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# Study on the Present Situation and Optimization Path of Gamification Design in Chinese University Libraries

**Yuchen Li[1], Junyan Zhu[1], Yaxian Feng[1,*], Xingrui Yang[2] and Yu Zhou[1]**

[1]School of Management, Wuhan Institute of Technology, Wuhan, 430205, China
[2]Hungarian University of Agriculture and Life Sciences, Godollo, H-2100, Hungary
*Corresponding Author: Yaxian Feng. Email: 849340413@qq.com

**Abstract:** In this paper, 137 "First-class universities" and "First-class discipline" construction universities in China are selected as the objects of investigation to analyzes the present situation and characteristics of the game design of University Library in China. Taking the university library in other countries as the reference object, this paper compares the differences of the game design of University Library in China and other countries, sums up the deficiency of the gamification service practice in Chinese university libraries. At last, this paper proposes an optimization path of the gamification design of Chinese University Library from six aspects of game type, game service object, game interactive mode, game application, game development and game playability.

## 1 Introduction

Games appeal to people at any stage, from children's games that help to enlighten the mind to games for the elderly that slow brain decline. They are always one of the most efficient ways to help improve mental cognition, stimulate interest in learning, improve memory and promote abstract thinking [1]. In recent years, mobile information technology has developed rapidly and a variety of mobile-based games have emerged. As an ancient form of entertainment and learning, games have become one of the most popular forms of entertainment for young people [2]. According to Newzoo, an authoritative data research agency, the global gaming market will reach US$200 billion by 2023. As gaming becomes a 'trillion-dollar industry', more and more people are looking at how to leverage the strengths of gaming to change the industry. Many other sectors, including libraries, have started to game or gamification practices, using game elements in non-game scenarios to inspire engagement, involvement and loyalty, and to leverage this to achieve better communication [3].

## 2 Review of Related Studies

The concept of "gamification" emerged in the early 20th century, and the more mainstream definition of "gamification" today is "the use of game elements and game design techniques in non-gamified situations" [4] to motivate users to use and enhance user experience [5]. By reviewing the relevant literature, we found that the research on gamification of university library services in China can be grouped into two main categories:

One is the issue of the system and model of university library games. For example, Li et al. [6] discussed the concept and realization of the design of university library game system from five aspects: goal, principle, system, engine and content. It is believed that the university library games should be oriented to user needs in the design process in order to achieve the full use of the library platform by users and improve the utilization of library resources. Liu et al. [7] analyzed the development status of gamification services in university libraries in other countries and formulated relevant principles and support systems for the development of gamification service projects in university libraries. Second, business practices and case studies of gamification services in university libraries. For example, Zeng et al. [8] took Wuhan University as an example and studied the organic combination of college library services and digital games, and believed that future college library gamification services would usher in better development opportunities; Ren [9] took American college libraries as an example, analyzed the cases of providing digital game services in American college libraries, and discussed the ways of providing related services in Chinese libraries.

Most of the existing studies focus on the analysis of the practice of university libraries in other countries and the summary of the practical experience of university libraries in other countries. Few studies have conducted a comprehensive investigation and analysis of the gamification design of university library services in China, and propose a systematic improvement for the shortcomings of the gamification design of university libraries in China. In view of this, this paper attempts to investigate and analyses the gamification design of Chinese university libraries. In view of this, this paper attempts to conduct a comprehensive and in-depth investigation and analysis of the practice of gamification design in 137 libraries of universities under the "double first-class" construction in China, with a view to proposing improvement paths for the provision of better gaming services in Chinese university libraries.

## 3 Survey of Gamification Design in University Libraries

### 3.1 Subjects of the Survey

Based on the "List of Universities and Disciplines under Construction of World-Class Universities and Disciplines" released by the Ministry of Education, this paper takes the libraries of 137 universities in the list as the target of investigation, and conducts game practice by accessing the game service pages on the libraries' official websites and the libraries' WeChat public accounts, with a view to forming a systematic understanding of the use of games and gamification in China's university libraries. The aim is to form a systematic understanding of the current situation of the use of games and gamification design in university libraries in China.

### 3.2 Headings

(1) Internet survey. We checked and browsed the official websites, WeChat public accounts and mobile library apps of 137 university libraries in the "List of Universities and Disciplines under Construction of World-Class Universities and First-Class Disciplines" released by the Ministry of Education, looked for the entrance of library games and related consultation, and had an experience.

(2) Online interviews. The investigators contacted several current students from different universities and conducted online interviews with them. By asking them questions about the game services provided by their school libraries and their own experiences, they were able to understand the real situation of the gamification practices in the libraries of these universities. (3) Literature search. In the CNKI database, the keywords "university library", "game" and "gamification" were used to search. Through reading the relevant literature, we collected and organized the information about the gamification practice in Chinese university libraries.

### 3.3  Findings

(1) Internet survey. We checked and browsed the official websites, WeChat public accounts and mobile library apps of 137 university libraries in the "List of Universities and Disciplines under Construction of World-Class Universities and First-Class Disciplines" released by the Ministry of Education, looked for the entrance of library games and related consultation, and had an experience. (2) Online interviews. The investigators contacted several current students from different universities and conducted online interviews with them. By asking them questions about the game services provided by their school libraries and their own experiences, they were able to understand the real situation of the gamification practices in the libraries of these universities. (3) Literature search. In the CNKI database, the keywords "university library", "game" and "gamification" were used to search. Through reading the relevant literature, we collected and organized the information about the gamification practice in Chinese university libraries.

### 3.3.1  Types of Library Games in the Construction of "Double First-Class" Universities

The overall situation of the gamification design of library services of the 137 universities under the "double first-class" construction was obtained by searching and browsing the official library websites, Weibo and WeChat public accounts of the universities, as shown in Table 1. Except for 4 universities whose library websites are inaccessible, 120 out of 133 universities provide gamification services.4.1.2 Figure Labels and Captions.

**Table 1:**  Types of "Double First-Class" university library service gamification design

|  | Educational games for new students | Information skills development game | Scenario simulation game | Other |
|---|---|---|---|---|
| Number of libraries | 77 | 75 | 4 | 19 |
| Percentage | 64.17% | 62.5% | 3.3% | 15.83% |

The new student orientation game is one of the earliest attempts to gamify library services in Chinese universities and is also the most common form. It aims at helping new students understand the library, familiarizing them with the rules and procedures of borrowing and returning books, learning how to find books and materials, mastering the skills of using library equipment and facilities, and becoming literate in using the library in a civilized manner.

The information skills development game is a game designed for the purpose of student information skills education. It is set with problem-solving as the background. By setting layers of levels, users can solve practical problems and train users' information skills in the process of solving problems.

The scene simulation game provides students with scene roaming capabilities to help them learn about the library and explore unknown areas through scene roaming before entering the library in the

field [10]. In the scene simulation game, many services that are difficult to realize in physical libraries are successfully applied [11]. For example, in the virtual sandbox system of the library of Central South University, a voiceover is recorded for the textual explanation, and students can learn about the knowledge points by clicking on the tags in the scene roaming mode, while there is a virtual teacher to lead the tour and provide explanations for new students to help cognitive.

*3.3.2 Forms of Library Games in the Construction of "Double First-Class" Universities*

Through the analysis of the survey results, this paper classifies the games of 120 "double first-class" university libraries into three categories, namely, quiz, breakout and treasure hunt, based on the rules and related elements of the games, and classifies the less frequent gamification services into other categories, as shown in Table 2.

(1) Quiz. Quiz games are the most common type of gamification services provided by the libraries of "double first-class" universities, mostly based on the correct rate and time spent on answering questions. The types of questions are mostly related to the use of the library and its equipment or knowledge of information retrieval skills. They also include screenshots to guess the title of a play, videos to guess the title of a film, and books to guess the title of a book.

(2) Breakout. We unify games and activities with level elements into the gamification services of the level category. 58 gamification services of the level category have been carried out in 50 libraries of universities under "double first-class" construction, among which, most of them are mainly question-answer games, and there are also games of various forms such as "Treasure Hunt" and "Poetry Solitaire", in which patrons are required to complete a number of tasks along the way.

(3) Treasure hunt. This type of gamification service requires patrons to search for treasures based on given clues. A total of 34 such gamification services were conducted in 31 university libraries. Most of the gamification services used the library as the venue for the activity, and the treasure hunt was conducted in the library to allow patrons to become more familiar with the spatial layout of the library in the process of participation, and to make better use of the library search system.

**Table 2:** Forms of gamification services in libraries of universities under "Double First-Class"

|                     | Quiz  | Breakout | Treasure hunt | Other  |
|---------------------|-------|----------|---------------|--------|
| Number of libraries | 99    | 50       | 37            | 31     |
| Percentage          | 82.5% | 41.67%   | 30.83%        | 25.83% |

## 4 Optimization Path for the Gamification Design of University Libraries Under the Construction of "Double First-Class"

Other countries have a long history of providing gamification services in their university libraries [12], and have accumulated rich experience in this area and formed some more successful cases. Although Chinese university libraries started to provide library games later than other countries, but they have achieved significant construction results after a long period of development. However, there are still some aspects for improvement in the design of games, and there are problems such as a small number of games, a small range of target users, a lack of interesting games, and a rough design of the game interface [13]. Therefore, based on the survey and analysis of the gamification service of Chinese

university libraries, this paper reviews the relevant literature, compares the differences of gamification design of university library services in other countries (Table 3), summarizes the excellent design cases of gamification service of university libraries in other countries, propose the shortcomings of the current gamification design of Chinese university library services and proposes an optimization path.

**Table 3:** Differences in gamification services between University libraries in China and other Countries

|  | Other countries' Universities | Chinese Universities |
| --- | --- | --- |
| Type of game | Game collections, literacy education games, externalization games | Education games, virtual smart library |
| Service users | Students, librarians, teachers | Students |
| Interaction methods | Mice, keyboards, joysticks, wearable, touchscreens | Mice, keyboard, touchscreen |
| Development subjects | Third party organizations, school development team, students | Third party |

### *4.1 Findings*

Compared to Chinese university libraries, universities in other countries offer library games in the form of game collections and external gamification [2], in addition to information literacy education games, scenario-based simulation games and virtual reality games. Other countries' university library game collections first originated from celebrity donations, and with the advent of computer games in the 1970s, similar donations allowed libraries in other national universities to accumulate a large collection of computer games and video games [2]. The games collection now plays more of a role in supporting teaching and research and hosting school events [14]. External gamification is a form of gaming that embeds game elements such as badges, scores and levels into the user experience [2] and can improve the utilisation of library resources [15].

Compared with the rich variety of games in university libraries in other countries, Chinese university library games are a bit monotonous. According to the survey, among the 120 "double first-class" universities that provide library games, the types of games provided are generally information literacy education (77 universities) and information skill development games (75 universities), with a few providing scenario simulation games (4 universities). Other than this, there are few other types of library games. The users of information literacy games as a way to educate students are mainly new students. Once the new students have completed the game and the game has served its educational purpose, it is no longer necessary for them to continue to use the game. For example, in the case of Wuhan University's new student game "Save Xiaobu", passing all the levels in "Save Xiaobu" is a prerequisite for new students at Wuhan University to have access to all online library functions. In this case, even though the game's difficult levels generate a lot of buzzs among new students every year, the game loses some users once they have passed the levels and gained access.

Chinese universities can learn from the game design of university libraries in other countries and develop similar game collections and digital badge authentication systems. These two games have already relatively mature applications in universities in other countries and are unanimously welcomed by teachers and students in universities in other countries. The details are as follows:

(1) Games collections. The following elements are needed to develop a modern games collection: places, equipment, talents, etc. Unlike other digital games, game collections require special

places to provide space for games. Universities can create special places in libraries or use space resources such as maker spaces to house game collections. In addition, modern game collections are different from traditional game collections in that they require hardware support from AR, VR or other wearable devices, which universities can stock depending on their own conditions. Another important factor is talent. For a games collection to achieve an orderly and high-quality service for students and teachers, it must be efficiently managed and have clear rules. This requires university libraries to have a certain number of service-oriented personnel to guarantee the effective operation of the games collection.

(2) Digital badge authentication system. This type of library game has proven to be an effective way to promote students' intrinsic motivation to learn in other countries. By introducing a digital badge authentication system, Chinese university libraries can improve the utilization of library resources on the one hand, and enhance students' independent learning on the other. However, digital badge authentication systems in universities in other countries have been found to be used by students to obtain badges or points through cheating means. Chinese universities can avoid cheating by setting strict rules and using sophisticated technical equipment when developing this type of game.

### 4.2  Expanding the Range of People Served by the Game

Other national university library games serve more than just current students. In addition to information and information literacy education games where the players are almost always students, players of similar game collections and externalized games include other users including librarians and teachers [16]. Game collections are also very popular among librarians at Carleton University Library, and librarians have even formed game clubs to promote bonding and improve working relationships between librarians through games [17].

Chinese university libraries mainly provide game services for students, and some university library games are even developed and designed for freshmen players only, making the scope of service recipients too narrow compared to library game services in other countries. The limited reach of library games can also limit their impact and activity to a lower level, which further restricts the subsequent development of the games [18]. A wider audience and a higher level of activity can give library games the resources they need to develop themselves. The University of Denver has developed a good reputation for the popularity of its video game host lending [10] activities offered by students and faculty, and its newly developed game collection has received donations as a result.

### 4.3  Diversification of Library Game Interaction

The mode of interaction is an important attribute of the game, and the mode of interaction determines the scenario in which the game is used. In other countries, the interaction mode of university library games is mainly through mouse keyboard and joystick, and the usage scenarios are mainly game labs, maker spaces and libraries. In addition to the mouse and keyboard, most of the interaction methods of Chinese university library games are based on the touch interaction method. According to the survey results, 59 universities in China have their library games online in their official library WeChat public website. Players can only use touch devices such as mobile phones or tablets to play the game, in addition to logging in on the computer side.

The mode of interaction is determined by the type of game. The limited types of game services offered by Chinese university libraries limit the choice of game interaction styles available to users [19]. Therefore, the expansion of the choice of game interaction in libraries goes hand in hand with the richness of game genres, and interaction should be an important design element in the design process of

gamification in university libraries. The addition of some new technological tools can greatly enhance the attractiveness of the games, such as 3D, VR technology, holographic projection technology and so on. This requires efforts in game development and design on the one hand, and places higher demands on university libraries in terms of investment in hardware facilities on the other.

### 4.4 Use of Games in Professional Courses

At present, most educational games in university libraries in China are mainly used for orientation or information retrieval literacy education for new students, and there is still a gap in their application in other professional courses. In fact, the use of games in the classroom has long been proven to be an effective educational method, and there are many applications in universities in other countries. Chinese universities can develop and design games for courses where they are available, for example, courses in essay writing, information indexing or game development related subjects are suitable for the use of games as a form of education.

### 4.5 Diversification of Game Designers

The subject of game development determines the concept of a game's development. In addition to developing games on their own or in collaboration with third-party organizations, universities can also encourage students or teachers to participate in the development of games or develop them on their own to enrich the subject of library games [20]. Universities in other countries will involve students in the game development process by holding GameJam game creation events. Chinese universities can link game development with credits or performance points to guide students to participate in the development of library games so that they can experience the games while gaining skills and experience.

### 4.6 Improving the Playability of the Game

The playability of library digital games, that is, the appeal of the games themselves, lies in capturing the interest of the players and avoiding the early appearance of fatigue points [1]. Currently, most library games in Chinese universities are still limited to a list of library guides, and the so-called levels are only simple quiz questions, a phenomenon that has been criticized by scholars. This phenomenon has also been criticised by scholars. Libraries in higher education can improve the playability of the games by enriching the interactive format of the games and adding more popular games such as crossword puzzles, jigsaw puzzles and elimination games. In addition, elements such as current buzzwords or popular IPs can be added to the games to make them more interesting. By making the library games more playable and interesting, players can be fully motivated.

## 5  Conclusion

Gamification is being applied to library services by more and more universities, and many Chinese universities have been practising gamification of library services for some time. But gamification is not simply a pile of game elements, nor should it remain in simple forms such as quizzes and level-breaking. Rather, it should be a unification of the library's own gamification conditions and library service objectives based on the analysis of users' needs. This study investigates the gamification design of 137 "double first-class" university libraries in China, in order to understand the current situation of the construction of gamification services in Chinese university libraries. The results of the survey show that most of the libraries in the "double first-class" universities use gamification services to achieve the functions of orientation education, information skills education and popularization of scientific and cultural knowledge. The types of game-based services include quizzes, quizzing, treasure hunting, etc. The games are also provided through the official website, WeChat public accounts and mobile

library platform. In addition, by comparing the business practice of gamification services with the advanced university libraries in other countries, the room for improvement of gamification services in Chinese university libraries is analyzed. Based on this, six improvement paths are proposed for Chinese university libraries in terms of game types, game service targets, game interaction methods, game applications, game development and game playability. However, this paper only takes 137 "double first-class" university libraries as the research objects, and each university library may have similar or different problems in the construction of library gamification service due to its scale and geographical location, which can be further explored and explored in future studies.

**Conflicts of Interest:** The authors declare that they have no conflicts of interest to report regarding the present study.

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