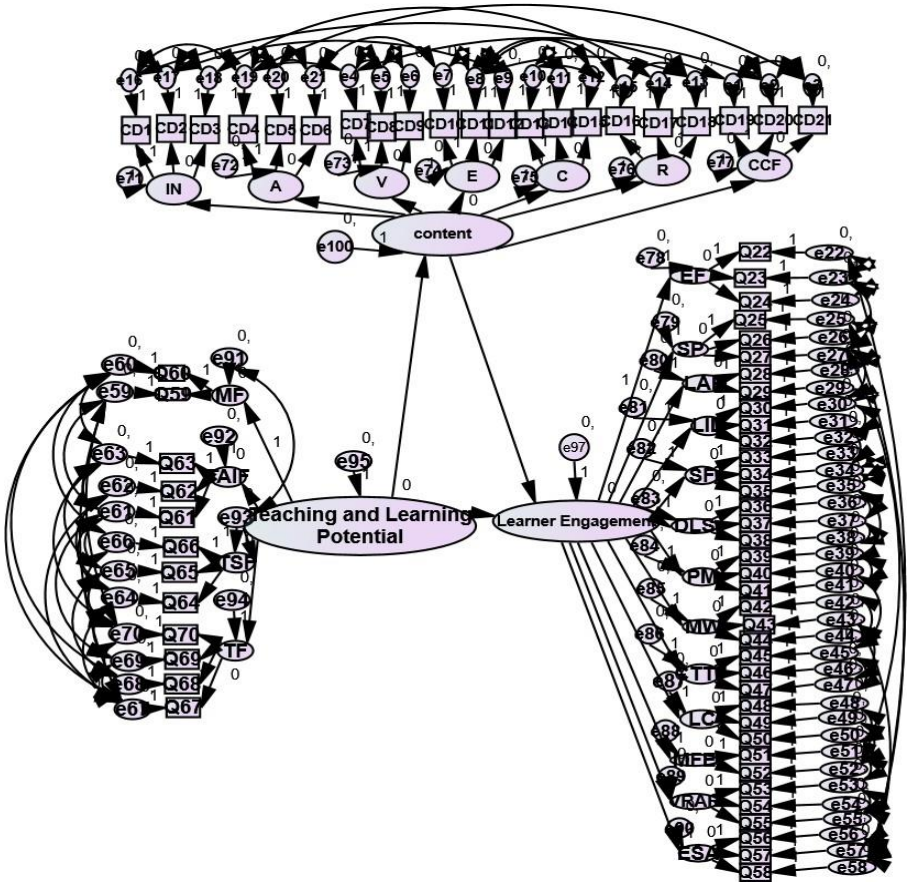


Figure 2. Fitted GBMDS SEM Model

Initially, we conducted the necessary calculations to assess the reliability of a sample of 340 questionnaires to ensure a commendable level of dependability. Following this the reliability was evaluated for all 340 questionnaires, which consisted of 70 items, yielding a satisfactory Cronbach's Alpha value of 0.989. As previously noted, a Cronbach's Alpha value exceeding 0.70 is considered acceptable and reliable. Additionally, the reliability of each variable within the study has been evaluated, as detailed in Table 4.

Table 4. Reliability of the Instrument

Variables	Cronbach's Alpha	N of items
Content & Delivery	0.964	21
Learner Engagement	0.980	37
Teaching and Learning Potential	0.942	12
Total	0.989	70

The development and validation of GBMDS represent a significant advancement in the field of ELT. The scale, comprising three core dimensions—Content & Delivery, Learner Engagement, and Teaching and Learning Potential—was rigorously tested using CFA through SEM. The final 70-item instrument, refined through the elimination of 18 items from the initial 88 items, demonstrated a robust model fit (CFI = 0.995, NFI = 0.990, RMSEA = 0.002). These results affirm the scale's structural integrity and its applicability in assessing GBMD within ELT contexts. The validated scale provides a standardized tool for material developers, enabling systematic evaluation of game-based instructional materials and fostering alignment with pedagogical objectives.

Discussion and Conclusion

The present study set out to develop and validate an ELT Game-Based Material Development Scale (GBMDS), with the aim of providing a psychometrically robust instrument for evaluating game-based instructional materials in English Language Teaching. The results of the confirmatory factor analysis and structural equation modeling confirmed the reliability and validity of the three-factor framework, comprising Content and Delivery, Learner Engagement, and Teaching and Learning Potential. These findings offer strong evidence for the structural integrity of the proposed model and underscore the need for standardized tools in guiding the design and assessment of gamified ELT resources.

The validation of the GBMDS contributes to addressing the conceptual fragmentation that has long characterized research in digital game-based language learning. As prior reviews have shown, the lack of universally accepted definitions and frameworks has limited comparability across studies (22, 23). By consolidating diverse theoretical insights into a coherent, empirically tested model, this study responds directly to calls for rigor and standardization in gamification research (6, 17). The identification of 24 sub-constructs within the three primary dimensions not only enhances the granularity of analysis but also provides researchers and practitioners with concrete criteria for evaluating materials, thereby bridging the gap between theory and classroom practice.

The results highlight the significance of the Content and Delivery dimension, which encompasses factors such as authenticity, relevance, cultural inclusivity, communicative competence, and visual appeal. These findings resonate with prior scholarship emphasizing that the effectiveness of game-based materials depends on their ability to simulate real-world communication and provide authentic contexts for practice (4, 5). For instance, MMORPGs and entertainment games have been shown to foster meaningful interaction and intercultural competence when they incorporate narratives and contexts that mirror learners' social realities (12, 13).

Moreover, the focus on cultural conflict-free design in the validated scale echoes research on contextualized game-based learning, which stresses the importance of aligning materials with learners' sociocultural backgrounds (7, 34). Without such alignment, learners may experience disengagement or cultural dissonance, undermining the pedagogical potential of gamified approaches. Similarly, the emphasis on communicative competence in the GBMDS reinforces findings that game-based environments are most effective when they encourage authentic communication rather than mechanical practice (24, 35).

The strong psychometric support for the visual appeal sub-construct also aligns with studies on design aesthetics in gamification. Research demonstrates that elements such as badges, colors, and personalized avatars significantly enhance learner motivation and flow, contributing to deeper engagement (19, 21). These results suggest that aesthetic considerations are not merely superficial but integral to the pedagogical value of game-based materials.

The second major finding of this study relates to the Learner Engagement dimension, which was supported by high factor loadings and internal consistency. This dimension encompasses constructs such as autonomy, self-paced learning, mistake-friendly environments, metacognitive awareness, and VR/AR role-playing. The validation of this dimension corroborates a substantial body of literature linking gamification to increased learner motivation and sustained engagement (9, 28).

Notably, the inclusion of mistake-friendly environments reflects the growing recognition that games can provide safe spaces for experimentation, where learners can take risks without fear of failure. This aligns with studies showing that interactive response systems and gamified tasks reduce anxiety and increase willingness to communicate (24, 30). Similarly, the validation of autonomy and self-paced learning supports findings that gamification fosters learner independence by giving students greater control over their learning trajectories (2, 17).

The emphasis on digital literacy as a sub-construct of engagement further expands the theoretical understanding of how games support twenty-first century competencies. Prior studies highlight that gamified environments not only promote linguistic competence but also cultivate digital skills essential for modern education (15, 31). This dual benefit underscores the value of gamified ELT materials in preparing learners for both academic and professional contexts.

Finally, the validation of VR/AR role-playing within the engagement dimension reflects the growing body of evidence on immersive technologies. Research demonstrates that VR-supported games enhance learners' ability to apply language skills in simulated real-world contexts, increasing both motivation and communicative competence (8, 16). The GBMDS thus captures a cutting-edge dimension of engagement that aligns with current technological innovations.

The third validated dimension, Teaching and Learning Potential, addresses the role of teachers and the pedagogical integration of gamified materials. Sub-constructs such as teacher friendliness, immediacy of access, and critical thinking highlight that game-based materials cannot succeed without alignment with instructional goals and teacher mediation. These findings support Becker's Four Pillars model, which emphasizes the importance of balancing gameplay, educational content, teacher support, and curricular integration (26).

The validation of this dimension also resonates with studies showing that teachers remain key mediators of game-based materials, ensuring their pedagogical relevance and feasibility in classroom contexts (27, 33). Moreover, the inclusion of critical thinking as a sub-construct highlights that games should not only entertain but also challenge learners to analyze, synthesize, and reflect, consistent with constructivist and socio-cognitive frameworks (8, 36).

The emphasis on teacher-friendly design also responds to concerns in the literature that many gamified tools are difficult to implement without significant adaptation, creating barriers for adoption (22, 32). By providing validated criteria for teacher accessibility, the GBMDS ensures that the needs of educators are integrated into the evaluation of gamified materials.

Taken together, the results of this study advance the theoretical and practical understanding of game-based ELT materials. Theoretically, the GBMDS consolidates fragmented insights into a structured model that integrates motivational, cultural, technological, and pedagogical dimensions. This synthesis responds to calls for holistic frameworks in gamification research (8, 28). Practically, the scale provides educators, material developers, and researchers with a tool for evaluating the effectiveness and appropriateness of gamified resources, ensuring alignment with learner needs and curricular objectives.

By validating constructs such as authenticity, cultural relevance, and digital literacy, the GBMDS also extends the scope of evaluation beyond narrow linguistic outcomes to include broader competencies. This aligns with research emphasizing that the value of gamified materials lies not only in language gains but also in fostering autonomy, intercultural competence, and twenty-first century skills (7, 13, 19).

Despite its contributions, this study is not without limitations. First, the sample was restricted to English language teachers within a specific national context, which may limit the generalizability of findings to other educational settings and cultural environments. While the stratified sampling ensured demographic diversity, learners' perspectives were not directly incorporated, which may overlook critical insights from the end-users of game-based materials. Second, the study relied on self-report instruments, which may be subject to social desirability bias or limited awareness among participants regarding certain dimensions of gamification. Third, although the GBMDS was rigorously validated through CFA and SEM, longitudinal validation was not conducted, leaving questions about the scale's stability over time and across diverse learning contexts.

Future research should aim to validate the GBMDS across different cultural, linguistic, and institutional settings to enhance its generalizability. Comparative studies across multiple countries could reveal how sociocultural factors influence the perception and effectiveness of gamified ELT materials. Additionally, incorporating the perspectives of learners, alongside teachers, would provide a more holistic understanding of the factors shaping engagement and effectiveness. Experimental

studies testing the predictive validity of the GBMDS in relation to learning outcomes would further strengthen its utility. Moreover, future research could explore the integration of emerging technologies such as artificial intelligence and adaptive learning systems into the framework, assessing how personalization and dynamic feedback enhance learner engagement.

For practitioners, the validated GBMDS offers a structured tool to evaluate and refine game-based ELT materials. Teachers can use the scale to assess the relevance, cultural appropriateness, and learner engagement potential of digital resources before adoption. Material developers are encouraged to integrate the identified sub-constructs into the design of gamified tools, ensuring alignment with pedagogical goals and user needs. Policymakers and curriculum designers can also benefit from the GBMDS by adopting it as a standard for quality assurance in educational technology. Ultimately, by grounding material development in validated frameworks, stakeholders can foster more engaging, effective, and inclusive language learning experiences.

Acknowledgments

We would like to express our appreciation and gratitude to all those who helped us carrying out this study.

Authors' Contributions

Not applicable.

Declaration of Interest

The author 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.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

References

1. McGrath I. Teaching materials and the roles of EFL/ESL teachers: Practice and theory: A&C Black; 2013.
2. Nunan D, Richards JC. Language learning beyond the classroom: Routledge; 2015.
3. Hamari J, Koivisto J, Sarsa H. Does gamification work?--a literature review of empirical studies on gamification. 2014 47th Hawaii International Conference on System Sciences2014. p. 3025-34.
4. Reinhardt J. Gameful Second and Foreign Language Teaching and Learning: Theory, Research, and Practice. Switzerland: Springer International Publishing; 2019.
5. Sundqvist P, Sylvén LK. Extramural English in teaching and learning: From theory and research to practice: Springer; 2016.

6. Li C, Fryer LK, Chu SK. Utilising gamified formative assessment to support English language learning in schools: a scoping review. Innovation in Language Learning and Teaching. 2025;19(2):188-204. doi: 10.1080/17501229.2024.2352789.
7. Yang L, Li R. Contextualized Game-Based Language Learning: Retrospect and Prospect. Journal of Educational Computing Research. 2024;62(1):357-75. doi: 10.1177/07356331231189292.
8. Esteban AJ. Theories, Principles, and Game Elements that Support Digital Game- Based Language Learning (DGBLL): A Systematic Review. International Journal of Learning, Teaching and Educational Research. 2024;23(3):1-22. doi: 10.26803/ijlter.23.3.1.
9. Chowdhury M, Dixon LQ, Kuo LJ, Donaldson JP, Eslami Z, Viruru R, et al. Digital game-based language learning for vocabulary development. Computers and Education Open. 2024;6:100160. doi: 10.1016/j.caeo.2024.100160.
10. Thompson CG, von Gillern S. Video-game based instruction for vocabulary acquisition with English language learners: A Bayesian meta-analysis. Educational Research Review. 2020;30:100332. doi: 10.1016/j.edurev.2020.100332.
11. Martinez L, Gimenes M, Lambert E. Entertainment Video Games for Academic Learning: A Systematic Review. Journal of Educational Computing Research. 2022;60(4):1083-109. doi: 10.1177/07356331211053848.
12. Savonitti G, Mattar J. Entertainment games for teaching english as a second language: Characteristics and potential. International Journal for Innovation Education and Research. 2018;6(2):188-207. doi: 10.31686/ijier.vol6.iss2.970.
13. Martins HF. Game on: Notes on Language Learning Potentials Through MMORPGs' Social and Motivational Dynamics. European Journal of Language and Culture Studies. 2023;2(6):1-5. doi: 10.24018/ejlang.2023.2.6.110.
14. Szabó F, Kopinska M. Gamification in foreign language teaching: A conceptual introduction. Hungarian Educational Research Journal. 2023;13(3):418-28. doi: 10.1556/063.2023.00202.
15. Hwang GJ, Chen PY, Chu ST, Chuang WH, Juan CY, Chen HY. Game-Based Language Learning in Technological Contexts: An Integrated Systematic Review and Bibliometric Analysis. International Journal of Online Pedagogy & Course Design. 2023;13(1). doi: 10.4018/IJOPCD.316184.
16. Jin G. Review and Case Study of The Impact of VR Technology on Internet 3D Game Design. 2021 International Conference on Intelligent Transportation, Big Data & Smart City (ICITBS)2021. p. 333-7.
17. Luo Z. The effectiveness of gamified tools for foreign language learning (FLL): a systematic review. Behavioral Sciences. 2023;13(4):331. doi: 10.3390/bs13040331.
18. Mäkelä T, Fenyvesi K, Mäki-Kuutti M. Developing a pedagogical framework and design principles for STEM learning environment design. Journal of Research in STEM Education. 2020;6(1):1-17. doi: 10.51355/jstem.2020.74.
19. Oliveira W, Hamari J, Joaquim S, Toda AM, Palomino PT, Vassileva J, et al. The effects of personalized gamification on students' flow experience, motivation, and enjoyment. Smart Learning Environments. 2022;9(1):16. doi: 10.1186/s40561-022-00194-x.
20. Zaric N, Lukarov V, Schroder U. A fundamental study for gamification design: Exploring learning tendencies' effects. International Journal of Serious Games. 2020;7(4):3-25. doi: 10.17083/ijsg.v7i4.356.
21. Rodrigues L, Pereira Jr CX, Queiroga EM, Santos HFS, Costa NT. The Influence of Aesthetic Personalization on Gamified Learning: A Behavioral Analysis of Students' Interactions. International Conference on Artificial Intelligence in Education; Cham: Springer Nature Switzerland; 2024. p. 283-90.
22. Culduz M. Gamification in English Language Teaching (ELT): A comprehensive review of theory and practice. International Journal of Social and Humanities Sciences Research (JSHSR). 2023;10(100):2663-75.
23. De La Cruz KML, Noa S, Gebera OWT, Valencia CCM, Velasquez SMB, Postigo GSP. Use of gamification in English learning in Higher Education: A systematic review. JOTSE. 2023;13(2):480-97. doi: 10.3926/jotse.1740.
24. Reinders H, Wattana S. Affect and willingness to communicate in digital game- based learning. ReCALL. 2015;27(1):38-57. doi: 10.1017/S0958344014000226.
25. Sadera WA, Li Q, Song L, Liu L. Digital game-based learning. Computers in the Schools. 2014;31(1-2):1. doi: 10.1080/07380569.2014.879801.
26. Becker K. Choosing and using digital games in the classroom. Berlin/Heidelberg, Germany: Springer; 2017. p. 175-214.

27. Reinhardt J, Sykes J. Special issue commentary: Digital game and play activity in L2 teaching and learning. Language Learning & Technology. 2014;18(2):2-8. doi: 10.125/44362.
28. Sailer M, Homner L. The gamification of learning: A meta-analysis. Educational psychology review. 2020;32(1):77-112. doi: 10.1007/s10648-019-09498-w.
29. Zhang H. A literature review and meta-analysis of digital games and second language learning. 2018.
30. Sun JCY, Hsieh PH. Application of a gamified interactive response system to enhance the intrinsic and extrinsic motivation, student engagement, and attention of English learners. Journal of Educational Technology & Society. 2018;21(3):104-16.
31. Klimova B, Kacet J. Efficacy of computer games on language learning. Turkish Online Journal of Educational Technology-TOJET. 2017;16(4):19-26.
32. Dixon DH. A methodological framework for analyzing the language in digital games. Digital Games in Language Learning: Routledge; 2022. p. 52-73.
33. Govender T, Arnedo-Moreno J. An analysis of game design elements used in digital game-based language learning. Sustainability. 2021;13(12):6679. doi: 10.3390/su13126679.
34. Ishaq K, Rosdi F, Zin NAM, Abid A. Serious game design model for language learning in the cultural context. Education and Information Technologies. 2022;27(7):9317-55. doi: 10.1007/s10639-022-10999-5.
35. Dehghanzadeh H, Fardanesh H, Hatami J, Talaee E, Noroozi O. Using gamification to support learning English as a second language: a systematic review. Computer Assisted Language Learning. 2021;34(7):934-57. doi: 10.1080/09588221.2019.1648298.
36. McDonough J, Shaw C, Masuhara H. Materials and methods in ELT: A teacher's guide: John Wiley & Sons; 2013.