

Immersion in open-world games based on Grounded theory -- A case study of Genshin Impact

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Abstract. In recent years, with the expansion of the game market and the rapid growth of game users, the game market has great potential. At the same time, open world games are loved by the vast majority of users. [Purpose/Significance] Explore the factors that affect the immersion of players in open world games, drive the improvement of the quality of open world games, help improve the industrial ecology, and achieve richer functional values. [Research design/Methods] Taking the open world adventure role-playing game "Genshin Impact" as a case study, semi-structured interview was used to obtain first-hand interview data, and coded research was conducted using grounded theory. Through several processes such as open coding, spindle coding, selective coding and theoretical saturation testing, the corresponding theoretical model is finally formed. [Conclusion/Finding] The results show that the basic feature of immersion performance is concentration. The two factors, the in-game condition and the out-of-game condition, together constitute the pre-factors that produce immersion. After entering the state of immersion, the main performance is to produce tension and emotional resonance. [Innovation/Value] builds a theoretical model for the generation of immersion in open world games, which lays a theoretical foundation for future theoretical model testing and empirical research.

Keywords: Open world games, immersion, grounded theory, Genshin Impact.

1. Introduction

With the continuous progress of science and technology and the rapid development of game technology, electronic games have become an important form of entertainment and culture in modern society. However, the actual sales revenue of China's game market in 2022 was 265.884 billion yuan, down 10.33% year-on-year. The number of game users was 664 million, down 0.33% year-on-year. After a significant slowdown in size growth in 2021, it declined for the first time in the past eight years. In 2022, the actual sales revenue of independently developed games in the domestic market was 222.377 billion yuan, down 13.07% year-on-year. It indicates that industrial development has entered the era of stock market. As China's population is growing steadily and the scale of game users is becoming saturated, it is difficult to continue to promote the growth of the game industry by demographic dividend. The incremental market has bottomed out, and the competition in the stock market will become increasingly fierce, and the precipitation of users in the industry will become the key to development. However, there are relatively few researches on the immersion of game users in China, which leads to the limitations of product development and practical application in the upstream of the game industry, and the multidimensional needs of players cannot be effectively met. Therefore, how to motivate users to contribute to the game market will be a question worth thinking about.

As a new game genre, open world games have attracted a large number of players and become an important part of the game industry. Open world games are popular with players for their vast game worlds, high degree of freedom of gameplay, and rich variety of missions and activities. In the 47th report of China Internet Network Information Center (CNNIC), the open world adventure game represented by Genshin Impact was especially mentioned, which creatively combined the open world mechanism with online games and mobile games to bring novel game experience to domestic and foreign players [1].

However, while open-world games offer a vast amount of space and freedom to explore, it can be a challenge to get players to truly immerse themselves in the game world. Immersion makes the player



completely immersed in the game, concentrating on the experience, forgetting their own existence, and having an emotional resonance with the game world. It is an important indicator of game quality and user experience [2]. Therefore, it is important to conduct in-depth research on the immersive experience of open world games. In particular, an in-depth analysis of the game design, game world construction, and application of game mechanics in open world games such as the original God, which has received much attention and been widely discussed, can reveal the key elements of creating immersion and provide valuable guidance and enlightenment for game developers. In addition, the study of the immersive experience of open world games is also important for the development of the game industry. As competition intensifies in the game market, game developers need to constantly explore innovative game design concepts and mechanics to meet the needs and expectations of players. A deeper understanding of the immersive experience of open-world games can provide guidance to game developers to help them design more engaging, highly immersive games. To sum up, it is of great theoretical and practical significance to study the immersive experience of open world games. Through the in-depth analysis of the original God as an example, we can gain insight into the key elements of creating immersion in open world games, and provide useful references and enlightenment for the development of game developers and the game industry.

2. Research Design

2.1. Grounded Theory

It is generally believed that for an emerging field lacking in research and theory, it is a relatively robust research path to conduct qualitative research first and then quantitative research based on exploratory results of qualitative research [3]. Among them, grounded theory is the most systematic and widely used qualitative research method [4]. Grounded theory is a commonly used method in qualitative research. It was first proposed by Glaser et al in 1967, arguing that problems arise naturally from situations, and models and theories can be obtained by continuous abstraction and conceptualization based on the original data behind a certain problem or phenomenon [5].

Grounded theory research is a dynamic research process, which has both a very standardized research process and corresponding dynamic adjustment according to research progress. Based on the above exploration and discussion of the research methods of grounded theory, the research process of this paper is mainly divided into the following five steps: generation of research questions, data collection, data analysis, theory construction and theory elaboration.

I. Condensing and determining research questions is crucial for scientific research, especially for grounded theory research. Through reviewing and combing literature related to open-world games and immersion, research questions gradually become clear: 1. The antecedents of immersion, that is, under what conditions will game players be immersed; 2. Immersive experience, that is, how you feel after feeling immersed.

II. Data collection: After the research question is generated, it is necessary to enter the relevant environment to obtain relevant data. The sources and channels of data include second-hand data crawled from the Internet, or first-hand data obtained through interviews, questionnaires and other ways.

III. Data analysis: that is, data is substantively encoded [6]. Data analysis in this study is mainly carried out according to the research process of grounded theory.

IV. Theoretical construction: that is, theoretical coding of data [7], mainly for the construction and improvement of theoretical models.

V. Theoretical sorting: the constructed model is stated and explained.

2.2. Data Collection

In this study, semi-structured interviews were used to conduct one-on-one in-depth interviews with participants. The interviewees are of different occupations, genders, ages and educational backgrounds. They have a certain understanding of online games, and have a certain degree of game participation and experience in Genshin Impact. Through acquaintance recruitment, five participants were recruited for interview research, including three college students, one freelancer, and one high school teacher. Two of them were men and three were women. All are between 20 and 30 years old, which is in line with the age of the Genshin Impact user base. Most have a bachelor's degree or above.

The interview was semi-structured, and the interview time was roughly controlled within 10-20 minutes. The interview content mainly included two parts. The first part was to ask the interviewees about their participation in the Genshin Impact. The second was to focus on asking the interviewees about immersion, first asking the players what was their most immersive experience while playing Genshin Impact. While the follow-up questions depended on the direction of each person's discussion, all participants were asked to give their own definition of immersion, whether they had an experience where they had been prevented from feeling immersive, whether they had done anything in the past to enhance immersion, and whether immersion was important to them. During the interview process, some videos or news about Genshin Impact can be supplemented to arouse the perception of the interviewees.

Table 1. Basic Information Of Interviewees

Respondent number	Gender	Age	Profession	Playing years (years)	Average daily online (hours)
1	M	23	master	2	7
2	F	23	undergraduate	2	5
3	M	23	master	3	6
4	F	22	master	3	3
5	F	27	senior	3	8

2.3. Theoretical Model Construction

In the process of data analysis, this paper adopts the three-stage analysis method based on the rooted theory, and gradually conceptualizes, categorizes and core categorizes the data obtained from the interview according to the process from open coding to spindle coding and then to selective coding.

2.3.1. Open Coding

In open coding, researchers should keep an open mind and try their best to get rid of the constraints of personal bias, subjective experience and academic opinion, and encode all data according to their own state [8]. It is a process of breaking up collected data, conceptualizing and abstracting it through constant comparison, and then reassembling it in new ways. The purpose of open coding is to discover and name concepts and categories from source data.

In this study, the author conceptualized and categorized the original data by manual coding. After sorting and sorting out the collected data, the author conducted open coding in four steps, including concept formation and category extraction, through summarizing and summarizing, labeling and other operations. Through continuous conceptualization and abstraction, 13 concepts and 4 categories were finally extracted, as shown in Table 2. As the open coding process is too cumbersome, part of the process is shown in Table 3.

Table 2. Open Encoding Result Table

Category	Concept
B1 In-game conditions	A1 degrees of freedom, A2 graphics and music, A3 rich characters, A4 social interaction, A5 mission accomplishment, A7 mechanics
B2 out-of-game conditions	A6 Self-learning, A10 game equipment, A11 game environment
B3 Focus	A9 forget time, A13 forget reality
B4 Perceptual feedback	A8 tension, A12 emotional resonance

Table 3. Partially Open Coding Process

Source	Concept
Freedom gives me a sense of being there. I can choose where I want to go, and that freedom makes me feel like I'm actually in this virtual world, right	A1 degrees of freedom
There are so many colorful characters in the game, each with their own backstory and personality traits, and this emotional connection strengthened my sense of engagement with the game	A3 rich characters
In the original God, I can team up with other players to explore and fight together. This collaborative interaction made me feel involved, there was a sense of co-creation and co-experience	A4 social interaction
I've also tried playing in a quiet, comfortable environment to avoid distractions and increase concentration. I also adjust the game time, choosing to play in the evening or in the morning so that I can enjoy the atmosphere and story of the game better	A11 game environment
In order to better understand the world of the game, I look up relevant materials, watch video commentary by game developers, and even participate in discussion communities so that I can better understand the plot and the relationships between the characters in the game	A6 Self-learning
When I am immersed in the game, during the process of fighting monsters, if I am in a disadvantageous situation, I will feel nervous, palms will sweat and feel short of breath	A8 tension
This engagement gives me a deeper sense of interest and engagement in the game, as well as enhancing my emotional experience and empathy	A12 emotional resonance
I would choose to use headphones for a better sound experience. Through the headset, I can hear the detailed sound effects and ambient sounds in the game more clearly, which makes the game world more realistic	A10 game equipment

2.3.2. Spindle Coding

At this stage, through the collation and classification of open codes, they begin to be reduced to more specific and organized themes and concepts. Researchers correlate and organize open codes to find the relationship and hierarchy among them, and thus dig out the main category [9]. The researchers set out to build a preliminary theoretical framework and compare and contrast the data against this framework to further develop the theory. This process may involve recoding, reclassifying, and reorganizing open codes.

According to the research objectives and the characteristics of the research objects, the four categories obtained in the open coding stage were summarized and clustered, and finally three main categories were formed: C1 immersion conditions, C2 immersion performance and C3 post-immersion behavior.

2.3.3. Selective Coding

Finally, selective coding is performed to select the most important and critical concepts and topics through further in-depth and precise analysis of the data, and integrate them into a complete theoretical model. Researchers need to consider the relationship between concepts, causality and the internal logic of the theory, so as to form the relationship between the three main categories, further dig out the core category, and systematically connect the core category with other categories by describing the "story line" of the studied phenomenon [9]. The goal of selective coding is to develop an interpretive and applicable theory that can explain phenomena and relationships in the data and provide answers to research questions.

Through repeated comparison and reflection on the three main categories of immersion condition, immersion performance and post-immersion behavior, this research finds that each main category revolves around the immersion of open world games, so "immersion of open world games" is identified as the core category. Thus, the story line around this core category is as follows: In the current prevalence of open world games, players are affected by the conditions of immersion (in-game conditions and out-of-game conditions), and the individual displays the corresponding performance of immersion (concentration), which leads to a series of potential consequences (perceptual feedback), as shown in Figure 1:

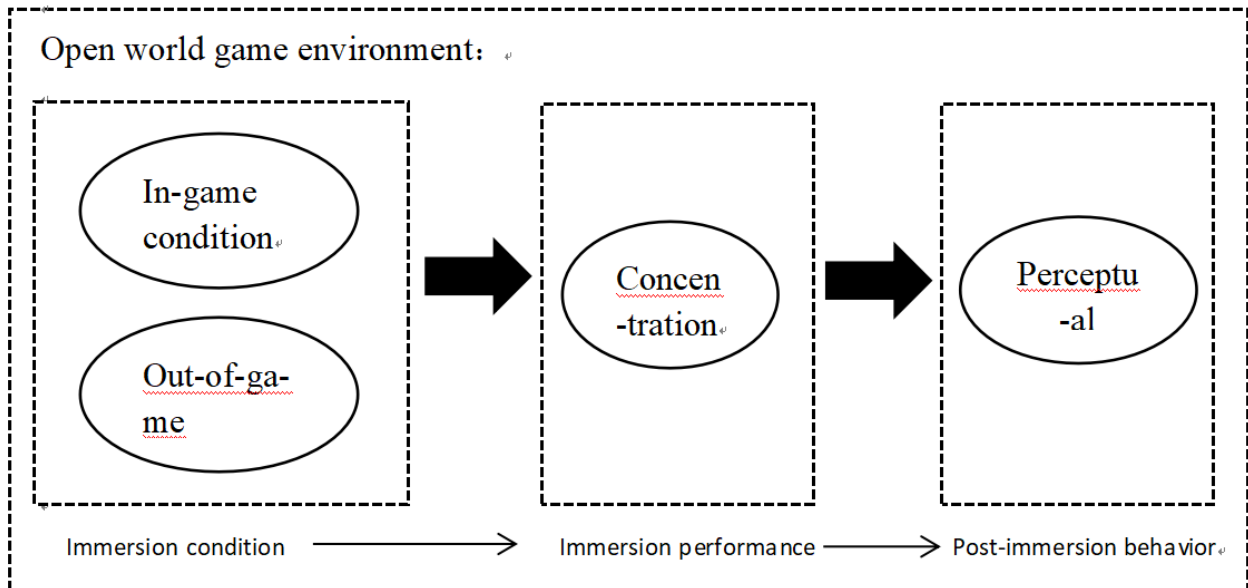


Figure 1. A theoretical model of immersion in an open world game environment

Color figures are welcome for the online version of the journal. Generally, these figures will be reduced to black and white for the print version. Authors should indicate on the checklist if they wish to have them printed in full color and make the necessary payments in advance.

3. Model Exposition And Research Findings

When analyzing the data, it became clear that when the discussion was immersed in Genshin Impact, the interviewer talked about two different aspects. Some interviewees, when describing their experience with Genshin Impact, chose to detail which features they found helpful in achieving immersion. These interviewees do not seem to care about the definition of immersion itself, only the factors that influence it. Other interviewees, however, chose to share their feelings when playing Genshin Impact and described how they felt immersed in the game. The purpose of these interviewees is not to focus on the aspects that contribute to immersion, but to describe and explore their own behavior after immersion. Thus, our theoretical generation yields two main categories: (1) Conditions under which immersion occurs - factors required for immersion to occur, such as the characteristics

of the game and the behavior of the player. (2) Post-immersion behavior - that is, after the player enters the state of immersion, describe the relevant behavior that he has shown.

3.1. Immersion Performance

Concentration (B3) is an important feature of immersion performance, and concentration can be defined as an individual's ability to consciously focus attention on a specific task, goal, or experience. It is a state of mind in which the individual is completely immersed in the current activity, free of distractions and external distractions, and able to focus continuously for a period of time in order to complete the desired work or experience. As a result, losing track of time (A9) is fairly common when playing open-world games. As Respondent # 2 stated, "Immersion allows me to completely immerse myself in the game world, immersing me through different sensory sensations to the point where I don't notice the passage of time". Unreality (A13) refers to a state of immersion in which one completely places oneself in the game world, uninfluenced by the real world. Because concentration is usually manifested by a high degree of focus on a task, the realization of a state of flow, and a clear awareness of details and goals. In a focused state, individuals typically reduce distractions from external stimuli and filter information through selective attention, keeping attention highly focused on critical tasks or goals. As respondent 1 stated, "You can forget the reality of your surroundings. Immersion allows me to feel the story, characters, and situations in the game, giving me a sense of being there. It takes my mind off the stresses and worries of real life and provides a sense of escape and relaxation."

3.2. Immersion Condition

The pre-occurrence conditions of immersion behavior can be summarized into two aspects: in-game conditions and out-of-game conditions.

3.2.1. In-game Condition

In-game conditions describe the inherent properties of the game that the game designer intentionally includes. This can describe, for example, the mechanics or art of a game. Other players described how the game's auditory and visual qualities helped them become immersed. As shown in the concept: freedom (A1), graphics and music (A2), rich characters (A3), social interaction (A4), mission accomplishment (A5), mechanics (A7). Freedom refers to the autonomy and variety of decisions and actions the player has within the game. It measures the number and variety of options and paths the player can freely choose in the game world. Freedom can be divided into many aspects, such as exploration freedom, role freedom, creative freedom and so on. The higher degree of freedom can stimulate the player's desire to explore and creativity, providing more personalized experiences and decision-making space. As respondent 1 said, "Freedom gives me a sense of being there, and this freedom makes me feel like I am really in this virtual world." The picture and music make people feel immersed through the visual and auditory senses. Rich characters, through the dialogue with the characters and the development of the mission plot, you can understand them more deeply and establish an emotional connection with them. Thus enhancing the sense of investment in the game, resulting in a sense of immersion. Social interaction refers to the ability and opportunity for players to communicate, cooperate, or compete with other players in a game, as respondent 1 stated, "Social interaction enhances my gaming experience and makes me feel less of a lone adventurer." Sharing in-game experiences and achievements with other players, exchanging strategies and skills, builds a sense of shared experience and identity that creates immersion." As Respondent 4 stated, "There are so many quests, challenges, and achievements to complete in the original God that I feel a sense of accomplishment and satisfaction as I gradually unlock new areas, characters, and story lines. This gradual progression and reward system motivates me to continue to explore and engage with the game, while also making me feel immersed." Mechanics refers to the rules, systems, and interactive elements of open-world game design that together determine how the game works, how it is played, and how it is challenged. Game mechanics are an important tool that game designers use to achieve game goals, guide player behavior, and create game experiences. The exploration mechanics in

Original God can stimulate the player's curiosity and make the player feel fulfilled and engaged in the process of exploration, thus creating a sense of immersion. The combat mechanic is an intense and fun combat experience that allows the player to become more deeply involved in the game and to feel immersed.

3.2.2. Out-game Condition

Out-of-game conditions describe factors that affect gameplay that are beyond the control of the game designer. This usually refers to some objective factor outside of the game. This includes self-learning (A6), gaming equipment (A10), and gaming environment (A11). Self-learning refers to doing some additional research outside of the game to understand the backstory and cultural setting of the game. As Respondent 2 said, "In order to better understand the world of the game, I consult relevant materials, watch video commentary by game developers, and even participate in relevant discussion communities so that I can better understand the plot and the relationship between the characters in the game, and these measures and additional efforts help me to become more deeply involved in the world of the Genshin Impact." Gaming equipment refers to game-related equipment, such as mice, keyboards, headphones, etc. Interviewee 1 said, "I would choose to use headphones for a better sound experience. Through the headset, I can hear the detailed sound effects and ambient sounds in the game more clearly, which makes the game world more realistic "and creates a sense of immersion. The game environment here is not the in-game environment, but the real environment that the player is in. Respondent 1 said that playing in a quiet environment can avoid distractions and increase concentration. By adjusting the game time, choose to play the game in the evening or in the morning, so that you can better enjoy the atmosphere and story of the game, so that the player has a sense of immersion.

3.2.3. Post-immersion Behavior

Post-immersion behavior refers to the behavior of the player after entering the state of immersion. According to the above summary, there are mainly two aspects, tension (A8) and emotional resonance (A12). Tension refers to that after the player enters the immersion state, when entering the battle link, they will be too invested and imagine that they are fighting in the world, resulting in nervous performances such as sweating palms and trembling. As interviewee 1 said, "When I am immersed in the game, during the process of fighting monsters, if I am at a disadvantage, I will feel nervous, palms will sweat and feel short of breath." Empathy is the ability to empathize emotionally with the characters and the story in the game. Interviewee 2 said, "Immersion not only allows me to enjoy the game, but also increases my sense of engagement and engagement. When I feel the details, atmosphere and emotion of the game world, I become more involved in the game and pay more attention to the growth of the characters and the development of the story. This kind of engagement gives me a deeper sense of interest and engagement in the game, as well as enhancing my emotional experience and empathy."

4. Summary

Through the application of grounded theory, this study builds a theoretical model for the generation of immersion in open world games, which lays a theoretical foundation for future theoretical model testing and empirical research. The main conclusions of this study are as follows.

I. The basic feature of immersion performance is concentration. When an individual experiences an open-world game, he is completely immersed in the current activity, eliminating distractions and external distractions, and losing track of time. In the current state, it is common to reduce the interference of external stimuli and filter information through selective attention, thus forgetting reality.

II. In-game conditions and out-of-game conditions together constitute the pre-factor of immersion. According to the analysis results of grounded theory, in-game conditions contain 6 related concepts, and out-of-game conditions contain 3 related concepts. The in-game conditions are the relevant

conditions independently designed by the game designer. By adjusting the in-game mechanism, music screen and other factors, the effect can affect the player's immersion. Outside the game conditions refer to some objective factors, through external intervention can also play a role in affecting the player's immersion.

III. The performance after entering the state of immersion is mainly to produce tension and emotional resonance. Being immersed in the first place gives the player a feeling of being there, which can make the player nervous during combat. Second, immersion causes the player to empathize with the NPCS and the storyline, thus creating emotional resonance.

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