

Gamification with self-determination theory to foster intercultural communicative competence and intrinsic motivation

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ABSTRACT

In globalization, possessing intercultural communicative competence (ICC) is essential for individuals' success. However, students face motivational barriers in online intercultural learning. Thus, this study aims to explore the effectiveness of integrating gamification with self-determination theory (SDT) to enhance the intrinsic motivation, ultimately aiding in the development of intercultural communication competence among Chinese vocational college students enrolled in online English intercultural learning. Employing a mixed-methods approach involving pre-post questionnaires and interviews, the study engaged 38 vocational college students from the automobile and rail transit faculty in a four-week online English intercultural learning module enriched with gamified elements such as points, badges, leaderboards, levels, and quests. The findings indicate that gamified learning effectively fulfills students' needs for competence and autonomy, partially addressing their needs for relatedness and consequently fostering an upsurge in intrinsic motivation. Additionally, improvements were observed in knowledge, attitude, and skill, with marginal changes noted in awareness. It is concluded that gamified learning approaches based on SDT can positively contribute to the development of intrinsic motivation and intercultural communication competence. These findings hold practical implications for educational institutions and researchers to cultivate intrinsic motivation and ICC through online gamified learning.

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1. INTRODUCTION

In a globalized world, intercultural communicative competence (ICC) is essential, as it enables individuals to engage with people from diverse cultures effectively [1]. Chinese educational guidelines have underscored the importance of integrating intercultural competence into foreign language curricula [2], [3]. Online language learning provides a promising avenue for Chinese students to access diverse intercultural resources, fostering the development of ICC [4]. However, online intercultural learning presents challenges for students, particularly in maintaining motivation [1], [4], given the nature of online environments where students may struggle to sustain interest in completing tasks without immediate supervision [5]. Moreover, acquiring various knowledge and skills demands mental and emotional engagement, which can prove daunting for students [6]. Intercultural learning, in particular, may expose students to cultural shock and

value differences, potentially leading to a loss of interest in learning [7]. It is noteworthy that intrinsic motivation, characterized by the enjoyment or interest derived from activities [8], can play a pivotal role in overcoming the challenges, yet there remains limited research on motivation in online intercultural learning.

Recent studies have shown a varied focus on the employment of online learning to improve ICC which spans four major dimensions: attitudes (curiosity and openness to different cultures), knowledge (understanding social groups, practices, and interactions), skills (acquiring and applying cultural knowledge for effective communication), and awareness (critically evaluate values across cultures) [9], [10]. Some studies examined the correlation between online intercultural learning and ICC enhancement, reporting positive impacts [11], [12]. Additionally, scholars are exploring how to use online learning to strengthen ICC [13], [14]. For instance, Shen [4] proposes a four-step training method encompassing attitude development, knowledge construction, skills practice, and reflection, demonstrating efficacy in enhancing various dimensions of ICC. Despite these advancements, concerns have been raised regarding the potential adverse effects of the online environment on student motivation [1], [4]. These findings emphasize the importance of addressing motivational challenges in online intercultural learning to ensure effectiveness.

Gamification is commonly utilized to enhance motivation by integrating game elements into learning contexts [15]. These elements, such as points, leaderboards, and badges, create an enjoyable and interactive learning environment that motivates students to invest time and effort in their studies [16]. Additionally, gamification can enhance the enjoyment, interactivity, and challenge of learning, providing timely feedback and rewards to enhance intrinsic motivation [15], [17].

Current studies tend to employ gamification to promote intrinsic motivation based on self-determination theory (SDT) [18]. SDT emphasizes the impact of three fundamental psychological needs on intrinsic motivation: autonomy (the freedom to choose), competence (a sense of capability), and relatedness (connection with others) [8]. These needs play a pivotal role in mediating the influence of gamification on intrinsic motivation [19]. By employing game elements to support basic psychological needs, researchers can modify learning environments to influence students' motivation [20].

While studies have shown that gamification produces a positive impact on enhancing vocabulary acquisition [21], improving listening [22] speaking [23], reading [24], and writing skills [25], there remains a gap in the literature regarding its impact on ICC which has been a critical learning objective in foreign language courses. Therefore, this study aims to address the gap in the literature by integrating game elements into online English intercultural courses based on SDT to create an engaging and game-like environment that supports students' basic psychological needs, nurturing intrinsic motivation directly and developing ICC indirectly. The study focuses on two main objectives. Firstly, it aims to integrate gamification elements rooted in SDT into online English intercultural courses to improve intrinsic motivation among Chinese vocational college students. Secondly, it endeavors to incorporate gamification elements, also grounded in SDT, into these online courses to cultivate ICC (including attitude, knowledge, skills, and awareness) among Chinese vocational college students.

2. METHOD

2.1. Integration of gamification based on self-determination theory

This study employs an SDT-based gamification framework demonstrating how game elements mediate psychological needs, thereby enhancing learning outcomes [26]. According to the SDT-based gamification framework, this study integrates game elements, such as points, badges, leaderboards, levels, and quests from gamified English education literature [27], into online English intercultural learning to support needs for autonomy, competence, and relatedness to develop intrinsic motivation and ICC, as illustrated in Figure 1. This integration transforms the learning experience into engaging gamified environments that cater to basic psychological needs and foster intrinsic motivation, enabling students to immerse themselves in the development of ICC.

In this study, we implemented an online English intercultural course using the Chaoxin learning platform, a widely adopted tool within Chinese colleges. The online learning platform integrates gamification elements, like leaderboards and points, to make learning interactive and engaging. Different game levels can be created by grouping learning information into varying difficulty levels, and in each level, certain activities are displayed as game quests. The online platform serves a dual function, providing learning skills tools and communication features. Through the learning skills tools, students can actively participate in various activities, encompassing quizzes, video presentations, and assignments. Additionally, communication tools foster student interaction and facilitate effective teacher-student engagement, including the establishment of discussion forums.

Central to the course's design is the online ICC training model [4], which consists of four stages: igniting interest in intercultural learning through problem discussion (attitude development), acquiring

intercultural knowledge through watching video, website searching or peer discussion (knowledge construction), applying knowledge and skills in problem-solving situations (skills practice), and reflecting on intercultural learning experiences through question-driven writing (reflection). Embedded within this design is a gamification-rich learning environment that satisfies the three basic psychological needs: autonomy, competence, and relatedness under the principles of the SDT through points, leaderboards, levels, quests, and badges. The Chaoxin platform can facilitate points and leaderboards functionality, while levels and quests can be integrated within the learning content. Badges can be awarded through the teacher's comment and notice features in the Chaoxin platform. Figure 2 demonstrates the structure and environment of the gamified course based on SDT in the Chaoxin learning platform.

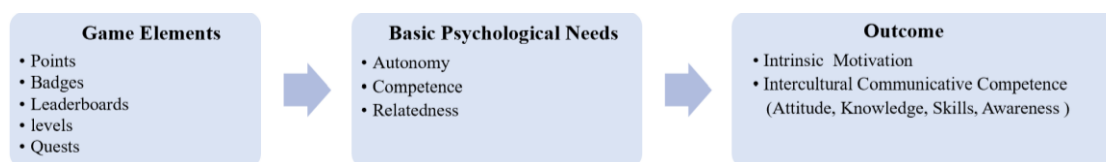


Figure 1. SDT-based gamification framework in online English intercultural courses

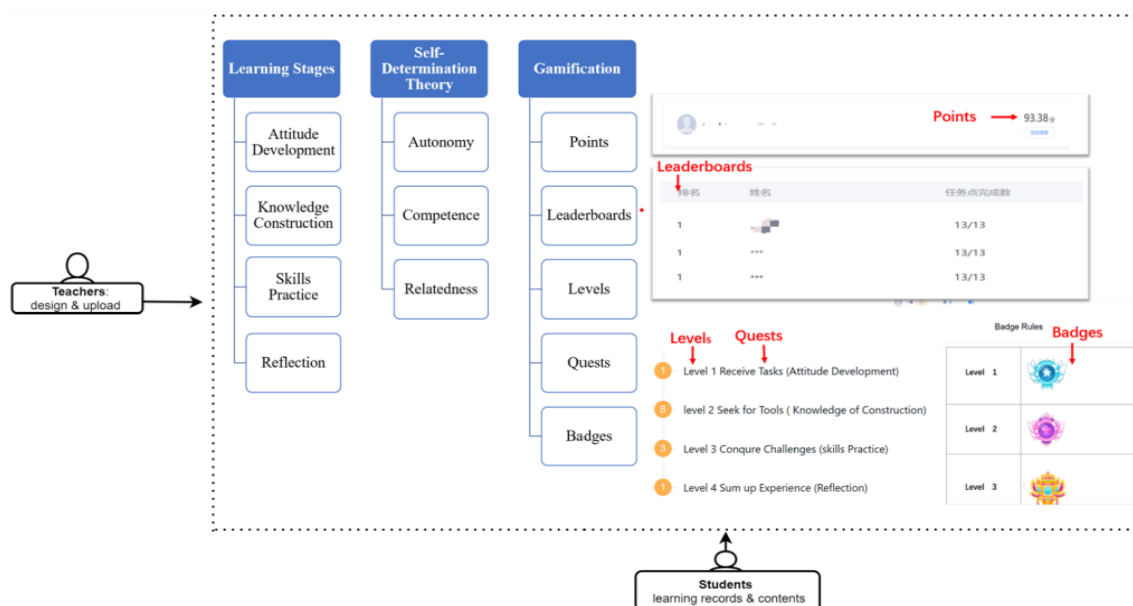


Figure 2. Structure and environment of gamified course framework

This study employs the game elements to meet basic psychological needs under the principles of the SDT, as illustrated in Table 1. To satisfy the need for autonomy, the course needs to create a sense of freedom of decision-making, which implies that meaningful and multiple choices can be offered, such as learning objectives and routes to achieve them. Thus, the course can build a set of learning objectives with a learning route in various ways. Quests and levels are employed to address the need for autonomy. The quest objectives can be divided into different levels: easy objectives, middle-difficult objectives, and difficult objectives. Each objective can correspond with quests and be completed in different ways. For example, various ways to obtain information to solve problems include watching tutorials, reading articles, using websites, or discussing with peers. Student can choose their preferred approach to achieve one of the quests.

For the need for competence, the course fosters the feeling of achievement in learning activities by providing feedback to help students highlight their sense of success, which points, badges, levels, and a lead board can realize. Points can be assigned as rewards when students complete quizzes and matching. With accumulated points, students can move to the following content level, obtain badges awarded manually through the announcement function of the online platform, and progress up the leaderboard. Thus, the game elements can provide timely feedback through points and sustained feedback through badges and leaderboards to shape their sense of competence.

Table 1. Mapping game elements to need satisfaction

Basic psychological needs	Strategies	Implementation through game elements
Autonomy	A set of learning objectives Different ways to reach objectives	Offer options for quests with different learning objectives through levels Offer options for the ways to get information to achieve quests e.g., videos, articles
Competence	Meaningful and informational feedback	Award Points and badges based on performances Use Levels and leaderboards to show the rank of overall performances
Relatedness	Different social interactions Visualization of social reputation	Award points & badges for posting in discussion forums Use leaderboards to show the performance comparison with their peers

Addressing the need for relatedness necessitates cultivating a robust sense of community. Different social interactions can support the relatedness, like commenting and posting their ideas in discussion forum. Besides, social reputation also can help students find their place in a meaningful community. Thus, points and badges are assigned to stimulate students to share their ideas in discussion forums and leaderboards to visualize their competence in communities and gain recognition and connection.

Then, the study integrates these strategies of the game elements to meet psychological needs across four learning stages, as depicted in Table 2. In the initial stage of attitude development, students acquire a foundational understanding of different learning levels and quests, actively participating in discussion forums to share ideas and earn points and badges. In the second stage, they construct knowledge by watching videos, website searching, or peer discussions to complete quizzes and exercises to earn points and track their progress on leaderboards. The third stage focuses on skills practice, where students select quests aided by preferred resources, receiving feedback through points, badges, levels, and leaderboards. Finally, in the fourth stage of reflection, students write about their learning experiences, strive to achieve the final level, and view their accomplishments on leaderboards and badges.

Table 2. The detailed design of gamified English intercultural courses

ICC development phases	Gamified system support (based on self-determination)
1. Attitude development phase Stimulate curiosity toward intercultural learning through problem-oriented discussion.	Use levels and points to demonstrate a set of goals involved with a range of quests before learning. Award points and badges for posting and commenting in forums.
2. Knowledge construction phase Acquire intercultural knowledge by completing tasks, like quizzes and matching.	Offer options for ways to obtain information to complete quests. Offer different scenarios (quests) to apply information.
3. Skills practice Apply knowledge and skills to problem-solving scenarios.	Offer timely feedback (points), and sustained feedback (badges, level, and leaderboard) to keep motivation in knowledge and skill phase.
4. Reflection Reflect on intercultural learning experiences through question-oriented writing.	Provide lead board and badges to show their final achievement feedback.

Figures 3 and 4 present an overview of the general learning contents, functionalities, and visual representations of the gamified learning journal accessible to students. Figure 3 showcases the fundamental functions of the Chaoxin platform, with learning phases presented in the form of game elements such as levels. Figure 4 provides a detailed illustration of the gamified learning journey, outlining the quests students will undertake and the corresponding badges and points they will earn.

2.2. Participants

Participants comprised 38 first-year students who took gamified intercultural English learning courses at the Faculty of Automobile and Rail Transit in a vocational college in China. Over four weeks, they immerse themselves in interactive tasks, including online discussions, tutorial viewing, knowledge quizzes, and problem-solving tasks. To examine the impact of this gamified learning experience, participants completed pre- and post-questionnaires assessing their intrinsic motivation and ICC. These questionnaires were administered following a single-group time series design, capturing their perceptions of motivational shifts and changes in ICC before and after the gamified module's utilization. It is important to note that data was collected from 36 students due to two participants not completing both pre- and post-questionnaires. Additionally, 12 students willingly volunteered for in-depth interviews, contributing valuable qualitative insights to complement the quantitative findings.



Figure 3. Super star interface

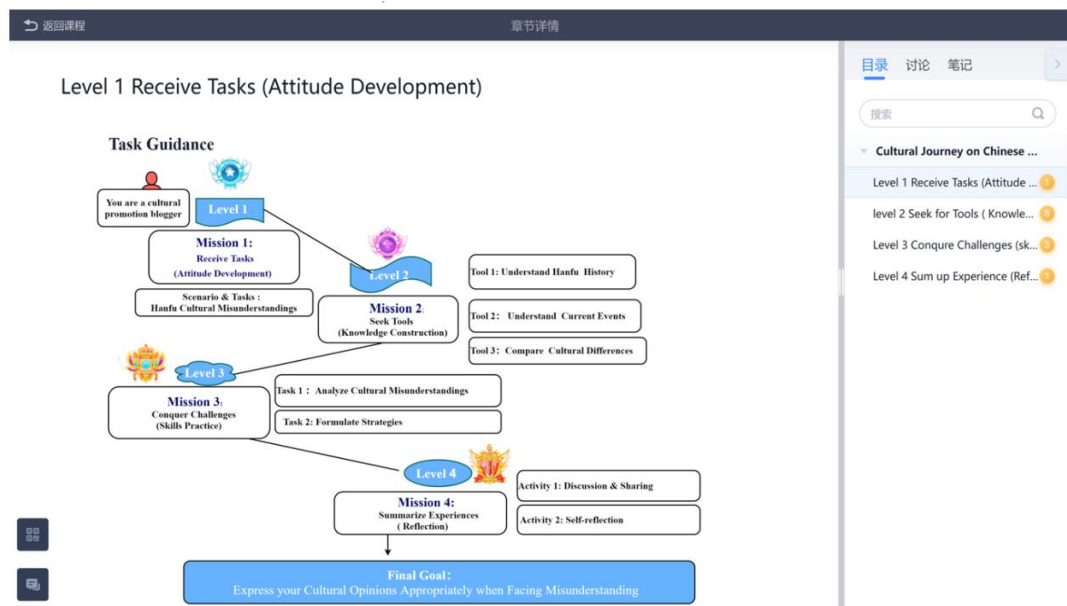


Figure 4. Interface of game elements: levels, quests, and badge

2.3. Instruments

The research employs two key instruments: the intrinsic motivation questionnaire and the ICC questionnaire. For the assessment of intrinsic motivation, a 16-item questionnaire was derived from the intrinsic motivation scale [28], a widely utilized tool in assessing intrinsic motivation [29]. It evaluates interest/enjoyment, perceived competence, effort/importance, value/usefulness, pressure/tension, perceived choice, and perceived relatedness. Notably, perceived competence, perceived choice, and relatedness are intricately intertwined with the psychological needs of autonomy, competence, and relatedness. Participants rated each item on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). These items underwent slight modifications to suit the specific context. For instance, the item “This activity was fun to do” was adapted to “The gamified learning was fun to do”. These changes were made to ensure relevance and consistency with the participant's experiences and the focus of the study.

The assessment of intercultural competence of Chinese college (AIC-CCS) students is employed to measure ICC [10]. This assessment draws from Bysram’s ICC model and comprises four core components: attitude, knowledge, skills, and awareness. This structure is based on the theoretical foundation of the research. Each of these components is represented by multiple items within the tool. Chinese scholars have demonstrated the AIC-CCS’s usability and efficiency [4]. Considering the gamified learning module's educational objectives, a 16-item questionnaire with a five-point Likert-type scale was administered before

and after the research to examine the changes in ICC from students' perceptions. Additionally, modifications were made to the questionnaire items to align with the learning content, such as changing the statement "Understanding of one's own historical knowledge" to "Understanding the history of Hanfu". Interviews were also employed, thereby offering a comprehensive perspective within this research.

3. RESULTS AND DISCUSSION

3.1. Data analysis

The data analysis includes two main parts: quantitative analysis and qualitative analysis. In the quantitative analysis, data from the questionnaires were evaluated by a paired t-test with the social sciences (SPSS) software version 27. Meanwhile, the qualitative analysis involved thematic coding of the interviews. This strategic division of analysis enabled the researchers to attain a holistic grasp of the learning activities' influence on intrinsic motivation and intercultural communication skills.

3.1.1. Analysis of pre- and post-questionnaires on intrinsic motivation

This study uses the intrinsic motivation questionnaire to examine how gamified learning impacts the intrinsic motivation of vocational college students in online English intercultural courses. We focused on perceived competence, perceived choice, and relatedness, corresponding to autonomy, competence, and relatedness needs. As shown in Table 3, significant improvements were found in perceived competence ($P=0.02$) and perceived choice ($P=0.037$), while the relatedness subscale showed a marginal increase ($P=0.777$). The data ($P<0.05$) indicate that gamified learning influences intrinsic motivation.

Table 3. Mean difference and paired t-test results (intrinsic motivation)

Subscales	Pre-test		Post-test		T	DF	P
	Mean	SD	Mean	SD			
Interest	3.17	0.75	3.42	0.65	2.328	35	0.026
Perceived competence	3.93	0.82	4.2	0.75	2.448	35	0.02
Effort/importance	3.85	0.82	4.15	0.74	2.582	35	0.014
Value/usefulness	3.97	0.77	4.26	0.79	2.428	35	0.02
Pressure/tension	2.67	0.53	2.69	0.59	0.285	35	0.777
Perceived choice	3.23	0.65	3.42	0.64	2.174	35	0.037
Related	2.75	0.54	2.78	0.59	0.285	35	0.777
Sum	3.35	0.51	3.55	0.50	2.899	35	0.006

3.1.2. Analysis of pre- and post- questionnaires on intercultural communicative competence

This study identifies the effect of gamified online English intercultural learning based on SDT on ICC through questionnaires. Table 4 demonstrates there is a significant difference in knowledge ($p<0.001$), attitude ($p=0.032$), and skill ($p=0.022$), but the awareness subscale showed marginal significance ($p=0.065$). Notably, the summed data from the pre-test and post-test phases produced a statistically significant result ($P=0.004$), thus supporting the rejection of the null hypothesis, implying that gamified learning courses can improve intercultural communication competence.

Table 4. Mean differences and paired t-test results (ICC)

Dimensions	Pre-test		Post-test		T	DF	P
	Mean	SD	Mean	SD			
Knowledge	3.44	1.12	4.25	0.80	4.571	35	<0.001
Attitude	3.94	0.90	4.25	0.79	2.231	35	0.032
Awareness	3.97	0.87	4.24	0.80	1.904	35	0.065
Skills	3.44	0.84	3.76	0.72	2.403	35	0.022
Sum	3.59	0.77	3.96	0.72	3.078	35	0.004

Figure 5 illustrates the mean differences in each component of ICC before and after gamified online English intercultural learning. A substantial increase is observed from the pre-knowledge test to the post-knowledge test. Skills also significantly improve despite initially having the lowest mean points among the components. Attitude and awareness, although starting with relatively higher mean scores in the pre-test, demonstrate slight increases. The bar chart highlights a comprehensive enhancement in students' ICC across attitude, knowledge, skills, and awareness dimensions.

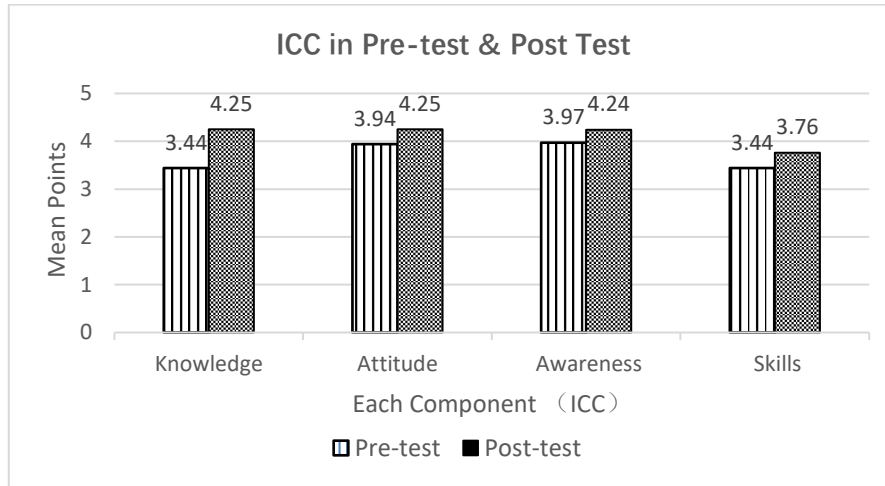


Figure 5. Mean differences of ICC

3.1.3. Analysis of interview on intrinsic motivation and intercultural communicative competence

To gain a deeper understanding of students' experiences in gamified learning, we conducted interviews that focused on two key aspects: the impact of gamified learning on student motivation through basic psychological needs (addressed by five questions) and its influence on ICC (addressed by three questions). We employed thematic analysis, which encompassed familiarizing with the data, generating codes, constructing themes, revising and defining them, producing the report, and further refining the analysis [30].

The results of these interviews are summarized in Table 5, highlighting the key themes that emerged through the coding process. An analysis of these coded themes consistently confirmed the positive impact of gamified learning on both motivation and ICC. However, it is worth noting that there were instances of neutral responses, suggesting that social interaction is insufficient, and that the effectiveness of gamification is intricately linked to individual interests and personalities. The results underscore the importance of achieving a balanced blend of autonomy, competence, and relatedness for the target group within the gamified educational system.

Table 5. Summary of themes' coding

Main theme	Subtheme	Positive example	Neutral example
Gamified learning satisfies psychological needs	Meet the need for competence	Leaderboard and points promote me to do better	It encourages me to compete for points rather than to learn
	Meet the need for autonomy	I would like to complete tasks I select	I would like to complete tasks, but seem a little pushed by points
	Meet the need for relatedness	Quests can be more interactive among classmates	Gamified learning needs to be more interactive
Gamified learning can Promote motivation	Spend more time	I would like to spend more time for points and good ranks	Points and leaderboard can influence my learning, but not much
	Invest greater efforts	I would like to make more efforts for more points	Points may encourage me to keep learning
	Feel interested	It is more interactive to finish quests than just doing exercise	I feel it is just a little interesting for me
Gamified learning assists me in developing ICC	Four dimensions (attitude, knowledge, skills and awareness)	I can develop my ICC, especially learning different cultural knowledge	

3.2. Discussion on the impact of gamification on students' intrinsic motivation

The findings of this study demonstrate gamified English intercultural learning significantly boosts students' intrinsic motivation. Pre-post questionnaire analysis revealed increased perceived competence and choice, aligning with the need for competence and autonomy that can influence intrinsic motivation. Feedback from interviews supported this, showing most students are more engaged when rewarded with points, leaderboards, and task choices. However, limited peer and teacher interaction slightly impacted relatedness satisfaction.

These findings are consistent with prior research, suggesting that gamified learning enhances students' intrinsic motivation through satisfaction of basic psychological needs [26], [31]. Notably, our results indicate that gamified learning has a dual impact, enhancing autonomy and perceived competence. The results

contrast with some studies, which emphasized the impact on autonomy and relatedness, with minimal effect on perceived competence [18]. The observed enhancement in autonomy and competence could be attributed to strategies such as offering task choices and timely rewards like points and badges [31]. However, it is crucial to acknowledge that relatedness needs are not adequately met, indicating the necessity for future research to promote increased communication and idea-sharing among students in gamified learning environments.

This study provides additional evidence of the positive impact of gamification by investigating how it influences intrinsic motivation in online intercultural courses based on SDT. It also offers educators an example of addressing students' psychological needs through gamification to establish more engaging and effective learning environments conducive to fostering intrinsic motivation, particularly in the context of online intercultural courses where motivation has been identified as a challenge for students [1], [5].

3.3. Discussion on the impact of gamification on students' intercultural communicative competence

The results indicate that gamified English intercultural learning effectively boosts students' ICC, with significant increases in attitude and skill, notably in expanding intercultural knowledge and marginal changes in awareness. Interview data further support this effectiveness, revealing that students engage with video content and exercises to earn points and badges, leading to improved attitudes, skills, and awareness. Our study extends existing research by examining strategies of online learning that incorporate gamification to boost motivation, thereby contributing to intercultural communication competence. Current studies have demonstrated gamification's effectiveness in maintaining student motivation and improving language learning outcomes, such as expanding vocabulary acquisition [21], improving listening [22], speaking [23], reading [24], and writing skills [25], but limited research has explored its impact on ICC. These findings contribute to the existing research on the impact of gamification on the development of ICC in English language courses. Through empirical investigation, our study demonstrates the positive effects of gamification on fostering ICC among English language learners, especially in expanding students' intercultural knowledge.

4. CONCLUSION

In conclusion, our study contributes to the existing literature by highlighting the role of gamification in stimulating student motivation based on SDT and facilitating the development of ICC. The findings suggest that well-designed gamification has the potential to improve both intrinsic motivation and ICC, particularly in expanding intercultural knowledge. This study offers practitioners insights into designing gamified English intercultural learning to enhance intrinsic motivation, thereby fostering the development of ICC. By creating motivating environments through gamification, practitioners can encourage students to dedicate time and effort to developing their intercultural communicative skills. However, it is essential to acknowledge the limitations of our study, including its relatively short duration of four weeks and reliance on questionnaires and interviews for assessment. Future research endeavors could employ more sophisticated methods, such as data logging and observation, to provide a more comprehensive and precise evaluation of gamification's impact on intrinsic motivation and intercultural communication competence.

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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

DATA AVAILABILITY

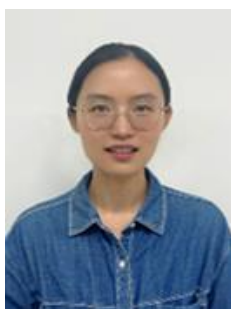
The data that support the findings of this study are available on request from the corresponding author [NAA].





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