

Research Paper

Practice-Led Action Research on Gamified Intangible Cultural Heritage Learning: Motivating and Engaging University Students

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Abstract: Digital gamification is increasingly employed in higher education to enhance culturally situated learning. However, in the context of intangible cultural heritage (ICH), the design choices that sustain student motivation and engagement remain unclear. This study examines the impact of a gamified learning experiences platform centred on Yue Opera's costume craft in China. A qualitative practice-led action research design was applied with 34 university students using the platform over five consecutive days in the frame of a single planning-action-observation-reflection cycle. Qualitative data were collected through structured diaries, unobtrusive digital observation as well as semi-structured interviews and analysed thematically using the self-determination theory as a sensitising framework. The findings show that students joined the platform because they were curious about its game features and interested in its heritage content. As they went along, some students experienced their competence and autonomy supported by challenges, badges, scores, feedback and creative tasks, while other students experienced pressure or fatigue due to public comparison, demanding tasks and repetitive content. Diary and interview data, read alongside observations of the platform, indicate that engagement peaked early and declined over the five days. Thus, motivational patterns varied throughout the learning process and depended on how game elements linked achievement feedback to meaningful cultural exploration. The study provides a context-sensitive account of how autonomy, competence and relatedness are supported or frustrated in gamified ICH learning. It also demonstrates how a single cycle practice-led inquiry can incorporate students' experiences into the evaluation of a culturally situated digital curriculum. The study was short-term and used a purposive sample from one university, so the findings do not reflect long-term effects. Future work should explore revised designs in multiple cycles and heritage contexts.

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Keywords: Gamification, intangible cultural heritage, self-determination theory, motivation, practice-led action research

Suggested citation: Li, R. & Goh, W. W. (2026). Practice-led action research on gamified intangible cultural heritage learning: Motivating and engaging university students. *Asia-Pacific Journal of Futures in Education and Society*, 5(3), 155–179.

Introduction

Jaskari and Syrjälä (2022) identified digital gamification as an increasingly influential approach in contemporary education, particularly in addressing issues related to student disengagement. Conventional teaching approaches often face difficulties in sustaining the interest of contemporary learners and encouraging meaningful engagement with traditional culture, particularly as modernization continues to widen the cultural awareness gap (Singh et al., 2024). In response to these challenges, gamification has emerged as a promising educational strategy by incorporating engaging game-based features into learning environments. Rosser and Soler (2024), together with Yun (2023), suggested that elements such as points, badges, leaderboards (PBL), and narratives-based activities can enhance students' interest in heritage education while simultaneously supporting the preservation and transmission of cultural knowledge.

Despite its growing adoption, the effectiveness of gamification in sustaining student motivation remains widely debated. Alonso-Sánchez et al. (2025) reported that gamification in higher education can strengthen both extrinsic and intrinsic motivation while also enhancing student participation and overall learning experiences. Similarly, in cultural heritage education, gamified and playful digital environments have been used to engage learners and raise awareness of heritage-related content (Marques et al., 2023; Rosser & Soler, 2024). Moreover, a growing number of studies focusing on opera heritage within technology-enhanced learning environments suggests that it can provide a promising context for innovative, digitally supported tertiary-level intangible cultural heritage (ICH) education (Li, 2025; Su, 2025). However, systematic and in-depth research into the impact of opera-based gamified environments on student motivation, and how they can be utilised as a concrete strategy for curriculum innovation remained limited.

Yue Opera provides a meaningful case for this inquiry. Originating from Shaoxing, Zhejiang Province, it developed into one of China's most recognised regional opera forms and was included in the first batch of the National List of Representative ICH Items. As illustrated in Figure 1 and Figure 2, Yue Opera costume-making demonstrates the integration of performance, visual symbolism, and traditional craft knowledge. These costumes serve purposes beyond decoration,

as they communicate character identity, role status, emotional tone, and narrative meaning through embroidery techniques, fabric choices, colour symbolism, and character-specific design conventions (Liu et al., 2022; Zhao & Sornyai, 2024). Consequently, Yue Opera's costume heritage presents valuable opportunities for design education and curriculum innovation within higher education contexts. This curricular rationale is consistent with research on integrating regional culture into university art and design education (Chen & Abd. Rahim, 2023).



Figure 1. Yue Opera's stage performance (Source: Tencent News, 2025)



Figure 2. Yue Opera's costume-making craft (Source: Xinhua Zhejiang, 2023)

Recent studies also highlighted several limitations of gamification. Both Ede (2022) and Khaldi et al. (2023) argued that when gamification relies too heavily on extrinsic rewards or superficial game mechanics, it may fail to enhance intrinsic

motivation or learning performance and can even reduce learners' sense of autonomy or create unnecessary pressure. In addition, Romero-Rodríguez et al. (2024) noted that limited research has examined how specific game elements influence sustained motivation, particularly within culturally specific learning contexts such as ICH education. Furthermore, existing research rarely applies action research approaches to refine gamified designs through iterative motivation, resulting in limited guidance on fostering long-term motivation (Vasilevski & Birt, 2021).

This issue is particularly evident in the context of ICH education. Learning about ICH is often a long-term and culturally sensitive process, yet limited evidence exists on how specific game elements can influence learners' motivation to engage with heritage content over time. To address these gaps, this study adopted the self-determination theory (SDT) (Ryan & Deci, 2020) and employed a practice-led action research design to analyse how gamification can be effectively designed to maintain motivation in ICH learning. The following research questions guided this inquiry:

RQ1: What are the motivational patterns of university students regarding the gamified learning platform for Chinese ICH?

RQ2: How do specific game elements sustain or hinder students' engagement in the gamified ICH learning process?

Literature Review

Gamification

Deterding et al. (2011) as well as Seaborn and Fels (2015) defined gamification as the integration of game elements into non-game context to enhance engagement and motivation. In the educational setting, gamification has gained increasing attention through the incorporation of elements such as PBL, levels, challenges, and storytelling into learning experiences (Khaldi et al., 2023). These features are intended to support both extrinsic and intrinsic forms of motivation. Li et al. (2023) as well as Sailer and Homner (2020) concurred that well-designed gamification can improve learners' commitment, enjoyment, and learning outcomes. Nevertheless, Urh et al. (2015) argued that its effectiveness in higher education remains inconsistent due to the greater complexity learning tasks and the more advanced characteristics of adult learners.

The effectiveness of gamification is strongly influenced by the selection and implementation of specific game elements. Bai et al. (2021) observed that leaderboards encourage competition but may also risk discourage lower-performing learners. Likewise, Choi et al. (2022) argued that although badges can promote achievement,

they may unintentionally shift learners' focus towards superficial reward-seeking behaviours. Therefore, effective gamified interventions require careful alignment between game mechanics, educational objectives, and learners' needs (Sailer et al., 2017).

Gamification and Intangible Cultural Heritage Education

United Nations Educational, Scientific and Cultural Organization (UNESCO) (2003) defines intangible cultural heritage (ICH) as living traditions that include oral expressions, performing arts, rituals, and craftsmanship. Blake (2017) further explained that ICH can only be preserved through continued practice and community participation, making education a critical means of cultural transmission. According to Šantek (2025), well-designed ICH education can strengthen cultural identity, civic responsibility, and local sustainable development when integrated into university curricula. However, Yan and Li (2023), along with Xu and Zou (2022), observed that ICH often remains marginal within higher education programmes, highlighting the need for curriculum-based approaches that make living heritage more relevant and meaningful to contemporary students.

Within ICH, opera heritage represents a significant domain that combines codified bodily movements, vocal techniques, musical structures, costume designs, and narrative performances within a unified artistic tradition (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2003). Originating in Shaoxing, China, Yue Opera has been nationally recognised as an essential part of ICH and embodies local history, dialect, and aesthetic values (Zhao & Sornyai, 2024). The craftsmanship of Yue Opera's costumes is particularly relevant to design and arts education because it links symbolic visual language with making processes and embodied performance practices. Both Li (2025) and Su (2025) concurred that regional opera heritage can serve as a valuable resource in higher education curricula by enabling students to develop creative skills while critically engaging with cultural contexts.

Building on this potential, increasing attention has been given to the use of gamification in revitalising ICH learning. A systematic review by Marques et al. (2023) showed that cultural heritage gamification has been widely used to support motivation, engagement, and creativity, including in mobile, augmented reality, and virtual reality applications. Similarly, Yun (2023) reported that empirical studies on gamified heritage activities show learners are more inclined to explore sites and practice traditional skills when activities are presented as clear challenges with defined goals and rewards. These findings suggest that gamification can make ICH more accessible and appealing, provided that the game mechanics respect the cultural depth and authenticity of the heritage being represented.

Motivation and Engagement in Gamified Learning

Motivation, defined as the internal drive behind goal-oriented behaviour, is a well-established predictor of academic success (Deci & Ryan, 2013; Krath et al., 2021). Engagement, defined as a multi-dimensional construct comprising behavioural, emotional, and cognitive dimensions, reflects how motivation manifests in learning behaviours (Park & Yun, 2017). According to Preuß (2021), high intrinsic motivation is correlated with deep, sustained engagement, while low or extrinsic motivation can lead to superficial participation.

In gamified contexts, the relationship between motivation and engagement is complex. Game elements can enhance short-term excitement but also trigger shallow engagement, focusing on rewards rather than learning (Hanus & Fox, 2018; Sailer & Homner, 2020). Hanus and Fox (2018) proved intrinsic motivation diminished over time within their gamified classroom, while Ratinho and Martins (2023) reported difficulty of maintaining motivation after initial participation. This underscores the importance of cultivating intrinsic motivation and designing gamified experiences that align with meaningful learning objectives (Mirzaie et al., 2022). Motivation is not static but dynamic. Learners may begin with curiosity but require increasingly meaningful engagement to sustain participation (Dörnyei & Ushioda, 2021). This reinforces the need to embed motivational theories into gamified learning to ensure both immediate appeal and long-term engagement.

Self-Determination Theory as a Framework

The Self-Determination Theory (SDT) provides a widely adopted framework for understanding motivation in educational settings. It distinguishes between intrinsic motivation and four forms of extrinsic motivation: external regulation, introjected regulation, identified regulation, and integrated regulation, each reflecting varying degrees of self-determination (Deci & Ryan, 2013). Ryan and Deci (2020) emphasised that SDT is centred on three fundamental psychological needs: autonomy, competence, and relatedness. When fulfilled, these needs foster more self-determination and sustainable motivation.

In gamified education, SDT has played a crucial role in understanding why certain game elements are successful. For instance, leaderboards may support competence through social comparison but risk undermining autonomy if perceived as controlling (Sailer et al., 2017). Conversely, narrative and creative tasks enhance autonomy and relatedness by giving learners a sense of agency and social connection.

According to Krath et al. (2021), the success of gamification lies not in the elements themselves but in how they align with SDT's motivational principles. However, SDT warns about the over-justification effect, which occurs when excessive external rewards or controls undermine intrinsic motivation (Ede, 2022; Mirzaie

et al., 2022). Thus, effective gamified learning environments must not rely solely on PBL systems but also support learner autonomy, foster competence through challenges, and encourage meaningful relatedness with peers or content.

In conclusion, SDT offers a robust foundation for designing gamified ICH curricula. It ensures that game elements are utilised not merely as engagement tools, but as vehicles for fostering sustained, autonomous motivation and deep cultural learning.

Methodology

This study employed a qualitative, practice-led action research (PLAR) design to examine how gamification elements shaped the motivation and engagement of tertiary students in Chinese ICH education. Taking an interpretive approach, the study generated situated insights through context-sensitive observation and reflection. Rather than pursuing generalisable outcomes, the study sought to understand the dynamic role of game elements in shaping learner experiences.

Context and Participants

The study was conducted in Shaoxing, Zhejiang Province, China, a cultural hub recognised for its Yue Opera heritage. The setting was a virtual simulation laboratory equipped with a digital learning platform, the “Yue Opera Heritage Hub”. The platform integrated 3D exploration, multimedia narratives, costume-making simulations, points, badges, staged quizzes, and a player chat forum.

A purposive sample of 34 Chinese university students aged between 18 and 24 years from various disciplines (including arts, engineering, and sciences) was recruited from a selected university. All participants were current undergraduates, to ensure a consistent institutional and learning context. The eligibility criteria were a Chinese educational background, prior digital game experience, a strong interest in traditional culture, and no personal ties to the research team. Participants were invited via an online recruitment form. This variation supported a broad reading of students’ responses to the gamified ICH platform (Vasileiou et al., 2018). Data adequacy was determined through interview saturation and cross-source convergence. By approximately the 30th interview, major themes had recurred, while diary entries and observational data further confirmed similar patterns (Ahmed, 2024).

Research Design

Within this qualitative design, PLAR provided the procedural structure for implementing, observing, and reflecting on the gamified learning intervention. This approach was suitable because the study involved a real educational intervention, rather than a detached evaluation. It is consistent with action research, which

introduces an intervention into a real setting and uses systematic reflection to improve practice and generate knowledge (Koshy, 2005; Reason & Bradbury, 2013). Due to time constraints and the exploratory nature of the study, a single-cycle PLAR process was adopted. The study focused on gaining an in-depth understanding of a specifically designed gamified intervention rather than testing several redesigned versions over multiple cycles. The research cycle consisted of four stages: planning, action, observation, and reflection. The overall research procedure is illustrated in Figure 3.

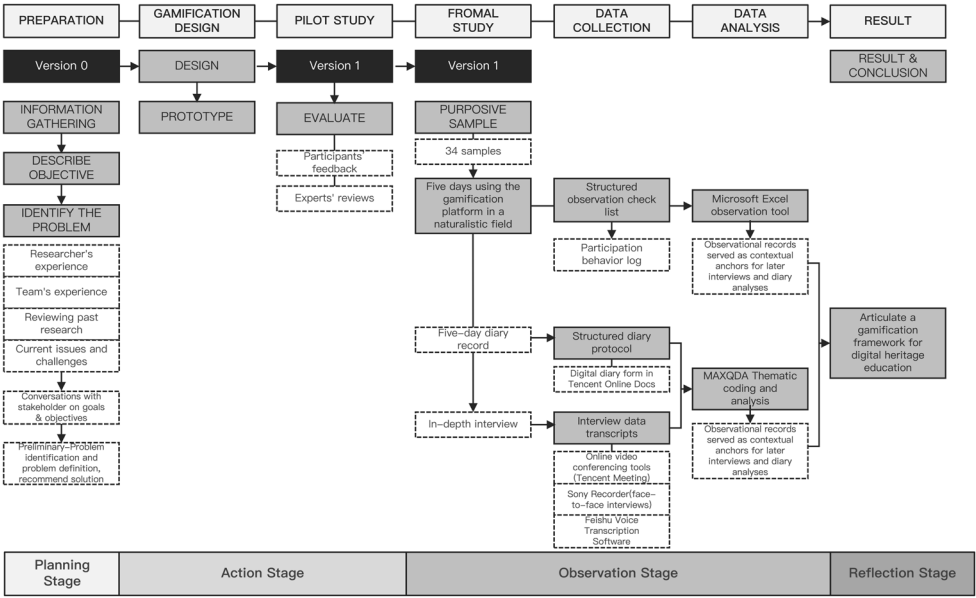


Figure 3. Research procedure of the study

In the planning stage, a multidisciplinary action research group was formed. It included software developers, cultural educators, and the researcher. The group defined the learning goals, selected the game elements, and reviewed the earlier version of the Yue Opera Costume Heritage Hub.

In the action stage, Version 1.0 of the platform was finalised and implemented with 34 participants over five consecutive days. The intervention consisted of four gamified modules: the Yue Opera history corridor, the 3D Yue Opera stage, the Yue Opera costume design Studio, and the timed challenge. The interfaces for these four core modules of the platform are displayed in Table 1. Participants first explored the historical and aesthetic aspects of Yue Opera through a history corridor and a 3D stage. They then engaged in simulated costume-making activities within the costume

design studio, including dyeing, pattern-making, embroidery, cutting, sewing, and displaying the final costume. Finally, participants completed a timed challenge that tested their knowledge from previous modules through time-based questions and visible scoring.

This learning journey established a sequence of exploration, practice, feedback, and reflection. The platform integrated PBL, staged quizzes, progressive tasks, 3D scenes, multimedia resources, simulated craft processes, autonomous creation, and a player chat forum. These elements are designed to enhance feedback, present challenges, promote autonomy, facilitate social comparison, and encourage cultural exploration. Sailer and Homner (2020) emphasised the importance of interface design and usability principles in supporting clear navigation, progressive levels of task difficulty, and real-time feedback within gamified learning environments. Before the formal study, the platform prototype underwent a pilot study and expert review.

Table 1. Yue Opera Costume Heritage Hub (Version 1.0)

Modules	Interface	Introduction
Yue Opera History Corridor		Players can freely explore the information points in the corridor by clicking on the lanterns.
3D Yue Opera Stage		Players can browse the aesthetic knowledge of Yue Opera performances by clicking on the light spots on the 3D characters.
Yue Opera Costume Design Studio		Players must explore the ten craft steps in the costume design studio module, each in a different space.
Timed Challenge		The timer on the interface will display real time as players answer questions.

The observation stage included diary entries, digital observations, and follow-up interviews. Participants completed structured diary entries during the five-day intervention. These entries recorded their motivation, goals, activity choices, and emotional responses. At the same time, the researcher monitored system logs and chat forum activity. These records included login frequency, engagement duration, module use, points, badges, and leaderboard responses.

After the platform experience, semi-structured interviews were conducted to clarify participants' reflections and explain patterns found in the diaries and observation logs. In the reflection stage, the researcher triangulated the diary, observation, and interview data to interpret how specific game elements supported or constrained motivation and engagement.

The PLAR process provided a clear structure for linking design intervention, data collection, and reflective interpretation (Koshy, 2005; Reason & Bradbury, 2013).

Data Collection and Analysis

A triangulated qualitative strategy was utilised, incorporating structured diaries, unobtrusive digital observation, and semi-structured interviews to capture participants' motivational and engagement experiences from multiple perspectives (Bans-Akutey & Tiimub, 2021). A pilot study was conducted to ensure the clarity and validity of the research instruments and procedures.

During the first phase, participants submitted structured diary entries through Tencent Docs over five days, from 27 November to 1 December 2024. Participants were asked to submit one entry per day, recording their motivation, goals, activity choices, and emotional responses (Cao & Henderson, 2021). During the same five-day period, the researcher conducted digital observation using backend platform logs and player chat records. The observation checklist recorded login frequency, engagement duration, modules accessed, points, and badges achieved (Lam & Tse, 2022).

Following the intervention, all 34 participants participated in semi-structured interviews lasting from 40 to 60 minutes. Interview prompts were informed by diary entries and observation records, allowing the researcher to follow up on individual experiences. Thematic saturation was reached approximately with the 30th interview. The final four interviews confirmed the stability of the themes; therefore, data collection was concluded after 34 interviews.

All qualitative data were imported into MAXQDA24 for thematic analysis. The transcripts were translated and back translated to ensure semantic accuracy (Gawlewicz, 2019). The thematic analysis followed the six-step method described by Naeem et al. (2023): familiarisation with data, open coding, theme generation, theme refinement, theme definition, and theme synthesis. Codes were derived

inductively, guided by sensitising concepts from SDT. Triangulation across different data types ensured analytical validity and enriched interpretation (Ahmed, 2024).

Findings

This section presents findings from the thematic analysis of diary entries, observation logs, and interview records of 34 participants. The results show that motivation and engagement were dynamic rather than fixed, evolving across three phases: early activation, mid-stage performance engagement, and late-stage decline.

Motivational Patterns

The analysis of qualitative data revealed four primary motivational dimensions aligned with SDT: external regulation, introjected regulation, identified regulation, and intrinsic motivation. These overarching categories encompassed 10 sub-themes of why students engaged with the gamified ICH learning platform. Figure 4 illustrates the distribution of these motivational sub-themes among participants.

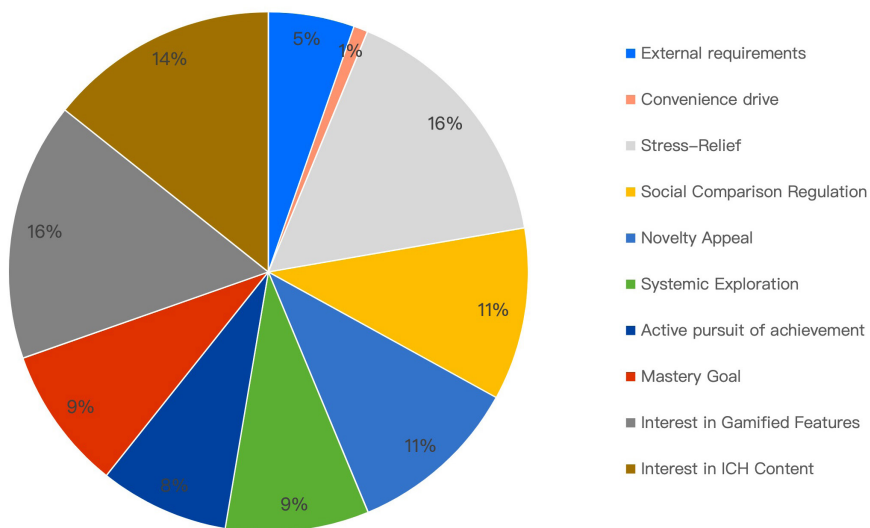


Figure 4. Multidimensional distribution of motivations

Interest in gamified features and the novelty appeal were prominent intrinsic drivers. Over half of the participants expressed interest in the game-based learning format. Many were motivated simply by a desire to explore how the platform worked, without focusing on any one game element. This initial curiosity often led to systematic exploration, with approximately 10 participants actively exploring all

aspects of the platform. They revisited modules and searched for hidden content to ensure nothing was missed, and others noted returning to unfinished tasks to fully explore the platform in subsequent modules (D=Diary; I=Interview; S=Sample).

Hearing that this software combines ICH with gamification... sparked my interest. (I-S25)

Intrinsic interest in the heritage itself was another key motivator. Interest in ICH Content (16 participants) reflects an identified regulation motive, where learners were driven by cultural appreciation and personal relevance of the heritage content. Such participants were motivated by the opportunity to deepen their understanding of ICH, independent of the game mechanics.

My initial intention was to learn more about Chinese cultural heritage because I have always been interested in traditional Chinese culture. (I-S27)

Competence-related and achievement-oriented motives also emerged. Mastery goals and an active pursuit of achievement characterised roughly one-quarter of participants each. These participants were motivated to improve their skills and attain success in the gamified curriculum. They repeatedly practiced tasks and tracked their progress, driven by features like timed challenges, cumulative points, and badges.

Today I wanted to play because I failed in the patternmaking yesterday. I aimed to complete the Sheng role costume and earn the Master Badge. (D-S17)

I noticed that others completed the timed challenge in record time. This motivated me to see how quickly I could also finish it. (D-S14)

Social influences further played a role through social comparison regulation. Approximately 12 participants reported that knowing peers were concurrently using the platform or seeing their peers' progress sparked a competitive drive. Gamified features such as leaderboards, badges, and shared designs within the group chat created a social feedback loop that encouraged collaboration and engagement. Participants felt pressured and motivated to keep up with or outperform their peers.

Whenever I noticed I had fewer badges or points than others in the group, I felt pressure. I could catch up—it probably is not that hard. That mindset pushed me to try harder. (D-S13)

Finally, some participants were driven by practical or extrinsic considerations. These participants participated out of a sense of duty or obligation. Most participants maintained consistent motivational orientations across their diary and interview responses, strengthening confidence in these results. However, these sub-themes should not be read as fixed categories. They formed different patterns across the learning process.

To address this temporal pattern of motivation, the coded sub-themes were reorganised across three learning phases: pre-actional, actional, and post-actional. Figure 5 visualises the aggregate pattern of this motivational change. In the pre-actional phase, motivation was mainly driven by interest in gamified features, ICH content, novelty appeal, and mastery goals. This suggests that students initially entered the platform through curiosity, cultural interest, or skill-oriented expectations.

During the actional phase, motivation shifted towards task performance, dynamic evaluation, badge certification, challenge progression, and social comparison, as visible progress and achievement feedback became more influential. In the post-actional phase, two tendencies appeared: some participants maintained mastery and achievement-oriented motives, while others showed motivational weakening due to fatigue, cognitive load, limited exploration, content exhaustion, and design constraints. Thus, the motivational findings should be understood as a dynamic trajectory rather than a stable positive effect. This pattern also helps clarify the fading phenomenon observed in the subsequent sections' observational data.

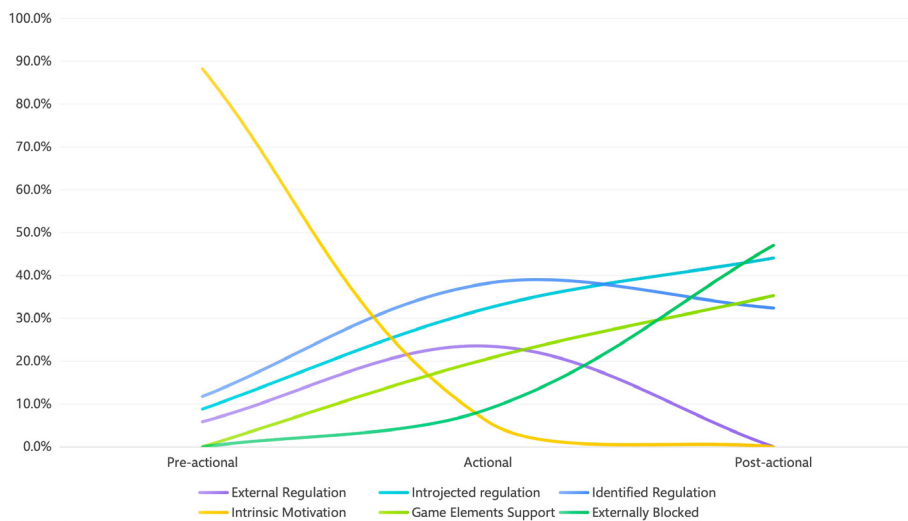


Figure 5. Evolution of motivation

Enabling and Constraining Factors of Engagement

In addition to motivation, this study revealed two broad categories of engagement factors: those that sustained or promoted continued participation and those that hindered or disrupted it. As shown in Figure 6, the engagement sub-themes were distributed across these two categories.

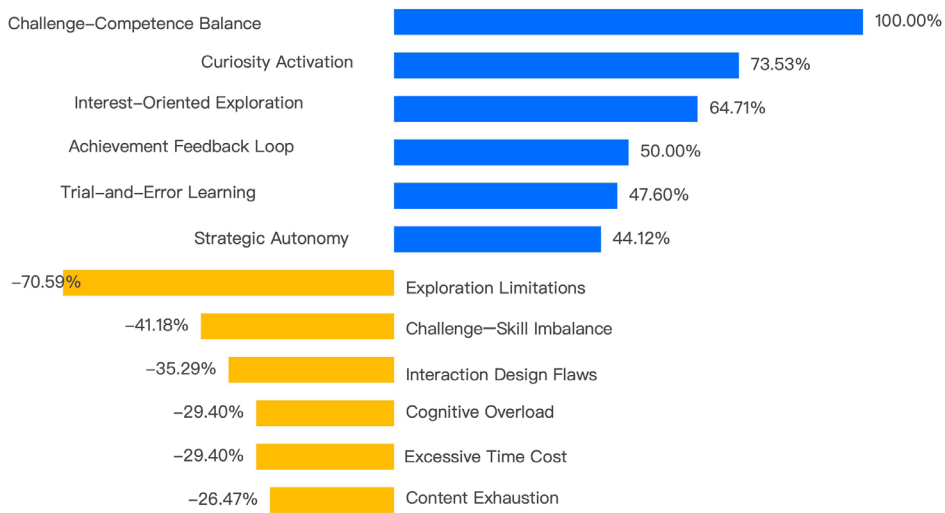


Figure 6. Multidimensional distribution of engagement

Several gamification design features were found to reinforce learner engagement by supporting a state of interest and “flow”. One important theme was the achievement feedback loop. Approximately five participants reported that receiving immediate feedback on their actions enhanced their sense of progress and motivated them to continue. In addition, a well-calibrated balance between challenge and competence emerged as critical for engagement. Half of the participants reported being most absorbed in the learning activities when the difficulty of tasks matched their skill level. When the platform provided achievable challenges along with feedback (including hints during tough moments), participants often experienced deep concentration and satisfaction, akin to a flow state.

When I scored 94 points, I felt proud and satisfied. Then I immediately wanted to challenge myself to earn even more points. (I-S11)

I was most engaged in the ‘Sewing’ level because every step gave me 3D visual feedback. If I made a mistake, the virtual mentor would offer a hint. (I-S27)

Opportunities for learner agency and iterative learning further supported ongoing use. Approximately eight participants found this trial-and-error learning iterative approach engaging, as it normalised failure as part of the learning process. The freedom to choose one's own paths and pacing was a significant engagement driver for 13 participants.

I planned my schedule... dividing the tasks across days. This way, I could manage the workload and stay motivated. (D-S8)

Participants' personal interests also guided their sustained engagement. Interest-driven exploration was evident, with 18 participants gravitating towards aspects of the platform that aligned with their personal interests and aesthetic preferences. Participants described being pleasantly surprised by new content unlocked as they progressed, which in turn sustained their engagement. In essence, by providing immersive narratives, creative tasks, and an open-ended environment, the gamified platform kept students engaged through their own intrinsic interest and curiosity.

Despite the positive outcomes, the study identified several factors that hindered student engagement. Approximately six participants encountered usability issues, which resulted in frustration. Another significant barrier was cognitive overload. Although the platform provided rich narrative content, 10 participants felt overwhelmed by the volume and format of information presented. Additionally, an imbalance between challenge and skill resulted in either frustration or boredom; tasks were sometimes too complex or too simple, disrupting the optimal learning flow.

The main issue I faced was the text-heavy presentation...made the experience tiring and monotonous. (D-S9)

When I didn't get a perfect score on the quiz, I felt discouraged and lost motivation to continue. (I-S33)

The observational data provided a third vantage point that enhances the credibility and depth of the findings on motivation and engagement. The data clearly show a significant increase in activity at the start of the program. This combination of high login frequency and the most extended usage duration during the first two days highlights an early peak in engagement, when motivation levels were at their highest (see Figure 7 and Figure 8). A steady decline in user engagement was observed after an initial peak. By Day 5, participants were spending approximately 30% less time on the platform compared to Day 2.

This overall trend indicates a gradual disengagement throughout the learning cycle. This usage data closely aligns with the feedback documented in both diaries and interviews, where participants noted factors such as achievement feedback, the balance of challenge and competence, and strategic autonomy as contributors to their engagement, while citing factors such as repetitive task structures, time pressure, and cognitive overload as reasons for their disengagement. This triangulation of data sources ultimately enhances the explanatory power of the findings related to research objectives.

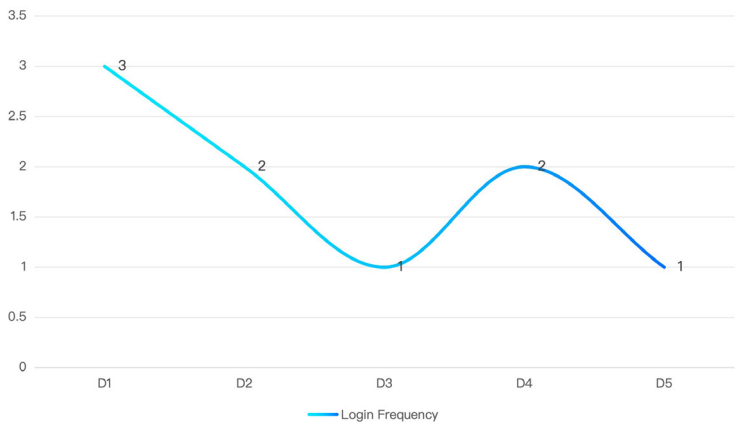


Figure 7. Daily login frequency on the ICH gamified learning platform (Values indicate daily instances of user behaviour)

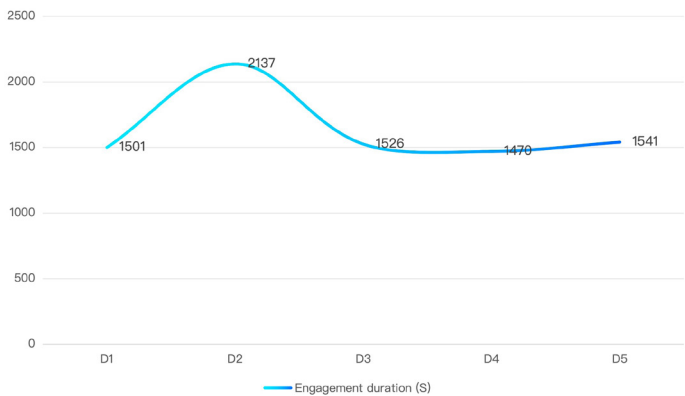


Figure 8. Daily engagement duration on the ICH gamified learning platform (in seconds)

In summary, the results demonstrate that a gamified learning design can effectively foster student motivation and engagement in learning about ICH by leveraging interest, feedback, challenge, and autonomy. At the same time, some design pitfalls can hinder the learning experience.

Discussion

This section analyses the findings through the lens of existing literature and theoretical frameworks, providing a thorough interpretation of how game elements affect students' motivation and engagement in the context of ICH education.

Satisfaction and Frustration of Basic Psychological Needs

The findings show that the platform supported autonomy, competence, and relatedness, but this support was uneven across the five-day intervention. This qualifies optimistic claims that gamification generally enhances motivation. It suggests that positive outcomes depend on design quality, scaffolding, and context, rather than on game elements alone (Huang et al., 2020; Sailer & Homner, 2020). In particular, competence was most effectively supported when students received clear indicators of progress and achievable craft challenges. Points, badges, progressive levels, and simulated craft processes made progress visible and meaningful.

Li et al. (2024), along with Sailer and Homner (2020), suggested that feedback-oriented gamification can strengthen learners' perceived competence when learners understand what counts as progress. However, competence became fragile when tasks became difficult too quickly, hints were unclear, or students felt overloaded. In this sense, challenge-supported motivation only occurred when cognitive load remained manageable and scaffolding was made available.

Autonomy was supported through 3D exploration, modular pathways, and costume creation. Students could choose routes, explore cultural scenes, and design costume outcomes in personalised ways. This aligns with SDT-oriented research that values meaningful choice and self-paced progression (Zainuddin et al., 2020). Bai et al. (2020, 2021) challenged the assumption that social game elements are inherently motivating. In this study, autonomy was weakened when students felt compelled to pursue points or maintain rankings, indicating a shift from offering choice to applying pressure. Similarly, relatedness was also ambivalent; while leaderboards and peer visibility created recognition and social presence, they also produced anxiety when comparisons became too public.

Phase Motivational Trajectories along the SDT

The findings show that students' motivation shifted across the pre-actional, actional, and post-actional phases along the SDT continuum. Benden and Lauerman (2021),

as well as Bureau et al. (2021), supported the view that motivation is dynamic and responsive to task demands, social visibility, and design context, rather than a fixed learner trait.

In the pre-actional phase, many students were drawn to the platform's novelty, the 3D ICH environment, and the unusual combination of Yue Opera's costume heritage and game-like interaction. Ratinho and Martins (2023), along with Rodrigues et al. (2022), noted that this pattern reflects the novelty-driven engagement often reported in gamification research. However, early motivation was not solely due to gamification. Some students also valued Yue Opera's culture and traditional craft skills. From an SDT perspective, this reflects identified regulation, as students engaged with the task because of its perceived personal or cultural value (Ryan & Deci, 2020).

In the actional phase, motivation shifted towards performance, visible progress, badge certification, timed challenges, and peer comparison. Points, badges, levels, leaderboards, and work showcases did not merely increase motivation. They changed what students considered important. For some learners, these elements acted as useful feedback and supported competence. For others, they became evaluative signals and increased introjected regulation, because students did not want to fall behind or lose status. This explains why students could remain active while also reporting pressure or fatigue. Engagement alone was therefore not enough to indicate high-quality motivation.

In the post-actional phase, several students showed motivational narrowing. Curiosity decreased, enjoyment weakened, and some students focused mainly on completing tasks. This pattern should not be read as a contradiction between positive motivation findings and observational decline. Rather, it shows a fading process. The platform activated early motivation, then redirected it towards achievement and social comparison. Later, when content became predictable and exploration became limited, some students' motivation weakened. Bai et al. (2021) as well as Ratinho and Martins (2023) provided evidence that gamification effects can diminish when designs rely on rewards without renewed challenge or deeper learning pathways.

This phase pattern suggests three boundary conditions. Novelty can encourage entry, but it is not a reliable long-term resource. Measurement and social visibility can support competence, but they may also create pressure. Cultural meaning can support identified regulation, but it only sustains engagement when autonomy and competence remain supported. These conditions help explain why gamification studies often report mixed or unstable outcomes (Krath et al., 2021; Zainuddin et al., 2020).

Engagement Dynamics Across Game Element Mechanisms

Engagement was active but conditional. It was supported by progress visibility, challenge pacing, and meaningful exploration, but weakened when participation became score-oriented, cognitively overloaded, or repetitive. This supports evidence that gamification can improve engagement, but it also qualifies that evidence. Bai et al. (2020) and Marques et al. (2023) argued that, in craft-based ICH education, engagement should not be judged only by activity level or time spent. It should also be judged by whether students move towards meaningful craft-related learning outcomes.

Progress visibility created an engagement loop. Students checked scores, badges, feedback, and incomplete tasks, then returned to modules or repeated challenges. This illustrates the claim that game elements work as secondary interventions that shape learning-related behaviours (Landers, 2014). However, progress visibility had two sides. It supported learning when it guided students back into craft tasks, but it encouraged performative participation when students focused mainly on scoring or finishing quickly. A study of digital music learning in Chinese higher education similarly linked visible progress to learner motivation, while highlighting the continuing need for pedagogical guidance in interpreting feedback (Zhu & Krish, 2026).

Hou et al. (2022) highlighted that craft knowledge in Yue Opera's costume learning is developed through repeated action and iterative correction. In this study, challenge pacing also shaped engagement. Students remained engaged when tasks were demanding but still manageable. They retried tasks, checked hints, corrected mistakes, and adjusted strategies, indicating sustained cognitive and behavioural engagement aligned with progressive skill acquisition. Yet poorly paced difficulty, weak hints, and dense text turned the challenge into frustration. Meaningful exploration had a similar dual effect. 3D scenes, narratives, and costume tasks supported curiosity when they revealed cultural and practical meaning. However, repetitive quizzes and limited routes reduced students' sense that exploration was leading to deeper craft understanding. These findings suggest that sustained engagement in ICH education requires more than adding game elements. Feedback must remain connected to cultural and craft meaning, challenges must be paced with clear scaffolding and exploration must continue to reveal new cultural and practical dimensions.

Implications for Theory and Practice

This study contributes to gamified curriculum innovation by showing how game elements shape motivation and engagement through psychological, behavioural, and cultural mechanisms. The findings refine SDT by showing that motivation is

phase-sensitive and conditional. Points, badges, feedback, simulated craft processes, and autonomous creation supported competence and autonomy by helping students see progress and make meaningful choices. Ryan and Deci (2020), together with Sailer and Homner (2020), emphasised that gamification does not motivate learners solely through rewards; rather, its effectiveness depends on whether autonomy, competence, and relatedness are supported over time. In this study, leaderboards, timed challenges, unclear hints, and repetitive tasks were found to sometimes generate pressure, increase cognitive load, or lead to withdrawal, thereby demonstrating the conditional nature of gamified motivation.

The Yue Opera platform suggests that gamified ICH curricula should balance four design concerns: visibility and psychological safety, immersion and cultural depth, competition and collaboration, as well as digital simulation and embodied craft learning. Heritage should not be treated as a decorative theme added to a generic game structure. It should shape the task logic, narrative frame, feedback system, and forms of learner interaction. Marques et al. (2023), along with Ratinho and Martins (2023), contended that designers should therefore move beyond static reward structures and develop adaptive experiences that renew content, scaffold challenge, and connect feedback to cultural meaning.

The PLAR design shows the value of combining diaries, digital observations, and interviews. Bans-Akutey and Tiimub (2021) highlighted that this approach helps teachers identify when students are motivated, pressured, confused, or beginning to lose interest, and supports timely refinement of gamified learning tasks. Thus, future gamified ICH curricula should be co-developed by educators, designers, developers, and cultural practitioners, so that digital innovation remains pedagogically sound and culturally responsible.

Limitations

This study has limitations related to duration, sampling, context, and research design. The short-term, single-cycle PLAR design suited exploratory inquiry but limited long-term evaluation and iterative redesign. The purposive sample of 34 students from one university also limits transferability, especially because participants had prior digital gaming experience and interest in traditional culture. The focus on Yue Opera's costume craft provided cultural depth, but it may not transfer directly to other ICH domains or educational settings.

Conclusion

This practice-led action research shows that culturally sensitive gamification can support student motivation and engagement in ICH education when it is aligned with heritage meaning and learning needs. The Yue Opera costume platform

showed that progressive challenges, autonomous creation, feedback, and simulated craft processes can support autonomy, competence, and relatedness. However, this support is conditional and could weaken when the design relies too heavily on ranking, repetition, speed, or decontextualised rewards. The findings suggest that gamified ICH learning can move students from curiosity to participation, and from task completion to cultural reflection. Future curriculum innovation should therefore treat heritage not as decorative content, but as a living cultural system that shapes task design, narrative, feedback, and assessment. Within these boundaries, the study offers a reusable but context-sensitive design logic for gamified Chinese ICH education in higher education.

Recommendations for Future Research

Future studies should adopt multi-cycle PLAR across several weeks or course cycles to test whether revised tasks, scaffolding, feedback, and content renewal can sustain motivation after novelty fades. Future research should also include learners with varying levels of digital confidence, cultural familiarity, and institutional backgrounds. Further, comparative studies should test the framework across other heritage forms, regions, and learning contexts. Lastly, future studies should examine how co-design with educators, developers, cultural institutions, and heritage practitioners affects authenticity and platform sustainability.

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