

Fostering Motivation through Cultural Serious Games: A Self-Determination Theory Approach



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Abstract: This study explores how serious games can foster learner motivation and cultural identity using Self-Determination Theory (SDT) as a guiding framework. We designed a game—*The Taste of Truth*, a culturally grounded serious game, to support students' needs for autonomy, competence, and relatedness, and compared the motivational, academic, and cultural identity outcomes between a game-based learning group and a traditional media group. The experimental results revealed that the game-based approach significantly improved learners' intrinsic motivation, academic achievement, and cultural identity, with no significant differences observed in gender. These findings affirm the effectiveness of SDT-based design strategies and highlight the potential of serious games as inclusive and culturally responsive educational tools. This research contributes to the growing body of evidence that serious games can simultaneously achieve cognitive, affective, and sociocultural learning goals.

Keywords: serious games, motivation, cultural identity, self-determination theory, traditional culture

1. Introduction

As video games increasingly influence both education and culture, serious games have emerged as powerful tools for engaging learners in meaningful learning experiences. By simulating real-life events or processes, users are expected to acquire knowledge, develop abilities, or receive treatment during the gaming experience (Zeng et al., 2020). Unlike commercial games designed purely for entertainment, serious games integrate educational objectives into their gameplay, offering immersive environments where players acquire knowledge, develop skills, and engage emotionally and socially. In the context of traditional culture education, this immersive potential offers a unique opportunity to revitalize content that may otherwise seem abstract or disconnected from students' daily lives.

As a burgeoning industry in China, the game industry not only makes significant economic contributions but also plays an important role in cultural dissemination and innovation. At the level of cultural construction, the industry will pay more

attention to the transformation from simply "going overseas with products" to profoundly "expressing values," and deeply explore the essence of China's excellent traditional culture (He & Tang, 2024). Just as Johan Huizinga regarded games as a cultural phenomenon. However, a significant challenge remains: how can serious games balance entertainment with educational depth while fostering intrinsic motivation and identity development? While prior research has shown that serious games can enhance engagement (Yu et al., 2021) and learning outcomes (Filsecker & Hickey, 2014), support cultural education (Schumacher & January, 2024; Hammer et al., 2018), relatively few studies have explored their capacity to promote cultural identity or the specific mechanisms by which game design affects motivation through a psychological lens. This study addresses this gap by developing a culturally grounded serious game, "The Taste of Truth", and evaluating its impact on learners' motivation, academic performance, and cultural identity. We pose the following research questions:

RQ1: What are the effects of the game on learners' intrinsic motivation, academic performance, and cultural identity?

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RQ2: Examine whether gender influences motivation in game-based learning contexts.

2. Theoretical Framework

2.1 Serious games and cultural identity.

Games are not only psychological tools but also cultural artifacts. In tackling the problem of play as a function of culture proper and not as it appears in the life of the animal or the child, we begin where biology and psychology leave off (Huizinga, 2003). Integrating traditional cultural elements into games can foster learners' sense of belonging and identity. Prior research highlights the potential of narrative-driven, culturally embedded games in promoting empathy, heritage learning, and identity development.

Viewing games as a cultural function not only helps us understand cultural dissemination, but also facilitates the integration of cultural elements into game design. Currently, most research on video games is carried out from a psychological perspective, but some scholars have also integrated culture into the research and design of games. Cerezo-Pizarro et al. (2023) conducted a systematic review exploring how video games influence cultural transmission. The study highlights the role of games in representing and disseminating cultural values and narratives, underscoring their potential as tools for cultural education. Some scholars have also proposed the "three realms" (symbol - knowledge - concept) and "three dimensions" (characters - environment - action) of digital games in spreading Chinese traditional culture and the innovative transformation of traditional culture in digital games (He & Li, 2024). Anderson et al. (2010) found that narrative framing tied to cultural heritage improves user retention and empathy. Studies show that integrating culture into serious games can improve intercultural sensitivity (Bachen et al., 2012), emotional development (Chen & Zhang, 2024), language and heritage learning (Kramsch, 2010), preserve and revitalise indigenous cultural heritage (Laiti, 2025).

Therefore, this study intends to design serious

games from multiple perspectives (culture and psychology) to promote the cultural identity formation and education of traditional Chinese culture.

2.2 Self-Determination theory in game-based learning.

Research on serious games from an psychological perspective is of great significance for the design, promotion, and application of serious games. Motivation affects the effectiveness of traditional cultural course teaching lies in college students' learning (Li, 2012). Intrinsic conditions (learning needs, the "usefulness" of educational content) and extrinsic conditions interact to influence learning motivation. The instructional content in colleges and universities is too uniform (Zhu, 2021). In the context of informatization, it appears very rigid and stereotyped, making it difficult to attract the attention of young people, leading to insufficient classroom participation. It is evident that the uniformity, rigidity, and dullness of cultural course content lead to low demand, lack of interest, poor initiative, and insufficient learning motivation. Therefore, in order to enhance the appeal of traditional cultural courses to college students, reforms should be made in dimensions such as the presentation of instructional content and enhancing learning motivation. The combination of serious games with traditional cultural education is significantly important for enriching traditional cultural education methods and stimulating students' learning motivation and interest.

Research on the motivation for serious games in the academic community primarily focuses on improving learning engagement, academic performance/achievement, intrinsic motivation, and extrinsic motivation. Based on literature analysis, research on motivation, engagement, satisfaction, and learning performance related to serious games has been an important research topic in recent decades (Yu et al., 2021). They also noted that there is a positive correlation between motivation and engagement, meaning higher motivation often leads to greater engagement, and vice versa. The purpose

of using serious games for learning is to utilize people's intrinsic motivation to promote learning while playing games (Bourgonjon & Valckel, 2017). Hawlitschek and Joeckel (2017) applied adventure games to the study of "historical events" and examined the impact of learning guidance (as a means of influencing extrinsic motivation) on gamified learning from two dimensions: learning motivation and cognition. The experiment found that the learning guidance in the game had a negative effect on academic performance, yet it did not affect intrinsic motivation. Filsecker and Hickey (2014) conducted an experimental study on the impact of external rewards (such as badges) on elementary students' learning motivation, engagement, and academic performance in serious games. They discovered that external rewards did not diminish learning motivation and interest, but they also had no effect on improving disciplinary engagement. Additionally, some researches have compared the influence of teacher support and digital support on student engagement in blended learning based on the motivational perspectives of Self-Determination Theory (Chiu, 2021a, Chiu, 2021b).

Research on the motivation of serious games is mostly based on experiments or quasi-experiments (Seyedahmad et al., 2021, Chowanda et al., 2016, Minović et al., 2015, Wronowski et al., 2019.), case study (Ponticorvo et al., 2019, Callaghan et al., 2018, Kazimoglu, 2020), conducting empirical analyses on learning motivation, academic performance/achievement, etc., and measuring intrinsic motivation from dimensions such as curiosity and interest. The research results can generally be categorized into three types: having (1) a positive effect on intrinsic motivation but no impact on academic performance, (2) no impact on motivation but positively promoting academic performance/achievement, (3) a positive effect on both motivation and academic performance/achievement, (4) no effect on academic engagement and not affecting motivation.

Most empirical research on motivation is conducted in traditional classroom or laboratory

environments, with fewer studies from a sociocultural dimension. From a sociocultural perspective, motivation should be evaluated based on the extent to which they support meaningful participation in authentic practices within the target knowledge domain (Hickey & Zuiker, 2005). External reward measures, as a form of extrinsic motivation, are often thought to undermine intrinsic motivation. If this is the case, then game elements like coins, health points, and scores should be carefully used in educational games. Yet, according to sociocultural theory, meaningful extrinsic motivation does not diminish intrinsic motivation. Therefore, when designing cultural serious games, it is necessary to start from a multidisciplinary perspective, make reasonable use of extrinsic motivational measures, promote the development and maintenance of intrinsic motivation, and enhance the learner's sustained motivation to learn. In addition, the sociocultural dimension of SDT suggests that internalization of cultural values can occur when learners feel connected to meaningful practices (Hickey & Zuiker, 2005). Thus, a culturally embedded serious game has the potential to support both psychological motivation and cultural identity formation.

2.3 Motivation design in serious games

After comparing 21 of the most popular theories about serious game design, the Self-Determination Theory (SDT) is by far the most frequently applied theoretical framework (Krath et al., 2021). This is followed by Flow Theory, Constructivist Learning Theory, Experiential Learning Theory, Cognitive Load Theory, and others. SDT originates from the research on intrinsic and extrinsic motivation by Ryan and Deci (Ryan & Deci, 1980). Unlike behaviorist theory, which emphasizes external control and influence on motivation, SDT underscores the importance of intrinsic motivation for learning and growth.

The SDT theory highlights the proactive role of individuals in the motivation process, suggesting that human intrinsic motivation can be enhanced by fulfilling three basic psychological needs, thereby

promoting the internalization of extrinsic motivation and healthy personal growth. These three fundamental needs are: Autonomy, Competence, and Relatedness (Ryan & Deci, 2000. Ryan & Deci, 2020). "Autonomy" refers to the initiative in action, supported by interest and valuable experiences, not controlled by external conditions such as rewards or punishments. When individuals experience autonomy provided by the external environment, or when they have a high degree of self-determination in activities, they attribute this internally, feeling in charge of their own lives. "Competence" is a feeling of mastery, an awareness of success and growth. A well-structured environment (such as serious games) is more conducive to satisfying the need for competence, offering optimal challenges, positive feedback, opportunities for growth, etc. Similar to Bandura's concept of self-efficacy, it involves an individual's belief in their ability to perform at a certain level in their learning behaviors or actions, confident in their competence to undertake the activity (Liu et al., 2010). "Relatedness" refers to a sense of belonging and connection, achieved through respect and care. Any obstacle to these three basic needs is considered detrimental to motivation and health. Therefore, the analysis of educational environments based on SDT primarily focuses on the extent to which these three fundamental human needs—autonomy, competence, and relatedness—are met.

Regarding the transformation between extrinsic motivation and intrinsic motivation, Lee and Hwang (2015) pointed out that whether there is a negative effect between intrinsic motivation and extrinsic motivation depends on the type of extrinsic motivation. Controlled extrinsic motivation undermines intrinsic motivation, but autonomous extrinsic motivation enhances it (internalization). Therefore, when designing serious games, one must use external incentives such as scores, badges, coins, and even punishments with meaningful content. How to promote the internalization of extrinsic motivation poses certain challenges in the design of serious games. According to SDT theory, the transition from extrinsic motivation to intrinsic motivation requires

undergoing four states of varying degrees of internalization—from weaker to stronger degrees of internalization: 1) External Regulation, such as external rewards or punishments; 2) Introjection, such as approval from others or oneself; 3) Identification, such as recognizing personal goals, self-worth, etc.; 4) Integration, which is the highest degree of internalization of extrinsic motivation, bearing many similarities with intrinsic motivation, but not intrinsic motivation itself. After transformation through these four states, the final internalization of extrinsic motivation is completed, achieving internal motivation drive (Deci & Ryan, 2008). Hence, SDT theory considers the change in motivation to be continuous. The inspiration for the design of serious games is that commonly used game elements like scores, health points (life values), coins, etc., are more rudimentary forms of extrinsic motivation (external regulation) stimuli. Designers must endow these incentives with certain (cultural) meanings, satisfying the three basic individual needs, to avoid extrinsic motivation remaining in a lower (external regulation) state.

3. Game Design

3.1 Importing cultural elements into serious games

In video gaming industry, traditional cultural elements have been fully utilized. Especially in the context of the digital era, this trend is becoming increasingly evident. As a convergence point of modern technology and culture, video games provide a new platform for the inheritance of traditional culture through their interactivity and immersion. For example, the game "Genshin Impact" combines Chinese traditional culture with gameplay through virtual regions like "Liyue" and festivals like the "Lantern Rite," with extensive use of traditional Chinese architectural styles in the game scenes (see Figure 1). "Honor of Kings" incorporates a large number of intangible cultural heritage elements into its skin designs, such as Dunhuang Feitian, Yue Opera, Su Embroidery, etc. (see Figure 2), which not only enriches the cultural connotations of game

characters but also allows young players to encounter and understand these precious cultural heritages while playing the game.



Figure 1 Screenshot of “Genshin Impact”



Figure 2 Game skin in “Honor of Kings”

Unlike the utilitarian and commercial aspects of typical video games, serious games are a type of computer software designed with specific educational goals. These games have the ability to simulate real-life scenarios, stimulate learners' intrinsic motivation, and facilitate learning outcomes through an engaging and enjoyable experience (Dörner et al., 2016). Serious games are developed for the sake of specific educational purposes (Djaouti et al., 2011), incorporating more traditional cultural elements into game scene design can enhance their educational functions and values, thereby improving educational effectiveness. Many digital game platforms (software), such as Roblox, offer a rich terrain system, realistic modeling scenes, and interactive design methods, providing necessary support for game design. It is advisable to learn from commercial games on using cultural elements when designing serious games (Lacasa et al., 2009).

3.2 Design features aligned with SDT

According to SDT, when three basic needs

(autonomy, competence, relatedness) are satisfied, external motivation becomes "internalized," and intrinsic motivation is enhanced. Therefore, for traditional cultural courses, exploratory game activities can be designed where individuals experience "autonomy" through free exploration in a virtual gaming environment and "competence" by overcoming challenges in the game. They accomplish the learning of more theoretical knowledge through genuine or virtual interactions with classmates, partners, or NPCs (non-player-characters).

3.2.1 Incorporating “relatedness” into the story background—fulfilling the need for “relatedness”

Although the need for relatedness is more distal than the needs for autonomy and competence in fostering intrinsic motivation, it is more central in promoting the internalization of extrinsic motivation (Zhang, 2010). By designing the storylines of the game, "relatedness" can be blended with historical and cultural backgrounds, thereby enhancing the realism and sense of reality of the game. Therefore, we conducted field research on the hometown of the protagonist of our game - Chen Wangdao, and made detailed observations of the local customs, geography, human environment, and traditional architecture.

Serious games with storylines can enhance students' immersion and sense of identification (He & Dong, 2021). Social disciplines emphasize emotional exchange and communication, which can be achieved through role-playing games by simulating real-life scenarios via scene design. We designed storylines such as how Chen Wangdao prepared for studying abroad (e.g., finding a land deed to sell the land), receiving the translation task from Mr. Shao Lizhi after returning from studying abroad, and searching for the key to the woodshed in the Sugarcane forest. Overall, this game allows students to experience the scenery, folk customs, and traditional residential culture of Chen Wangdao's hometown through digital storytelling and relationship building, from a first-person perspective (RPG game mode).

According to SDT theory (Oliver, 2016), a

player's perception of their relationship with virtual characters significantly impacts the success or failure of game design. To enhance the realism of traditional cultural games, we primarily designed three sets of relationships: father-son (such as Chen Wangdao and his father), friendship (such as Chen Wangdao and Shao Lizi), and stranger relations. These three relationships correspond to functions in the game such as navigation, mission guidance, and implicit knowledge transfer, respectively. These NPC characters can also provide players with informative rewards, namely positive feedback, thereby establishing a sense of mutual respect and reliance with others (based on virtual characters designed from real individuals). Through the Roblox platform, this game can be designed in a multiplayer mode, thus constructing both real relationships with fellow players and virtual relationships with NPCs in the game.

3.2.2 Diversification of learning resource presentation - achieving the need for "Autonomy"

Li et al. examined how autonomous options in game design affect the intrinsic motivation in gamified learning (Li et al., 2020). Providing autonomous options in games is a specific application of SDT theory. In our game, we primarily present learning resources through NPC dialogues, question integration, and visualizing implicit knowledge.

First, it is achieved through player dialogue with NPC (Non-Player Character) characters. Game NPCs or "helpers" can be used to implement scaffolding and coaching strategies (Shang et al., 2012). For example, in the dialogue with the NPC character Shao Lizi, we incorporate historical knowledge, background, and processes, allowing learners to understand corresponding historical and cultural knowledge through interaction with NPCs.

Second, we employ a subtle question integration strategy. In traditional educational games, learners answer questions to receive corresponding "rewards," and upon collecting enough rewards, they advance to the next level. We believe this method can disrupt the sense of immersion and flow experience

in gaming, to some extent depriving learners of "autonomy." Therefore, we adopted a subtle question integration approach. For example, we designed the sugarcane field as a maze puzzle, with key positions within the maze incorporating relevant questions (with built-in feedback functions). This design ensures that learners do not feel like they are answering questions but rather navigating the maze. All questions are not presented in a simple question-stem-and-answer format but are visually designed to blend with the environment.

Finally, we integrate implicit knowledge into the game scenarios for learners to experience autonomously. Factors such as resource availability and interactive design in the learning environment can influence learner engagement (cognitive, behavioral, and emotional engagement) (Kamkuimo et al., 2020). In traditional culture-themed games, the beauty of one's hometown is an implicit form of knowledge; an aesthetically pleasing environment can cultivate an individual's character. Kuksa advised to reshape the learning spaces by blending the virtual and physical realms, providing students with authentic experiential environments (Kuksa et al., 2014). We extracted elements from Chen Wangdao's hometown, such as sugarcanes, architecture, streams, rice fields, and village layouts, and artistically presented these elements in the game visuals (Figure 3 and 4). By organically integrating implicit knowledge about local specialties, products, landscapes, geography, and cultural information into the visual design of the game, we not only enhance the sense of immersion in traditional culture games but also reshape the learning space. This provides learners with a gamified learning space that blends the virtual and real, allowing for autonomous experiences in an interactive virtual environment and achieving the effect of cultural education subtly.

3.2.3 Creating appropriate "Challenges"-meeting the need for "Competence"

The most commonly used game elements in serious games are, in order: feedback, challenge, score, collaboration, rule, role-playing, etc., and pointed out that "penalty" must be specific in a

educational gaming environment and is not a common element (Noroozia et al., 2020). In the design of traditional culture games, we mainly set two types of challenges: complex and simple. Simple challenges include finding the key to the woodshed, finding the land deed, etc., while more complex challenges include navigating through a maze, crossing a shaking broken bridge, etc. After completing these challenges, players will receive corresponding score rewards. Conway found that rewards set to motivate players' extrinsic motivation (such as scores, gold coins, etc.) are important factors in promoting players to level up or complete levels in games. However, if this process is given some meaning, it will be more conducive to stimulating players' intrinsic motivation and promoting the internalization of extrinsic motivation (Conway et al., 2017). To achieve this transformation, we designed a plot where players search for land deeds, sell land to raise tuition fees, and receive score rewards. Through such design, the game activities are endowed with "real" significance - studying abroad and returning to serve the country after graduation. In students' real social lives, they have the desire to study abroad and to earn material rewards, and the appropriate "challenging" tasks in the game, such as finding land deeds, selling land, obtaining gold coins, and studying abroad, also effectively meet the contemporary college students' real needs. That is to say, when the design successfully connects with the player's Dasein, the sense of relatedness to the entire gameworld is augmented (Conway et al., 2017).

Based on the above design strategies, we developed a serious game: "The Taste of Truth" on the Roblox platform. It is a story-driven serious game developed specifically for this study to integrate traditional Chinese cultural knowledge with interactive decision-making. Players assume the role of a young investigator in ancient China who must solve a cultural mystery based on historical clues. Game mechanics were designed to support:

Autonomy: Players choose dialogue paths and make investigative decisions.

Competence: Players complete

knowledge-based mini-games and challenges.

Relatedness: Characters provide emotional and narrative support through interactions.



Figure 3 Interior design screenshot of "The Taste of Truth"



Figure 4 Interior screenshot of the game architecture

Based on the above analysis and principles, we designed the game: "The Taste of Truth", it is a story-driven serious game developed on the Roblox platform specifically for this study. It centers around Chen Wangdao, a key figure in Chinese intellectual history. The game integrates traditional cultural knowledge, interactive decision-making, and narrative relationships to create a learning environment that is both motivational and culturally immersive. Players assume the role of a young investigator exploring his life, values, and cultural context through interactive missions.

4. Instructional Design and Implementation

4.1 Learning objectives

The instructional sequence aimed to enhance intrinsic motivation, academic understanding of

cultural content, and cultural identity.

4.2 Implementation procedure

Day 1: Pre-test and introductory lecture on cultural themes.

Day 2: Game-based group played the game individually for 30 minutes; control group watched a cultural documentary for the same duration. Both groups then engaged in guided group discussions.

Day 3: Students completed reflective writing and post-tests (motivation scale, academic test, and cultural identity scale).

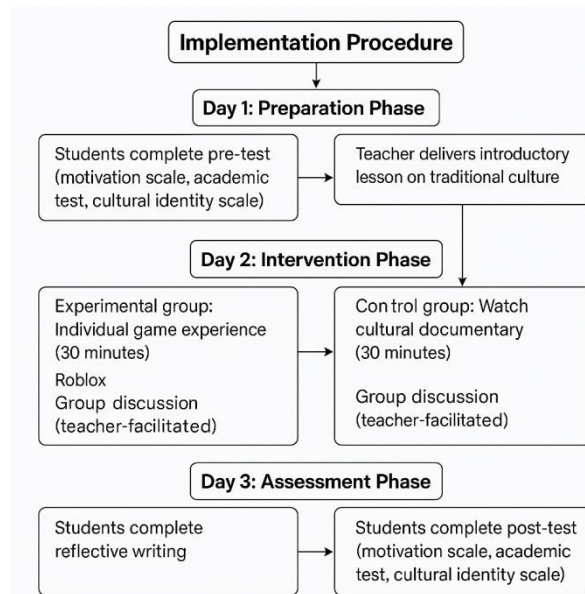


Figure 5 Implementation procedure

5. Method

5.1 Ethics Statement

Recruitment period for this study is from January 10 to 31 2025. The data were accessed for research purposes on March 8. Informed consent was obtained verbally from all participants. The process of obtaining verbal consent was carefully documented and witnessed to ensure compliance with ethical standards. Specifically, each participant was provided with a detailed explanation of the study's purpose, procedures, potential risks and benefits, and their right to withdraw at any time. This information was presented in a clear and understandable manner. No minors participated in this study.

To document the verbal consent, a trained

research assistant recorded the consent process using an audio recording device. The recording captured the participant's explicit agreement to participate in the study. This documentation was reviewed and approved by the school ethics committee.

5.2 Subjects

Eighty high school students (40 female and 40 male) were randomly assigned to either the experimental group (game-based learning) or control group (traditional instruction).

Before the experiment began, the experimenters fully informed the participants of the experimental process, the collected data, and the purpose of the data, and obtained the consent of each participant. All participants signed an informed consent form prior to the experiment.

5.3 Instruments

Cultural identity scale: Quoting and modifying existing scales to measure learners' affective connection, cognitive understanding, social interaction, value endorsement and behavioral inclination towards traditional culture (Phinney, 1992).

Intrinsic Motivation Inventory (IMI): Based on SDT, assessing autonomy, competence, and relatedness (Bosch, 2024).

Academic performance test: Includes multiple-choice and short-answer items aligned with cultural content.

5.4 Hypotheses:

H1: The game-based group will demonstrate higher intrinsic motivation.

H2: The game-based group will show equal academic performance. .

H3: There will be no significant gender differences in motivational outcomes.

H4: The game-based group will exhibit stronger cultural identity.

6. Results

6.1 Pre-test and post-test academic performance by group

As can be seen from Figure 1, the pre-test scores of the control group ($M=73.4$) were slightly

higher than those of the experimental group ($M=71.6$). After the experiment, the scores of both groups improved. However, the increase in scores for the participants in the experimental group ($M=86.7$) was greater.

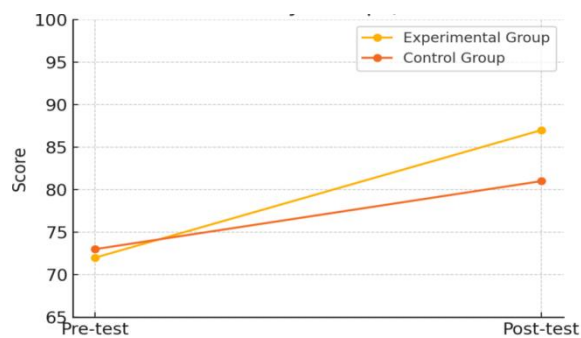


Figure 6 Academic performance by group (pre and post test)

6.2 Independent sample t-Test results of motivation and academic performance

Table 1 presents the results of independent sample t-tests conducted to evaluate the differences between groups. The results show a statistically significant difference in both motivation scores ($t = 4.34, p < 0.001$) and academic performance ($t = 3.21, p = 0.002$) between the experimental and control groups. These findings reject the null hypotheses and support the effectiveness of the serious game in enhancing both intrinsic motivation and academic outcomes. This aligns with the theoretical proposition that game mechanics designed to promote autonomy, competence, and relatedness can have a meaningful impact on learners.

Table 1 Descriptive Statistics of Motivation and Academic Performance

Variable	Group	N	Mean	Std.Deviation	P
Motivation Score	Experimental	40	4.26	0.45	0.000
	Control	40	3.67	0.52	
Academic Performance	Experimental	40	86.7	6.2	0.002
	Control	40	81.7	7.8	

6.3 Motivation by group and gender

Table 2 explores whether gender interacted with the instructional method (game-based vs. traditional) to influence motivation. The results reveal a significant main effect of group ($F = 9.65, p = 0.003$), affirming that the experimental group exhibited higher motivation. However, no significant main effect of

gender ($F = 1.33, p = 0.25$) or interaction effect ($F = 2.87, p = 0.096$) was found. This indicates that while the serious game design effectively boosted motivation, this effect was consistent across male and female participants, suggesting gender-neutral applicability of the game-based approach.

Table 2 Two-Way ANOVA: Motivation by Group and Gender

Source	SS	df	MS	F	p-value
Group	3.28	1	3.27	9.65	0.003
Gender	0.44	1	0.44	1.33	0.25
Group * Gender	0.98	1	0.98	2.87	0.096
Error	17.67	56	0.34		

Table 3 compares the cultural identity scores between two groups, which supports the hypothesis that interactive media (games) can better promote learners' cultural identity compared to traditional media ($p=0.000$).

Table 3 Comparison of cultural identity of two groups

Variable	Group	N	Mean	Std. Deviation	P
Cultural identity score	Experiment	40	4.33	0.41	0.000
	Control	40	3.81	0.36	

The experimental results demonstrated that students who engaged with the serious game "The Taste of Truth" showed significantly higher levels of intrinsic motivation ($M = 4.26$, $SD = 0.45$) and academic performance ($M = 87.5$, $SD = 6.2$) compared to those in the traditional media group (motivation $M = 3.67$, $SD = 0.52$; performance $M = 81.7$, $SD = 7.8$), with both differences reaching statistical significance ($p < 0.001$). Additionally, the experimental group reported a significantly stronger sense of cultural identity ($M = 4.33$, $SD = 0.41$) than the control group ($M = 3.81$, $SD = 0.36$, $p = 0.000$). A two-way ANOVA revealed that the game-based approach significantly boosted motivation regardless of gender, with no main effect or interaction effect for gender, indicating that the motivational benefits of the serious game were consistent across male and female learners.

7. Discussion

The study offers empirical evidence supporting the design and implementation of cultural serious games based on Self-Determination Theory (SDT), especially within the context of traditional culture education. The incorporation of psychological needs—autonomy, competence, and relatedness—into the serious game "The Taste of Truth" resulted in notable enhancements in learners' motivation, academic performance, and cultural identity, as opposed to a traditional instructional approach that utilized documentary media.

7.1 Motivation and learning gains through

SDT-Driven design

Consistent with Ryan and Deci's (2000, 2020) propositions, the game environment facilitated greater intrinsic motivation by offering learners opportunities for self-directed exploration, optimally challenging tasks, and emotionally engaging relationships within the narrative. The motivational benefits are in line with prior studies that emphasize the role of autonomy-supportive environments in fostering learner engagement and persistence (Bourgonjon et al., 2010; Li et al., 2020). Importantly, the increase in academic performance indicates that motivationally rich game environments do not dilute educational outcomes but rather reinforce them, supporting the findings of Rahimi et al. (2021) and Filsecker and Hickey (2014) who emphasized that well-aligned extrinsic incentives can support knowledge retention without undermining intrinsic interest.

7.2 Inclusivity and gender neutrality in game-based learning

The lack of a significant gender effect or interaction in the motivational outcomes suggests that the game was equally effective for male and female students. This is different from the study that game-based learning may disproportionately benefit one gender over another (Norris et al., 2014). The design's emphasis on relational and narrative depth likely broadened its appeal, echoing Oliver et al.'s (2016) argument that meaningful, emotionally resonant games transcend demographic divides by offering universal themes and affective engagement.

7.3 Serious games as vessels for cultural identity formation

One of the study's most compelling contributions lies in demonstrating that serious games can effectively promote cultural identity. Learners who engaged with "The Taste of Truth" reported significantly higher levels of cultural identification than those in the control group, suggesting that culturally embedded narratives can support not only cognitive learning but also affective and sociocultural development. This aligns with prior literature that highlights the power of games to transmit cultural values and foster empathy (Bachen et al., 2012; Cerezo-Pizarro et al., 2023). From a sociocultural perspective, this supports Hickey and Zuiker's (2005) view that motivation and identity formation emerge through meaningful participation in authentic cultural practices—experiences that serious games are uniquely positioned to simulate.

7.4 Toward a multidimensional design paradigm

Collectively, these findings advocate for a multidimensional approach to serious game design—one that considers psychological, cultural, and pedagogical factors in tandem. Rather than relying solely on surface-level game mechanics such as scoring or rewards, designers should embed deeper narrative structures, challenge learners meaningfully, and cultivate emotional and social resonance. This study provides a practical model for how SDT principles can guide the development of culturally responsive educational technologies that enhance not only learning outcomes but also learners' self-concept and sense of cultural belonging.

8. Conclusion

This study highlights the transformative potential of serious games in education when underpinned by a robust theoretical framework, such as Self-Determination Theory. "The Taste of Truth" exemplifies how the integration of autonomy, competence, and relatedness within a culturally authentic narrative can simultaneously enhance motivation, academic achievement, and cultural identity. The statistically significant improvements

across all three dimensions—motivation, performance, and identity—indicate that serious games are not just supplementary tools but can function as core components of a modern educational strategy for cultural purposes.

Importantly, the findings affirm the inclusivity of the game design, showing consistent motivational benefits across gender, and pointing to the broad applicability of SDT-based principles in diverse learning contexts. Furthermore, the cultural impact of the game provides new evidence that interactive media can effectively serve heritage education, allowing learners or players to engage affectively and cognitively with traditional values and narratives.

For practitioners and researchers, this study highlights the need to move beyond gamification toward gameful design—an approach that treats games not as a delivery system but as an experiential space where learning and identity formation converge. Future research should further examine how specific game mechanics contribute to each psychological need and explore the longitudinal effects of serious games on learners' motivation trajectories and cultural self-conception.

Data availability:

Data of this study are available from the corresponding author upon reasonable request.

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Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

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