

# How to Adapt Existing Video Games to Become Educational Games Used to Motivate Students and Help Them form Good Study Habits.

## —Taking The King of Glory as an Example

Dongqing Zhou

<sup>1</sup> Enter Author Affiliation: School of Foreign Languages, Wenzhou University, Zhejiang Province, China  
Corresponding author. Email: 2226045570@qq.com

### ABSTRACT

Game is a promising industry in China, but in the eyes of most parents, games are just obstacles for students to learn. With the rapid development of information network technology, the traditional school education as the center of the era has come to an end and human society has stepped into the realization of the all-around integration of human, education, life "post-education era". Educational games try to return the development of learners to the natural form of human development and respect the natural law of human development. This paper will take the game "Be your own King" model adapted from "The King Of Glory" as an example to discuss how to adapt existing games, analyze and rationally use the game mechanism in popular games, and make it serve for education, which will have a positive guiding effect on the market and researchers. "Be Your Own King" is a game to cultivate the learning habits of the target group aged 13-18. Through the rules and experience of the game, it guides students to develop the learning habits of review, question making, and summary, forming a virtuous circle and stimulating the inner driving force of learning.

**Keywords:** Digital Games, Game-based Learning, Inner Motivation For Learning, Learning Habits.

### 1. INTRODUCTION

On July 20, 2021, China Internet Network Information Center (CNNIC) released the "2020 Research Report on Internet Use of Minors in China". The number of underage Internet users in China reached 183 million in 2020, and the Internet penetration rate was 94.9 percent, up 1.8 percentage points from 2019, according to the report. Quite a large number of minors have been playing online games as an indispensable habit in life. The rise of online games has brought challenges to scholars in the field of education. As a result, the use of games in educational Settings and their use for learning and development has become a trend in the field of education. Educational Game industry Research Report (2004) provided by China Distance Education Market Research Office defines the educational game as "computer game software that can cultivate game users' knowledge, skills, intelligence, emotion, attitude and values, and has certain educational significance. More and more scholars have conducted in-depth studies on the development potential of educational games. Zhao Xi

<sup>[1]</sup>(2012) put forward the advantages of self-learning educational games: they can highlight learners' personality characteristics and promote learners' inquisitive learning. Studies have found no significant gender differences in learning or motivational outcomes in educational games (e.g., Annetta, Magnum, Holmes, Collazo, & Cheng, Cheng. 2009; Papastergiou, 2009)<sup>[2]</sup>, considering the wide range of participants created by games, and their social functions. Advocates argue that games are an ideal medium for learning (Squire, 2011)<sup>[3]</sup>. Based on the theoretical and empirical research evidence outlined above, most of which focuses on analyzing the benefits and potential of gamified learning. Moreover, most of the existing educational game apps serve a specific subject (for example, "PET Pingo" aims to help children better understand a series of concepts in mathematics, and "One Day of the Emperor" guides students to understand traditional historical and cultural traditions) rather than educational games that cultivate a specific learning ability. Therefore, this paper will demonstrate and analyze how to adapt and use game factors in popular games according to existing theories,

create a situation for learning, and achieve the best psychological experience of immersion, so as to guide educators and relevant educational game software developers to design better games for educational work, let students achieve the best learning state of immersion with the help of such educational games. In addition, the positive role of effective game learning mechanisms in developing good learning habits is specifically analyzed to facilitate the development of educational games that foster learning habits by educational game developers

## 2. LITERATURE REVIEW

### 2.1. Gamification

Gamification refers to the integration of game thinking and game mechanics in a non-game environment to guide user interaction and use, thereby increasing audience engagement, loyalty, and enjoyment (Salen & Zimmerman, 2004)<sup>[4]</sup>. Since the process of learning new knowledge or abilities is often considered unpleasant and painful, the integration of game mechanics goes with the flow of human nature. Mihaly Czechoslovakia<sup>[5]</sup> (1900) proposed an optimal state, the state of immersion, and found that many players while playing a game, are fully absorbed in the situation. And filter out all the surrounding irrelevant perception, can complete in peacetime oneself seem impossible to complete the task, accompanied by a sense of pleasure, into the so-called immersion state. In this state, the negative emotions generated in the usual repetitive and boring learning process will be greatly reduced, and the acceptance and understanding of knowledge will be greatly improved. Miller et al.<sup>[6]</sup> (2011) said that games, like aesthetics, pursue freedom. Then from this direction, combined with the immersion theory. People's free choice of games, players' desire to speak, players' desire to express emotions, and players' "immortality" in games prove that players are addicted to games because they want to pursue the peak experience brought by free games all the time -- that is, self-realization.

### 2.2. Game-based Learning

Hogle<sup>[7]</sup> (1996) once proposed the advantages of game-based learning: enhancing visual experience, stimulating the brain, extending the retention time of memory, providing more opportunities for practice and application, and guiding students to form higher-level thinking. Generally speaking, in terms of knowledge point memory, the carrier on which knowledge point appears will directly affect learners' memory effect. Prensky<sup>[8]</sup> (2005) believes that educational games can train your skills, improve your attention and stimulate learning motivation, which plays a very important role in the teaching process of teachers. (Ni Qiyu, & Liu Lili, 2009)<sup>[9]</sup> proposed that learning-based game design significantly reduces cognitive load. In the traditional

classroom learning model, if students do not have strong learning motivation as support, attention deficit is easy to occur. Game-based learning can mobilize learning enthusiasm through the rational use of positive factors in the game mechanism, to reduce cognitive burden. Zhao Xi<sup>[1]</sup> (2012) proposed the advantages of self-study educational games: they can highlight learners' personality characteristics, promote learners' curiosity learning, help learners to achieve self-realization, and enhance their sense of self-efficacy.

### 2.3. Inner Motivation

Motivation is an internal process or internal psychological state that stimulates individuals to engage in learning activities, maintains the learning activities that have been elicited, and moves learning behaviors toward certain goals. High school students with high learning motivation may feel the happiness brought by active learning. <sup>[10]</sup>(Wang Tian, Liu Enlightenment, Luo Haifeng, Liu Jian, 2021). (J.S. Bruner, 1963)<sup>[11]</sup> emphasizes the role of "intrinsic motivation" and holds that intrinsic motivation is the real power to promote learning. Since then, attention has been paid to the effect of intrinsic motivation on learning. Muis<sup>[12]</sup> (2014) believes that for students with strong intrinsic motivation to learn, the learning process can be regarded as relaxing and enjoyable. The knowledge acquired by learning can satisfy one's thirst for knowledge and reflect one's social value. Yang Jiawei<sup>[13]</sup> (2020) proposed strategies to stimulate high school students' learning motivation. First of all, students should have a reasonable positioning for themselves, do not rush to achieve, the goal should be appropriate, step by step set. The students at the same level and the students of the same age should have a better incentive effect, and the school should establish a reasonable evaluation system. Eccles, Wigfield, and Sichir<sup>[14]</sup> (1998) argue that contemporary theories of achievement motivation can be structured around three questions that students ask when faced with learning tasks: "Can I do it? Do I have to do this? Why?" "And" What do I need to do to succeed? Current motivational theories include expected value theory <sup>[15]</sup>(Wigfield and Eccles, 2000b), self-determination theory <sup>[16]</sup>(Ryan Deci, 2000b), self-efficacy theory <sup>[17]</sup>(Schenk, 1991), attribution theory <sup>[18]</sup>(Weiner, 2012), Achievement goal-oriented Theory <sup>[19]</sup>(Ames and Archer Theory, 1988) and theory of Interest<sup>[20]</sup>(Schienele, 1991).

### 2.4. Learning Habits

Habit is a tenacious, powerful force that can dominate life. Learning habit is a kind of automatic learning tendency formed by students to achieve good learning results. Huo Yanyan<sup>[21]</sup> (2018) points out that students' inner motivation for learning may come from ideals and beliefs, hobbies or habits. Therefore, if the students' internal motivation for learning can be stably stimulated

for a long time, and it can be consolidated into a habit, which will stimulate the internal motivation for learning again, to form a virtuous circle of learning.

### 3. RULES DESIGN

#### 3.1. Theories Based

Plass et al.<sup>[22]</sup> (2015) concluded that game design and game research need to combine cognitive, motivational, emotional, and sociocultural perspectives.

Cognitive factors: Piaget<sup>[23]</sup> (1962) described the game as an integral part of children's cognitive development, and as children develop, becomes correspondingly more abstract, symbolic and social. And it can be used in in-game design in the form of constructing game and learning mechanics, media Design, Support Features, and Feedback <sup>[22]</sup>(Plass et al., 2015).

Motivational factors: Motivational features in games are incentive structures such as stars, points, leaders, boards, badges, trophies, and game mechanics and activities that the player likes or is interested in.(Hidi & Renninger, 2006).

Emotional factors: There are two methods of inducing emotion, one comes from the representation of information and the other generates from game mechanics. <sup>[25]</sup>(Plass & Kaplan, 2015).

Sociocultural factors: Social interactions and activities provided by games tend to enhance learning <sup>[26]</sup>(Squire, 2006,; Ito et al., 2008).

#### 3.2. Rules

First of all, there are two modes: single-mode and multiplayer mode. In single-player mode, it is man-machine battle mode. Players can choose the subjects they want to learn. The system will recommend the appropriate difficulty according to the player's previous learning record, and players can also choose according to their situation. In multiplayer mode, the three-person group is automatically assigned by the system according to the player's level, so that the ability level of the two teams will be controlled with reasonable range. The game process can be roughly divided into two stages. In the first stage, players independently choose the route (divided into upper, middle, and lower). When they meet opponents, a 3-minute "knowledge memory competition of the day" begins. In this link, players who answer more correct questions within the specified time can enter the "wild area" in advance to fight monsters, while another player who answers fewer correct questions can also enter the wild area in 15 seconds. In the second stage, the player's direct confrontation object changes from the opposing player to a monster. The monster is divided into two levels. The first category is the Dragon King. Players

need to answer three questions correctly in a row to get the corresponding three points. The second category of monsters (except the Dragon King) only needs to answer two questions correctly in a row to get the corresponding two points. It should be noted that the game time at this stage is 5 minutes, and a double score will be calculated at the end of the time. The team with the highest scores wins, and each team is awarded MVP based on individual scores. Here, the game part is over, but after the score settlement and MPV peer evaluation results come out, there will also be a learning report generated for individuals. The report will roughly involve three aspects, the collection and analysis of wrong questions, the summary of weak knowledge points, and the recommendation of human-computer review mode.



Figure 1 The overall map of Be Your Own King



Figure 2 The six characters you can choose before the game

#### 3.3. Three Periods For Learning

The process of learning can be divided into three-part.

Students review relevant knowledge in class independently to prepare for entering the game.

Students play the hero role they choose to enter the virtual world created by the game for gamification learning, which is called the gamification learning stage.

Students reflect and summarize according to the personal learning report automatically generated by the system. This stage is called the reflection and summary stage.

### 3.4. Three Steps In The Virtual World Created By The Game For Gamification Learning

In the first stage, the players will be examined in the form of fill-in-the-blank questions for the degree of mastery of the day's knowledge, usually involving more basic and simple knowledge, which is required to be mastered by students of all levels, players will start answering the questions at the same time, and after the three-minute countdown, the player who answers more questions correctly can have the right to enter the second stage of the game 15 seconds earlier than another player, and these 15 seconds will not be included in the five minutes of the second stage.



Figure 3 “Daily knowledge recall contest”

In the second stage, the Dragon King will be the demonstration object, so that everyone can better understand more rules and show more details of the game in this session. First of all, there are three kinds of monsters in the game, which can be divided into two categories according to the corresponding points, except for the Dragon King, which is a three-point monster, and the rest are two-point monsters. Each kind of monster has its corresponding attack mode and sound effects, such as the Dragon King's attack mode for the fire, sound effects for the dragon's roar, similarly, each character also has its own attack mode and sound effects. After the Dragon King's fire, players need to start answering questions, in the second stage, the investigation mode becomes multiple-choice questions, and these multiple-choice questions examine the knowledge points from the previous session the player answered correctly, the difficulty is moderate, suitable for 80% of the players. After the player selects the answer, the game character will start to attack the wild monster, in this map, the game character's attack weapon is the fan, and its attack sound is the sound of the fan opening and closing, if the player answers correctly, the dragon king will be "injured" due to the player's attack, the game continues, until the player answers all questions correctly in a row, the wild monster will disappear. On this map, if the player fails to answer all the questions correctly in a row, the confrontation with the monster will automatically end.



Figure 4 “Compete with monsters”

The report will roughly involve three aspects, the collection and analysis of wrong questions, the summary of weak knowledge points, and the recommendation of human-computer review mode.

#### Wrong topic parsing

During the old democratic revolution, what was the most fundamental reason for the failure of China's struggle against aggression?

- A. corrupt social system
- B. backward economic and technological
- C. conservative ideology and culture
- D. poor military equipment

【Answer】 A

【Parsing】 From 1840 to 1919, the Chinese people waged a valiant struggle against foreign aggression, but both of them failed because of the corruption of the social system and the backward economy and technology.



Figure 5 “Customized learning report”

## 4. SIMULATION AND ANALYSIS

### 4.1. Similarities And Differences (Between The King Of Glory And Be Your Own King)

#### 4.1.1. Similarities

Firstly, the similar map layout design, in both games, players can choose three paths (divided into upper road, middle road, lower road), the entire large wilderness area by four symmetrically distributed small wilderness area to form the layout of the wilderness, and in the location of the diagonal from left to right there is a river running through it. And each hero has its own proprietary "weapons" and attacking sound effects. Moreover, both of them have reward and punishment mechanisms to enhance player participation. In Be your own king, players log in at least 5 times a week to complete 5 matches, with extra points for exceeding 5 times, and penalties for not logging in 5 times a week. There are rewards for daily logins in Be your own king, and long periods of time without ranked matches will result in a significant drop in segments at the end of a season. Finally, at the end of the game, the winning team and the

best player of the respective team will be generated based on in-game performance.

#### *4.1.2. Difference*

These differences are mainly due to the differences in the nature of these two games. The King Of Glory is a competitive entertainment game, and all the games are designed to increase the number of players and extend their online time by optimizing their experience. In contrast, Be Your Own King is a game for education, which is designed to help players consolidate their daily knowledge, develop good study habits and form internal driving force for learning, in addition to enhancing the player experience to weaken the discomfort of learning and improve the fun of the learning process. First of all, there is a limited range of characters to choose from in Be Your Own King (only 6 characters), and these six characters are characters with ancient Chinese characteristics, which may be added in the future. Players who identify with the game characters have the potential to stimulate positive emotions in the game <sup>[27]</sup>(Hefner et al., Klimmt, & Vorderer, 2007). In this case, a survey about students' favorite characters should be done before making characters for the game. In King of Kings, you must kill as many monsters and opponents as possible to earn money and increase your combat power, but in Be Your Own King, it looks like you are fighting opponents with wild monsters, but players can only become more familiar with the points taught by the teacher in today's class so that you can defeat your opponents and gain access to the "wilderness" 15 seconds earlier. Then, the next process (fighting monsters) tests the ability to flexibly use the knowledge points to solve the problem in question. In other words, be your own king is just the shell of the game of glory of kings, injected with the soul of educational learning.

#### ***4.2. The Reason For Choosing Teenagers Aged From 13-18 As The Main Target Group***

Their study pressure is relatively higher than pupils and college students.

The courses of middle and high school require a higher proficiency of knowledge points. Forming a good learning habit is necessary and would benefit their further study life.

A great number of High school students have a strong sense of curiosity and exploration but weak possessiveness Coupled with the psychological "forbidden fruit effect," simply banning it is not realistic. Therefore, game-based learning would be in need to help them have a smooth transition out of this phase and form the timely learning habit moderately.

#### ***4.3. Game Mechanism Involved In Game-based Learning Mechanism***

The reason for making players interested in it, the sense of achievement brought by immediate feedback (It will indicate whether you have chosen the correct answer by a certain gesture of the monsters). There have been several efforts to identify the specific elements that contribute to engagement and motivation in games, such as incentive systems, visual aesthetics, game mechanics, narrative fantasy, and musical-score.<sup>[28]</sup>(Squire, 2011).

##### *4.3.1. Cognitive Design Factors*

Game mechanics: use their weapon to fight against opponents and monsters (the glory of the king).

Learning mechanics: Players select correct answers to trigger the "attack".

##### *4.3.2. Media Design*

(Liu Jiacen, 2020)<sup>[29]</sup> points out that the game musical sound effect refers to the sound effect of the game plot displayed in the musical performance, which appears along with players' choices and instructions. Different sounds are added according to different scenes and instructions to make the game more expressive and trigger players' immersion experience.

Sound for background, successfully killing the monsters, gaining the priority entering the "wild area".

A lert at the last two minutes and 30 seconds.

"There are 15 seconds for your turn to enter the wild area" —the notification sound for participants who have been defeated in the first stage.

The notification sound to inform each team of victory or defeat in the end.

##### *4.3.3. Support And Help Features*

A short video at the beginning of the game for players to know the rules of the process vividly. Important information: the timer (in red)/The MVP for each group would be highlighted in the ranking board finally /a document which is the summary for each player contains all the knowledge points and problems in today's game, among which the incorrect answers and its explanations would be marked in red.

##### *4.3.4. Feedback*

There will be an individually designed summary document based on each player's performance. After the group battles, there will be a single player mode for students to practice. There are two versions for students to choose from. One is a deformed question based on the player's mistakes, and the other is a question with the

appropriate difficulty level matched to the player's current level, focusing on points that the player has never practiced before.

#### **4.3.5. Motivational Design Factors**

Situational interest in the activity (Vivid battles against monsters and opponents add the pleasure of the review process).

Challenge: familiarity of knowledge points and you ought to be careful using your knowledge to cope with the problems.

Aesthetic Design: the design of the atlas involves birds, fishes, bridges, grass (all in warm colors) and all characters show no sharp angle in their bodies. Both warm colors and round shapes were individually capable of promoting comprehension. <sup>[30]</sup>(Plass, Heidig, Hayward, Homer, & Um, 2014). Besides, the atlas itself has a sense of beauty because it could be divided into four symmetrical regions which are called symmetry.

Social-cultural factors: Gain the idea from a popular Chinese digital game *The glory of the king*. The Chinese elements can be easily seen in the game, for example, all the characters are in Chinese traditional customs, the "weapon" for each character, etc.

#### **4.4. The Promotion Of Inner Motivation For Learning**

Self-determination theory <sup>[31]</sup>(Ryan et al., 2006) points out that self-regulated behavior originally comes from the relationship without intrinsic motivation. Only with the internalization of the value of learning activities, external regulation gradually becomes internal regulation and intrinsic motivation can promote people's behavior more. (Challenge of task) and relationship (approval of others) promote the integration and internalization of intrinsic motivation on the premise of supporting autonomy.

##### **4.4.1. The Challenge Of Task**

A high requirement of familiarity of the knowledge, because you need to gain the priority to enter the wildlife area in a limited time.

Players select correct answers to trigger the "attack" based on knowledge gained from today's class.

#### **4.5. The Development Of Good Learning Habits Involved In Be Your Own King**

The main process of this game is divided into three parts, the first in the competition with classmates. The second is the competition with monsters, which can be understood as the flexible use of knowledge points mastered in class. And the questions in the second stage

are usually based on the knowledge presented in part 1. In the final feedback phase, students' learning reports are generated. The knowledge points used in the topic will be mentioned in the report. These three steps reflect the correct learning sequence of students after class. It is a good learning habit to integrate knowledge points and review them before doing exercises. Through the game's reward and punishment system as well as the points system, students will gradually understand that only by being familiar with knowledge points and making flexible use of knowledge points can they get high scores. This mechanism can guide students to develop good learning habits—(review, question making, and summary) in their daily study.

#### **4.6. Evaluations System—Forming A Dynamic Assessment (JanL. Plass, Bruce D. Homer & Charles K. Kinzer, 2016)**

In the context of learning, the goal of a good game is to be in the player's immediate development zone. Jan L. Plass, Bruce D. Homer Charles K. Kinzer<sup>[32]</sup> (2016). The concept of a recent development area comes from Vygotsky (1978). He described the play as a "dominant factor" in child development and argued that an important role of play is to create a zone of proximal development for children. Therefore, it is important to enable students at different levels to learn effectively and stimulate their maximum development possibilities. Will give them a match with a similar ability. Students are also free to choose their opponents. But in the first stage of the game session, the key knowledge is reviewed. The questions are the same, and this part is usually very basic and key, which all students need to understand clearly. The difference is in the second stage (answering questions). Depending on the level of the student, the system will assign questions that are a little higher in their ability range, but most of them are still within their ability range.

## **5. CONCLUSION**

Not all motivations inspired by the above game design factors are motivations for learning. For educational games, students' subjective motivations are not necessarily for learning, but may be for fun, challenge, curiosity, communication, leisure and other purposes. In order to objectively and comprehensively evaluate educational games and to allow game designers to design games in such a way that as many other aspects of motivation as possible are transformed into real motivations related to learning, a scientific and high-level comprehensive evaluation system for educational games is necessary as soon as possible. The biggest shortcoming of this paper is that the educational game *Be Your Own King*, which is based on existing theories, is only at the idea stage. Therefore, the game can only be explained and analysed based on existing data and theories on the construction of educational games, such as the game

mechanisms and learning mechanisms that need to be constructed for educational games and how to stimulate internal motivation for learning. There is no way to verify whether this educational game can stimulate students' internal drive for learning and achieve the development of students' learning habits. However, this paper takes the popular game, King of Glory, as an example and analyses it with the existing theories about educational games to guide educational game developers to analyse and apply the factors in the popular game, cleverly integrating it with the purpose of education, bringing education in line with the times, realising the integration of games and education and changing people's single perception of games to a certain extent.

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