

# A Correlation Analysis Between Gamification Design of Online Learning Resources and Foreign Language Enjoyment: Take the Duolingo App as An Example

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**Abstract:** With the development of Internet technology, the influence of gamification learning design on the learning effect has been widely noticed, but there is a lack of in-depth exploration of its relationship with foreign language enjoyment. Therefore, this paper takes Duolingo APP as an example to explore the relationship between the two. This paper finds that gamification design has a significant positive correlation and influence on enhancing learners' foreign language enjoyment, but also has obvious individual differences. Based on this, this paper proposes some suggestions for designing foreign language learning materials, closely integrating gamification elements with learning content while paying attention to learners' differences.

## 1 INTRODUCTION

In recent years, applying Positive Psychology (PP) in the field of Foreign Language Acquisition (FLA) has attracted extensive attention from scholars. One of the most popular positive emotions is foreign language enjoyment, which is regarded as a key factor in improving learners' overall cognitive level and increasing learners' communicative willingness in the process of foreign language acquisition (Dong, 2022). Existing studies have proved that, through classroom games, teachers can create a relaxing atmosphere, reduce tension and pressure, and trigger students' pleasure emotions.

However, current research mainly focuses on the design of teaching games in traditional physical classrooms and pays insufficient attention to the learning resources of online platforms. With the development of modern network technology, it is more and more common for language learners to use online learning platforms for self-study, therefore, the game-based learning design of learning resources on online learning platforms has also become a concern. Based on this, this study, from the perspective of PP, takes Duolingo APP as an example to explore the relationship between game-based learning design of learning resources and foreign language enjoyment, to provide suggestions for the design of materials or learning methods of other foreign language learning.

## 2 LITERATURE REVIEW

### 2.1 Foreign Language Acquisition from a Positive Psychology Perspective

In 2012, PP was introduced into the field of foreign language acquisition, and its key emotion theory, Broaden-and-Build Theory, was first introduced (Fredrickson, 2001; MacIntyre & Gregersen, 2012). The theory discusses the effects of positive emotions on individual psychology and behavior, suggesting that positive emotions have two core functions: instantaneous broaden function and long-term build function. Through the two functions, positive emotions can promote the accumulation of resources while further enhancing the positive emotions, and ultimately increase the overall sense of well-being. In addition, the introduction of the Control-Value Theory in the field of educational psychology has also played a theoretical guiding role in the field of foreign language acquisition (Pekrun, 2006). The theory discusses emotions from three dimensions: titer (positivity and negativity), activeness (arousal level), and definite object (arousal object). It argues that pleasure is a positive high-arousal emotion, which is closely related to an individual's sense of control over the learning activity or outcome and value recognition. In recent years, many scholars have conducted empirical studies, and the results generally show that there is a significant positive correlation

between foreign language enjoyment and the learning effectiveness of language learners (Li & Han, 2022).

## 2.2 Game-Based Learning

Gamification refers to the application of game elements to non-game scenarios. Most Gamification systems include three elements: points, badges, and leaderboards (PBL), which are the three standard features of gamification (Kevin & Dan, 2014). Richard Landers proposed the game-based learning theory in 2014, which explores how gamified features can improve learning effect by influencing learners' behaviors and attitudes. The theory suggests that gamified features can improve the learning effect through two kinds of processes: mediation and regulation, with learners' learning attitude as the intermediary or by the method of improving their learning attitude. In addition, the flow theory is also applied to gamified learning. Gamification features can encourage learners to enter the "flow state", that is the psychological state of being fully immersed, feeling excited, happy, and focused, which will stimulate learners' positive emotions and lead to a new state of mind-flow, so that the flow experience runs through the whole process, and ultimately produce better learning results. Empirical studies have found that the game elements and feedback mechanisms integrated into the learning environment can trigger learners' emotional experiences such as pleasure, tension, or immersion, which can further stimulate learners' intrinsic motivation (Zhang & Shang, 2018).

However, most of the existing studies focus on the effect of gamified learning, and pleasant emotions are only involved as part of the effect, and the relationship between the two has not been discussed in depth. Moreover, most of the existing empirical studies focus on the gamification design of the physical classroom and pay less attention to the game-based design of the learning resources of the online learning platform. Based on this, this study chooses Duolingo, an online learning platform with the core concept of the combination of gamification and learning, as an example to explore the relationship between the gamification design of Duolingo's learning resources and the sense of pleasure in foreign language acquisition.

## 3 RESEARCH METHODOLOGY

### 3.1 Study Design

The purpose of this study is to collect and analyze the data through the online questionnaire to explore the relationship between the gamification design of learning resources in the Duolingo app and the pleasure of foreign language learning, and thus provide new methods and suggestions for foreign language learning.

Game-based learning is the application of game elements in learning situations. This theory has been applied to the teaching of foreign language acquisition with the development of Internet technology. Garriss et al. proposed an input-processing-output model for teaching games and foreign language acquisition, which illustrated the acceptance process of the gamification of foreign language acquisition (Garriss et al., 2002). Previous studies have also proved that game-based learning has a significant positive influence on foreign language subjects, which can stimulate students' interest and enthusiasm for learning, and promote the improvement of the learning effect (Li et al., 2019).

Combined with existing research, gamification system theory, and the actual situation of the gamification design of APP learning resources in Duolingo, this study selected the typical gamification elements therein and analyzed them in the following four dimensions: points, badges, leaderboards, and friends quest.

#### 3.1.1 Points

Duolingo's point design is a core component of its gamification learning mechanism. The basic point system awards experience points (XP) based on the user's performance in completing courses, missions, and other activities, and maintaining a winning streak provides additional points to bind users for long-term use. In addition to the basic system, users can earn points by participating in time-limited activities and challenges, improving their leaderboard rankings, and completing missions of friend quests. The acquisition of points is an intuitive reflection of the user's learning progress and provides instant feedback on the user's learning outcomes quantitatively. The clear task objectives make users feel controllable so can reduce their anxiety during learning. Interesting game design and instant feedback can make learners feel a sense of achievement and improve their individual value evaluation, which in turn can

encourage users to have pleasant emotions. Accordingly, the following assumptions are proposed:

H1: The point design will positively promote learners' pleasure.

### 3.1.2 Badges

Duolingo provides users with a wide variety of reward badges. The badges are awarded based on the learner's achievements and performance. For example, learners can earn "Winning Streak" badges for completing learning tasks for several days in a row, or "Diligence" badges for completing a specific number of lessons, and so on. In addition to mainline learning, Duolingo also offers a special daily task function, and students can get the monthly badge after they insist on completing it.

From the perspective of Control-Value Theory, badges, as a visual sign of achievement, enable users to feel their progress and ability enhancement. At the same time, they are also combined with social functions, which can be shown to friends in their profiles to gain recognition and appreciation from others, to increase the users' recognition of the value of the learning activities, thus providing motivation for continuous learning. Accordingly, the following assumptions are proposed:

H2: Badge design will positively promote learners' pleasure.

### 3.1.3 Leaderboards

Duolingo motivates users to learn and compete with each other through the Leaderboard system. The system is open once a week for seven days, users are ranked with 30 people of the same level by points, and they can improve their ranking by completing learning tasks and gaining experience value. The leaderboard is updated every day, which enables users to see their progress and others' scores in time. After the weekly settlement, users at the top of the list will be promoted to a higher level, while those at the bottom of the list will be relegated to a lower level, ranging from bronze to diamond. This design also makes users feel that they are part of a learning community in Duolingo, which enhances their sense of belonging and identity, thus increasing their participation and activity and making them enjoy the learning process more. Accordingly, the following assumptions are proposed:

H3: The leaderboard design will positively promote learners' pleasure.

### 3.1.4 Friends Quest

In addition to the three main game elements, the community features of Duolingo--Friends Quest, Classes, etc., also have significant gamification features. The Friends Quest sets clear tasks for users, as well as interactive reminders, achievement sharing, and other functions. Through this, users can encourage and urge each other with their friends to complete the task goals together. The class system allows users to join or create a class, and the organizer will help class members set common learning goals so that the users can feel the collective atmosphere of learning through completing the class tasks and sharing progress. The design of community function can stimulate users' social motivation and achievement motivation, to enhance their sense of self-worth and obtain a pleasant emotional experience. Accordingly, the following assumptions are proposed:

H4: The Friends Quest design will positively promote learners' pleasure.

In summary, this study proposes the above four assumptions based on PP's Control-Value Theory, combined with gamification elements and gamified learning theory, and will test and revise the assumptions through quantitative research.

## 3.2 Issuance and Recovery

### 3.2.1 Research Tools

This study conducted a quantitative study through a combined questionnaire with the following measurement tools:

First, this study refers to the Game User Experience Satisfaction Scale (GUESS) and combines the theory of the gamification system and the actual situation of the gamification design of APP learning resources in Duolingo to prepare the scale. It is divided into 4 dimensions, including points, badges, leaderboards, and friends' quests with a total of 8 measurement items, which is a 5-level Likert Scale. The scale has high reliability (Cronbach's  $\alpha=0.869$ ) and validity, proving to be a reliable and valid scale for the sense of experience of gamification design.

In addition, this study was compiled concerning the Chinese version of the Foreign Language Enjoyment Scale (CFLES). The original scale was a 5-level Likert scale, which was adapted by Li et al. based on a sample of Chinese high school students from the Foreign Language Enjoyment Scale. To meet the needs of this study, the original question

Table 1: Gamification design of learning resources and foreign language enjoyment.

Variant	Mean $\pm$ standard deviation	Variance	Median	Minimum value	Maximum values	Kurtosis	Skewness	Coefficient of Variation (CV)
point	3.745 $\pm$ 0.969	0.940	4.000	1.000	5.000	0.409	-1.048	25.884%
badges	3.775 $\pm$ 0.939	0.881	4.000	1.000	5.000	0.784	-1.091	24.868%
leaderboards	3.688 $\pm$ 1.038	1.076	4.000	1.000	5.000	0.186	-0.968	28.137%
Friends quest	3.737 $\pm$ 0.996	0.992	4.000	1.000	5.000	0.211	-1.037	26.653%

item scenario was set to the Duolingo online platform, and the questions were adapted to form three dimensions, including personal foreign language pleasure, Duolingo's gamification-design-related foreign language pleasure, and Duolingo's community-interaction-related foreign language pleasure, with a total of eleven measurement items. The adapted scale has high reliability (Cronbach's  $\alpha=0.888$ ) and validity and proved to be a reliable and valid foreign language pleasure scale.

### 3.2.2 Distribution and Collection of Questionnaires

This study was conducted by distributing the questionnaires through the online platform. In this study, 20 questionnaires were firstly distributed for pre-survey, the reliability and validity of the questionnaire were tested according to the collected data, and the questionnaire was formally distributed after some of the items were reasonably adjusted according to the feedback from the subjects. In this study, convenient sampling was used to select non-English major undergraduates who use the Duolingo App for online English learning as the research subjects. Finally, a total of 200 valid questionnaires were obtained. After the questionnaires were collected, with the help of SPSS 22.0, the data were analyzed by descriptive statistics, Pearson correlation test, and linear regression analysis.

values of all variables are between 3.688 and 3.796, and the median is 4, indicating that their central trends are similar and tend to be high, which suggests that the overall performance of foreign language learners' sense of experience with gamification design is relatively positive, and generally at a high level. At the same time, the skewness of all variables is negative and the data distribution is skewed to the left, indicating that there are extremely low values in the data, and the data distribution is skewed to the left, suggesting that a few subjects have different experiences in the game design of learning resources and foreign language pleasure.

On the whole, learners' overall acceptance of game design is high, but there was individual variability in the learners' sense of experience and the resulting pleasurable emotions. For example, among the four important elements, each variable has a high average value and a low coefficient of variation, but the variability of the leaderboard is the largest, indicating that learners' acceptance and experience of this element are significantly different, making its impact more complex. This reflects that the design of the leaderboard should be more careful, fully considering the individual differences and psychological needs of users to further optimize the design.

## 4.2 Correlation Between Gamification Design of Learning Resources and Foreign Language Enjoyment

Based on the descriptive statistics results in Table 1, this study used SPSS 22.0 for Pearson correlation analysis and linear regression analysis. Table 2 shows that there is a significant positive correlation between foreign language pleasure and the four gamification elements: points, badges, leaderboards, and friends quest. The correlation analysis data all showed a significant level of 0.01, and the correlation values were high, showing a significant positive correlation. This suggests that in the context of foreign language learning, learners are more likely to feel more

## 4 RESULTS

### 4.1 Overall Sense of Gamification Design Experience in Duolingo

This study first used SPSS 22.0 to make descriptive statistics on each variable. The results are shown in Table 1.

Table 1 shows that foreign language learners' experience of gamification design is at a medium-high level with individual differences. The average

Table 2: Correlation matrix between gamification design of learning resources and foreign language enjoyment.

	Foreign Language Pleasure	Check Numbers	Coat of Arms	Charts (of best-sellers)	Friendly Alliance
Foreign Language Pleasure	1				
Point	0.778**	1			
Badges	0.748**	0.631**	1		
Leaderboards	0.755**	0.657**	0.629**	1	
Friends quest	0.763**	0.652**	0.634**	0.592**	1

\* p&lt;0.05 \*\* p&lt;0.01

Table 3: The role of gamification design of learning resources on foreign language enjoyment.

	Variant	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F (4,195)	Non-Standardized Coefficient		Standardized Coefficient	t	VIF
						B	standard error	Beta		
Implicit Variable	Foreign Language Pleasure	0.894	0.800	0.796	195.044					
Independent Variable	Point					0.230**	0.040	0.278	5.734	2.292
	Badges					0.196**	0.040	0.229	4.922	2.118
	Leaderboards					0.202**	0.036	0.261	5.639	2.096
	Friends quest					0.226**	0.037	0.282	6.077	2.092

\* p&lt;0.05 \*\* p&lt;0.01

pleasure and enjoyment in the process of language learning if they obtain higher points, more badges, higher leaderboard rankings, and more active performances in their friend's quest on the game-based learning platform.

Based on Table 2, taking points, badges, leaderboards, and friends' League as independent variables and foreign language pleasure as dependent variables, linear regression analysis shows that all four gamification elements have a significant positive effect on foreign language enjoyment and that the model was well fitted. Table 3 shows that the regression coefficients are good, in addition, the multilinear test found that the model does not have a covariance problem ( $VIF < 5$ ) and the D-W value is around the number 2, which indicates that the model is not autocorrelated and the model is significant. This indicates that the gamification design can effectively enhance the foreign language pleasure of foreign language learners and have a positive impact on them. Among them, the regression coefficients of points and friends quest are slightly higher than those of badges and leaderboards, indicating that points and friends quest are more influential on foreign language pleasure.

It can be seen that the gamification design of learning resources in Duolingo has a significant

positive correlation and impact on enhancing learners' foreign language enjoyment. However, due to the significant differences in users' experience of different elements, the existing design still needs to be optimized.

## 5 DISCUSSION

### 5.1 Overall Sense of Gamification Design Experience in Duolingo

The average value of the four dimensions (Table 1) reflects the foreign language learners' experience of the game learning elements of Duolingo. On the whole, foreign language learners can obtain a sense of foreign language enjoyment through game-based learning, which improves the learning effect. But at the same time, this sense of experience has individual variability, and some elements may put pressure on some learners, especially the element of leaderboards with the greatest variability. Therefore, when designing the leaderboard, students can set a variety of ranking methods, such as single skill ranking, as well as privacy options, allowing learners to choose whether to disclose their ranking information or not, to reduce learners' anxiety and pressure.



## 5.2 Correlation Between Gamification Design of Learning Resources and Foreign Language Enjoyment

As shown in Tables 2 and 3, the gamification design elements have a positive effect on enhancing learners' foreign language pleasure. When designing other foreign language learning materials, it can learn from the design ideas of Duolingo, and closely combine gamification elements with learning content to improve students' learning pleasure. At the same time, it should pay attention to individual differences, provide diversified learning paths, meet the needs of different learners by setting up different learning modules, intelligent recommendation functions, etc., and dynamically optimize and improve them according to the progress and feedback of the learners, to achieve the purpose of promoting continuous learning (Landers & Landers, 2014; Jiang, 2020).

## 6 CONCLUSION

Taking the Duolingo App as an example, this study explores the relationship between the gamification design of learning resources and foreign language enjoyment from four dimensions: points, badges, leaderboards, and friend quests. Overall, the gamification elements have a strong positive effect on foreign language pleasure, which can promote the generation of foreign language pleasure emotions and thus improve the learning effect, which provides an empirical basis for future foreign language teaching and learning design. Meanwhile, this study also reminds designers to fully consider learners' individual differences and psychological needs, and make targeted improvements and optimization of gamification strategies to provide language learners with a better learning experience.

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