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Beyond Learning Achievement: Investigating International Students' Acceptance of Game-based Technology for Chinese Language Learning

Chuanyang Gong¹ & Kittaway Thongkoo^{2*}

Faculty of Multidisciplinary and Interdisciplinary School, Chiang Mai University, Thailand¹, College of Arts, Media and Technology, Chiang Mai University, Thailand²

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Abstract

While previous studies on game-based learning have primarily focused on learning achievement, achievement results alone do not explain whether learners perceive the technology as useful, easy to use, and worth continuing to use. Learner acceptance is essential because successful technology implementation depends on learners' willingness to adopt and continue using it. This study investigated international students' acceptance of game-based technology for Chinese language learning by integrating the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT). This acceptance-focused analysis used post-intervention questionnaire data from 40 international students enrolled in Chinese language courses at a language school in Chiang Mai, Thailand. A 12-item questionnaire measured intrinsic motivation, extrinsic motivation, perceived usefulness, perceived ease of use, attitude, and behavioral intention. Data was analyzed using descriptive statistics, Cronbach's alpha, and Pearson's correlations. All six constructs were rated at a high level. Attitude obtained the highest mean ($M = 4.18$), followed by intrinsic motivation and perceived usefulness (both $M = 4.16$), whereas behavioral intention obtained the lowest mean ($M = 4.04$). Behavioral intention was positively correlated with intrinsic motivation ($r = .989$), extrinsic motivation ($r = .980$), perceived usefulness ($r = .989$), perceived ease of use ($r = .962$), and attitude ($r = .988$), with all relationships significant at $p < .01$. However, the consistently high correlations suggest possible overlap among the constructs and should be interpreted cautiously. The findings indicate that continued-use intention is closely associated with learners' technology perceptions and motivational orientations. By focusing on students' acceptance rather than repeating the analysis of learning achievement, this study offers practical guidance for designing useful, manageable, and engaging game-based Chinese learning environments.

Keywords: Game-based Learning, Technology Acceptance Model, Self-determination Theory, Chinese Language Learning, International Students, Behavioral Intention

■ Introduction

* Corresponding author

Email address: kittaway.t@cmu.ac.th

The rapid advancement of digital technology has transformed language education by providing learners with more interactive, flexible, and learner-centered learning environments. Technologies such as mobile learning applications, artificial intelligence (AI), adaptive learning systems, and game-based learning have become increasingly integrated into language classrooms to enhance learners' engagement and learning experiences (Yu & Tsuei, 2023). In Chinese language education, game-based technology has gained considerable attention because it combines instructional content with game elements, including rewards, challenges, immediate feedback, and progress tracking, which encourage active participation and continuous practice (Nadeem et al., 2023). Previous studies have demonstrated that game-based learning can improve language achievement, learner motivation, engagement, attention, and self-efficacy by creating interactive learning environments that encourage active participation and repeated practice (Acquah & Katz, 2020; Yu & Tsuei, 2023). However, evidence of improved learning outcomes does not fully explain whether learners perceive the technology as useful, manageable, and worth continuing to use. Examining students' acceptance therefore provides information that cannot be obtained from achievement results alone.

Learner acceptance is a critical factor influencing the successful implementation and long-term sustainability of educational technology. Even when digital learning tools demonstrate positive effects on learning performance, their educational value may be limited if learners perceive them as difficult to use, lacking usefulness, or not worth continuing to use. The Technology Acceptance Model (TAM) explains technology adoption through learners' perceptions of usefulness and ease of use, which subsequently influence their attitudes and behavioral intentions toward technology use (Davis, 1989). At the same time, Self-Determination Theory (SDT) distinguishes between intrinsic and extrinsic motivation and explains how these motivational orientations influence learners' participation and persistence (Ryan et al., 2021). Integrating TAM and SDT allows learner acceptance to be examined from two complementary perspectives: learners' perceptions of the technology and their motivation to engage with it. In the present study, intrinsic and extrinsic motivation are treated as factors associated with acceptance rather than as learning outcomes.

Although TAM and SDT have been applied in e-learning, mobile learning, and online education, their combined use in examining international students' acceptance of game-based technology for Chinese language learning requires further investigation. International students must learn a new linguistic system while adapting to unfamiliar cultural and educational contexts, which may influence how they evaluate and use learning technologies. The present study reports an acceptance-focused analysis from a broader research project on game-based Chinese language learning (Cho & Heron, 2015). The earlier study examined learning achievement and motivation, whereas the present study specifically investigates perceived usefulness, perceived ease of use, attitude, and behavioral intention. It also examines intrinsic and extrinsic motivation as antecedent factors associated with continued-use intention. Accordingly, this study proposes and tests an integrated TAM-SDT framework in the context of Chinese as a second or foreign language. By distinguishing students' acceptance from learning achievement, the study provides theoretical and practical insights into the design of game-based environments that learners perceive as useful, accessible, engaging, and suitable for continued use.

Literature Reviews

Game-Based Technology in Chinese Language Learning

Game-based technology has become an important instructional approach in language education because it integrates educational content with interactive game mechanics that encourage learner participation, engagement, and continuous practice. Unlike traditional teacher-centered instruction, game-based learning environments promote active learning through challenges, rewards, immediate feedback, and progression systems, allowing learners to construct knowledge through meaningful interactions (Acquah & Katz, 2020). Recent advances in digital learning have further expanded the application of game-based technology through mobile applications, online platforms, and AI-supported learning environments, making language learning more flexible and learner-centered (Alexiou & Schippers, 2018).

In Chinese language education, digital game-based learning has been applied to support Chinese language achievement, learners' attention and self-efficacy, and their understanding of Chinese character structures (Wong et al., 2017; Yu & Tsuei, 2023). Previous studies have reported that game-based learning improves learners' motivation, engagement, confidence, and language achievement by creating enjoyable learning experiences that encourage repeated practice (Nadeem et al., 2023). These findings demonstrate the instructional value of game-based technology; however, they primarily focus on learning outcomes rather than learners' acceptance of the technology itself.

As educational technologies continue to evolve, understanding learner acceptance has become increasingly important. Successful implementation of game-based learning depends not only on its ability to improve academic performance but also on learners' willingness to adopt and continue using the technology. Therefore, investigating learner acceptance provides valuable insights into the long-term sustainability of game-based learning environments in Chinese language education.

Technology Acceptance Model (TAM)

According to the Technology Acceptance Model (TAM), technology acceptance is explained through four related constructs: perceived usefulness, perceived ease of use, attitude, and behavioral intention. Perceived usefulness refers to the extent to which individuals believe that using a particular technology will enhance their performance, whereas perceived ease of use reflects the degree to which the technology can be used with minimal effort. These perceptions contribute to users' attitudes toward technology and their intention to continue using it (Davis, 1989).

TAM has been widely applied across various educational contexts, including e-learning, mobile learning, blended learning, and AI-assisted learning environments. For example, Chen and Zou (2024) found that perceived usefulness was a key factor associated with teachers' adoption of intelligent mixed-reality devices, whereas perceived ease of use did not significantly influence their attitudes. Their findings suggest that the relationships among technology acceptance factors may differ according to the technology, user group, and educational context. Within game-based learning environments, interactive game mechanisms can promote learners' participation, attention, and confidence in language learning (Yu & Tsuei, 2023). Consequently, TAM provides an appropriate theoretical foundation for examining international students' acceptance of game-based technology in Chinese language learning. In the present study, perceived usefulness, perceived ease of use, and attitude are examined as separate factors associated with behavioral intention. Because Pearson's correlation is used, the proposed relationships are interpreted as associations rather than causal pathways.

Self-Determination Theory (SDT)

Self-Determination Theory (SDT) explains human motivation by distinguishing between intrinsic motivation and extrinsic motivation (Martela & Ryan, 2020). Intrinsic motivation refers to engaging in an activity because it is enjoyable, interesting, or personally satisfying, whereas extrinsic motivation refers to participation driven by external rewards, recognition, or academic outcomes. Both forms of motivation influence learners' engagement, persistence, and willingness to participate in educational activities. Game-based learning naturally incorporates motivational elements that align with SDT. Features such as points, badges, leaderboards, rewards, immediate feedback, and progressive challenges enhance learners' enjoyment while simultaneously providing external incentives for continued participation. Previous studies have demonstrated that learners with higher intrinsic motivation tend to engage more actively in digital learning environments, whereas extrinsic motivational factors also encourage sustained participation when appropriate rewards and recognition are provided (Reeve & Lee, 2019). Integrating SDT with TAM therefore provides a more comprehensive explanation of learner acceptance by considering both motivational factors and perceptions of technology.

Conceptual Framework and Research Hypotheses

Based on the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT), the present study examines five acceptance-related factors associated with international students' behavioral intention to continue using game-based technology for Chinese language learning. Intrinsic and extrinsic motivation represent learners' motivational orientations, while perceived usefulness, perceived ease of use, and attitude reflect their acceptance of game-based technology. Each construct is examined separately to ensure alignment among the research hypotheses, conceptual framework, measurement instrument, and correlation analysis. Because the study employs Pearson's correlation, the proposed relationships are interpreted as associations rather than causal pathways. Accordingly, the conceptual framework presented in Figure 1 guides the following hypotheses:

H1a: Intrinsic motivation is positively associated with behavioral intention to continue using game-based technology.

H1b: Extrinsic motivation is positively associated with behavioral intention to continue using game-based technology.

H2a: Perceived usefulness is positively associated with behavioral intention to continue using game-based technology.

H2b: Perceived ease of use is positively associated with behavioral intention to continue using game-based technology.

H3: Attitude toward game-based technology is positively associated with behavioral intention to continue using it.

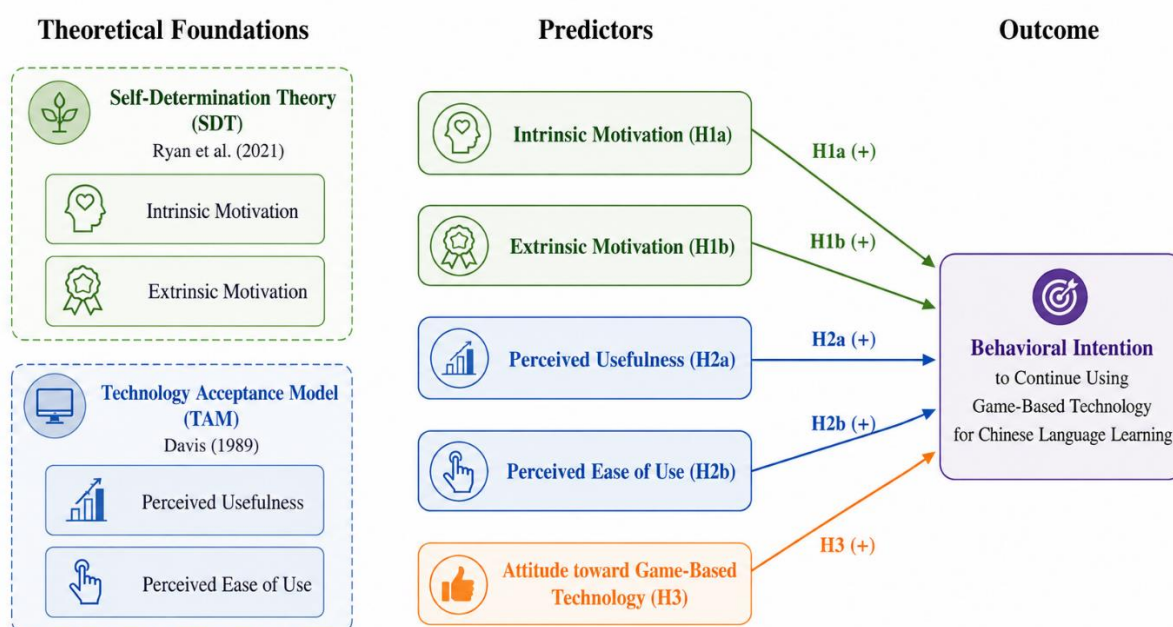


Figure 1. Acceptance-focused conceptual framework

Research Methodology

Game-Based Learning Intervention

The game-based learning intervention in this study was implemented using “Chinese Adventure” a mobile-based language learning application designed specifically for beginner to intermediate CSL learners. The application incorporates a thematic, quest-based framework in which learners navigate through real-life scenarios (e.g., ordering food, shopping, asking for directions) that correspond to the target vocabulary and grammatical structures covered in their formal Chinese language courses (Lin et al., 2026).

The intervention was conducted over six weeks, with each learning session lasting approximately 90 minutes. The application organized the learning content into progressive scenario-based quests that required learners to recognize target vocabulary, apply grammatical structures, and respond to short communicative tasks. Its main game mechanics included points, levels, task progression, immediate feedback, repeated attempts, and rewards for completing learning activities. Vocabulary and grammar exercises supported language recognition and controlled practice, while scenario-based dialogue tasks allowed learners to apply the target language in everyday communicative situations. The instructor introduced the learning objectives, provided technical assistance, monitored learners’ progress, and reviewed common language difficulties after each session. These details clarify the learning experience that participants evaluated when completing the acceptance questionnaire.

Research Design

This study employed a quantitative research design to investigate international students’ acceptance of game-based technology for Chinese language learning. The study was guided by the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT) to examine learners’ perceptions

of game-based technology and the relationships among intrinsic motivation, extrinsic motivation, perceived usefulness, perceived ease of use, attitude, and behavioral intention. Rather than evaluating learning achievement, this study focused on understanding learners' acceptance of game-based technology through descriptive statistics and Pearson's correlation analysis. This acceptance-focused analysis was conducted separately from the earlier achievement-focused analysis of the broader research project. Because the study examined associations among the constructs, the results were not interpreted as evidence of causal relationships.

Participants

The analytical sample comprised 40 non-native speakers of Chinese studying at a language school in Chiang Mai, Thailand. Participants were between 19 and 25 years old ($M = 21.73$, $SD = 1.65$) and reported Chinese proficiency levels ranging from beginner to intermediate.

A convenience sampling method was employed to recruit participants. Recruitment flyers were distributed in Chinese language classrooms, and interested students were invited to register voluntarily. Of the 45 students who expressed initial interest, 40 completed the full intervention and returned valid questionnaires, yielding a completion rate of 88.9%. No incentives were provided for participation. Because the participants were recruited from a single language school through convenience sampling, the findings may not be generalizable to international CSL learners in other institutional, cultural, or geographical contexts.

Research Instrument

Data was collected using a self-administered questionnaire developed based on the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT). The questionnaire consisted of two sections. The first section collected participants' demographic information, including gender, age, nationality, native language, and current Chinese proficiency level. The second section comprised 12 items measured on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The instrument measured six constructs: intrinsic motivation, extrinsic motivation, perceived usefulness, perceived ease of use, attitude, and behavioral intention. Each construct was assessed using two questionnaire items. Intrinsic and extrinsic motivation were developed based on SDT (Ryan et al., 2021), while perceived usefulness and perceived ease of use were based on TAM (Davis, 1989). The attitude and behavioral intention items were adapted to measure learners' evaluations of and intention to continue using game-based technology for Chinese language learning. The measurement constructs, questionnaire items, and corresponding theoretical sources are summarized in Table 1.

Before data collection, three experts in educational technology and Chinese language education reviewed the questionnaire for clarity, relevance, and consistency with the theoretical constructs. Cronbach's alpha was subsequently calculated to examine the internal consistency of each construct and the complete questionnaire. Because each construct was measured using only two items, the reliability coefficients were treated as preliminary evidence of internal consistency rather than evidence of construct validity.

Table 1

Measurement Constructs

Construct	Items	Theoretical Source
Intrinsic Motivation	Q1–Q2	Ryan & Deci (2021)
Extrinsic Motivation	Q3–Q4	Ryan & Deci (2021)
Perceived Usefulness	Q5–Q6	Davis (1989)
Perceived Ease of Use	Q7–Q8	Davis (1989)
Attitude toward Game-Based Technology	Q9–Q10	Yu, Yu & Tsuei (2023)
Behavioral Intention	Q11–Q12	Yu, Yu & Tsuei (2023)

Instrument Validity and Reliability

The questionnaire was developed based on established theoretical frameworks and relevant literature related to technology acceptance and learning motivation. Prior to data collection, the questionnaire was reviewed by experts in educational technology and Chinese language education to ensure content validity. Reliability was assessed using Cronbach's alpha coefficient. The overall questionnaire demonstrated excellent internal consistency ($\alpha = .984$), while the reliability coefficients for all six constructs ranged from .891 to .940, indicating high reliability for subsequent statistical analyses.

Ethical Considerations

This study was conducted in accordance with ethical principles for educational research involving human participants. Before data collection, the researchers explained the study's purpose, research procedures, and participants' rights. Participants were informed that their participation was voluntary, that they could decline to answer any question or withdraw from the study without penalty, and that their decision would not affect their academic standing. Information consent was obtained from all participants before they completed the questionnaire.

The questionnaire did not request personally identifying or sensitive information. Participants were informed that their responses would remain confidential and would be reported only in aggregated form. All data were stored securely, accessed only by the research team, and used solely for the purposes of this study.

Data Collection

Data were collected after participants had completed the game-based Chinese language learning intervention. Participants completed the questionnaire anonymously during the final stage of the learning intervention. The questionnaire required approximately 10–15 minutes to complete. All responses were screened for completeness before statistical analysis, and no incomplete questionnaires were included in the final dataset. Of the 45 students who initially expressed interest, 40 completed the intervention and provided usable questionnaire responses, resulting in a completion rate of 88.9%.

Data Analysis

The data collected were analyzed using IBM SPSS Statistics. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were employed to summarize participants'

demographic characteristics and scores for the six acceptance-related constructs. Mean scores were interpreted using the following intervals: 1.00–1.80 = very low, 1.81–2.60 = low, 2.61–3.40 = moderate, 3.41–4.20 = high, and 4.21–5.00 = very high.

Cronbach's alpha coefficients were calculated to examine the internal consistency of each construct and the complete questionnaire. Pearson's correlations were conducted to examine the relationships between behavioral intention and intrinsic motivation, extrinsic motivation, perceived usefulness, perceived ease of use, and attitude, thereby testing H1a, H2a, H2b, and H3. Pearson's correlation analysis was conducted to examine the relationships among the study constructs and to test the proposed research hypotheses. Pearson's correlation was selected because the primary objective of this study was to explore the associations among learner acceptance constructs rather than to examine causal or structural relationships. Statistical significance was determined at the .05 level. Accordingly, the results were interpreted as evidence of association and not as evidence of causation.

■ Results

Participant Characteristics

Table 2 summarizes the demographic characteristics of the 40 international students included in the analysis, including gender, age, and current Chinese proficiency level.

Table 2.

Participant Characteristics

Characteristic	Category	n	%
Gender	Male	20	50.0
	Female	20	50.0
Age (years)	Mean $\pm$ SD	21.73 $\pm$ 1.65	
	Range	19–25	
Chinese Proficiency	Beginner	15	37.5
	Elementary	21	52.5
	Intermediate	4	10.0

The participants ranged in age from 19 to 25 years ($M = 21.73$, $SD = 1.65$), with equal numbers of male and female participants. Most participants reported elementary Chinese proficiency (52.5%), followed by beginner (37.5%) and intermediate proficiency (10.0%).

Reliability Analysis

Table 3 presents the internal consistency coefficients for the six constructs and the overall questionnaire. Cronbach's alpha values for the individual constructs ranged from .891 to .940, while the overall questionnaire obtained an alpha of .984. These values indicate high internal consistency. However, because each construct was measured using only two items and the overall coefficient was exceptionally high, the results may also indicate conceptual or item overlap among the constructs. The reliability

coefficients should therefore be interpreted as preliminary evidence of internal consistency rather than confirmation of construct validity.

Table 3.

Reliability Analysis

Construct	Cronbach's Alpha
Intrinsic Motivation	.940
Extrinsic Motivation	.908
Perceived Usefulness	.899
Perceived Ease of Use	.894
Attitude	.891
Behavioral Intention	.905
Overall Questionnaire	.984

Descriptive Statistics of Learner Acceptance

Table 4 presents the descriptive statistics for the six acceptance-related constructs. Based on the predefined interpretation criteria, all constructs were rated at a high level. Attitude obtained the highest mean score ($M = 4.18$, $SD = 0.70$), followed by intrinsic motivation ($M = 4.16$, $SD = 0.68$) and perceived usefulness ($M = 4.16$, $SD = 0.66$). Behavioral intention obtained the lowest mean score ($M = 4.04$, $SD = 0.78$). Although the 0.14-point difference between attitude and behavioral intention was small, it indicates that favorable attitudes toward game-based technology did not translate into an equally strong intention to continue using it for every participant. Nevertheless, behavioral intention remained within the high interpretation range.

Table 4.

Descriptive Statistics for Acceptance-Related Constructs

Construct	Mean	SD	Interpretation
Attitude	4.18	0.70	High
Intrinsic Motivation	4.16	0.68	High
Perceived Usefulness	4.16	0.66	High
Extrinsic Motivation	4.11	0.66	High
Perceived Ease of Use	4.06	0.59	High
Behavioral Intention	4.04	0.78	High

Correlation Analysis

Table 5 presents the Pearson correlations among the six acceptance-related constructs. Behavioral intention was positively correlated with intrinsic motivation ($r = .989$), extrinsic motivation ($r = .980$), perceived usefulness ($r = .989$), perceived ease of use ($r = .962$), and attitude ($r = .988$), with all relationships significant at $p < .01$. Accordingly, H1a, H1b, H2a, H2b, and H3 were supported at the bivariate level.

However, the correlations among all constructs were exceptionally high, ranging from .962 to .996. Although these results indicate strong positive associations, they may also suggest conceptual overlap among the constructs, common-method effects, or insufficient distinction among the two-item measures.

The findings should therefore be interpreted as evidence of association rather than independent predictive or causal effects.

Table 5.
Pearson Correlations among Acceptance-Related Constructs

Variable	IM	EM	PU	PEOU	ATT	BI
Intrinsic Motivation (IM)	1.000	.984**	.995**	.980**	.994**	.989**
Extrinsic Motivation (EM)	.984**	1.000	.986**	.977**	.982**	.980**
Perceived Usefulness (PU)	.995**	.986**	1.000	.983**	.996**	.989**
Perceived Ease of Use (PEOU)	.980**	.977**	.983**	1.000	.980**	.962**
Attitude (ATT)	.994**	.982**	.996**	.980**	1.000	.988**
Behavioral Intention (BI)	.989**	.980**	.989**	.962**	.988**	1.000

Note. ** $p < .01$.

■ Discussion

The findings indicate that international students demonstrated a high level of acceptance of game-based technology for Chinese language learning. All six acceptance-related constructs were rated at a high level. Attitude obtained the highest mean score ($M = 4.18$), followed by intrinsic motivation and perceived usefulness (both $M = 4.16$). These results suggest that participants responded positively to the learning experience and recognized the educational value of technology. However, motivation should be interpreted as an antecedent factor associated with acceptance rather than as a component of technology acceptance itself.

Behavioral intention obtained the lowest mean score ($M = 4.04$), although it remained within the high interpretation range. The 0.14-point difference between attitude and behavioral intention was modest but meaningful. It suggests that favorable attitudes toward game-based technology did not translate into an equally strong intention to continue using it for every participant. Learners may have evaluated the technology positively while remaining uncertain about its long-term relevance, the persistence of its novelty, the time required for continued use, or the extent to which its activities represent authentic language communication. Because these factors were not directly measured, they should be regarded as possible explanations rather than confirmed reasons for the lower behavioral-intention score. Future research should examine whether self-efficacy, habit, social influence, task authenticity, and access conditions help explain the difference between positive attitudes and continued-use intention.

The correlation analysis showed that behavioral intention was positively associated with intrinsic motivation, extrinsic motivation, perceived usefulness, perceived ease of use, and attitude. The positive relationships of perceived usefulness, perceived ease of use, and attitude with behavioral intention are consistent with TAM, which emphasizes the importance of users' perceptions and attitudes in technology adoption (Davis, 1989). The relationships between motivational orientations and behavioral intention are also consistent with SDT, which explains how intrinsic and extrinsic motivation can support learners' participation and persistence (Ryan et al., 2021). Taken together, the findings suggest that continued-use intention is associated with both learners' evaluations of the technology and their motivation to engage with it.

Nevertheless, the correlation coefficients were exceptionally high, ranging from .962 to .996. Although these values indicate strong positive associations, they may also reflect conceptual overlap among the constructs, common-method effects, similar wording across questionnaire items, or limited differentiation resulting from the use of only two items per construct (Feng et al., 2025). The findings therefore provide stronger evidence of an overall pattern of favorable acceptance than of the unique contribution of each factor. They should not be interpreted as evidence that any construct independently predicts behavioral intention or causes learners to continue using game-based technology. Further research with larger samples, expanded measures, and factor-analytic techniques is needed to establish whether the six constructs are empirically distinct.

This study extends the evaluation of game-based Chinese language learning beyond learning achievement by focusing specifically on students' acceptance. The earlier analysis from the broader research project examined learning achievement and motivation, whereas the present study considers whether learners perceive technology as useful and manageable and whether they intend to continue using it. This distinction is important because positive learning outcomes alone do not ensure sustained technology adoption. For instructional designers and Chinese language educators, the findings emphasize the need to develop game-based environments that provide clear educational value, simple interaction, meaningful feedback, varied activities, and explicit connections to authentic language use. Continued-use intention should also be evaluated separately from enjoyment and short-term engagement when considering the long-term implementation of game-based technology.

■ Conclusion

This study investigated international students' acceptance of game-based technology for Chinese language learning by integrating the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT). All six acceptance-related constructs were rated at a high level, with attitude obtaining the highest means and behavioral intention obtaining the lowest. Behavioral intention was positively associated with intrinsic motivation, extrinsic motivation, perceived usefulness, perceived ease of use, and attitude, supporting H1a, H1b, H2a, H2b, and H3 at the bivariate level. These findings suggest that students' intention to continue using game-based technology is associated with both their perceptions of the technology and their motivational orientations. However, the exceptionally high correlations among the constructs indicate possible conceptual overlap. The results should therefore be interpreted as evidence of association rather than causal influence or the independent predictive effect of each construct.

This study contributes to the growing body of research on technology-enhanced language learning by shifting the focus from learning achievement to learner acceptance. Whereas the earlier analysis from the broader research project examined learning achievement and motivation, the present study specifically examined learners' evaluations of the technology and their intention to continue using it. The findings suggest that effective learning outcomes alone may not ensure sustained technology adoption. Game-based learning environments should also be perceived as useful, manageable, engaging, and relevant to learners' long-term language-learning needs. These findings provide practical guidance for educators, instructional designers, and developers, while further research with larger samples and more comprehensive measures is required to confirm the relationships among the acceptance-related constructs.

■ Limitations and Recommendations

Despite its contributions, this study has several limitations. First, this study employed a convenience sample of 40 international students recruited from a single language school in Chiang Mai, Thailand. This sampling approach, while practical, significantly limits the generalizability of the findings to broader populations of international CSL learners across different cultural, institutional, or geographical contexts. Future studies should therefore recruit larger and more diverse samples from multiple educational institutions. A larger sample would also permit the use of more advanced techniques, such as confirmatory factor analysis and structural equation modeling, to examine the measurement and structural models more rigorously.

Second, the study employed a cross-sectional survey design that examined learner acceptance at a single point in time. The study did not determine whether behavioral intention resulted in actual continued use or whether learners' acceptance changed after the initial novelty of the game-based activities declined. Longitudinal research should measure acceptance and actual technology use at multiple points to examine how students' perceptions and continued-use behaviors develop over time.

Third, although the questionnaire demonstrated high internal consistency, each construct was measured using only two items. The exceptionally high Cronbach's alpha coefficients and correlations may indicate conceptual overlap, similar item wording, or insufficient distinction among the constructs. Because all variables were measured through the same self-report questionnaire, common-method bias may also have contributed to the strength of the observed relationships. Future research should expand the number of items, conduct cognitive pretesting, and evaluate construct validity through exploratory and confirmatory factor analyses before testing structural relationships.

Finally, the study examined acceptance within one game-based Chinese language learning context. The findings may not apply equally to other platforms, game mechanics, language skills, or instructional settings. Future studies could compare different types of game-based technologies and examine additional factors, such as self-efficacy, social influence, habit, task authenticity, satisfaction, and learning engagement. Such research would provide a more comprehensive explanation of students' acceptance and clarify the conditions that support the sustained use of game-based technology in Chinese language education.

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