Development of Children's Multiple Intelligence Based on Computer Educational Game Platform

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Abstract. To develop children's intelligence in a joyful way of learning, four kinds of teaching modes for the development of children's multiple intelligence in computer education games were proposed, including guidance mode, diagnosis mode, inquiry mode and practice mode. These four models basically covered the basic forms of computer education games used in teaching. On the basis of constructing a teaching model, a platform for computer educational game was designed around the multiple intelligence theory. The research results showed that the design of teaching model and game platform can play a guiding role in the development of children's multiple intelligence teaching practice. It is concluded that computer education game has a very broad prospect in preschool education.

1. Introduction
Computer games are a great attraction for young children. According to an online survey by Nick Rodion, the American Children's Cable Television Broadcasting Company, 65% of children play games online. In 2000, surveys of children's internet use in five cities in China showed that 62% of children play games online. In other words, more than half of children have close contact with computer games [1]. Therefore, it can be said that computer games have become an important form of game that is popular with young children. The multiple intelligence theory has profound implications for the design and development of educational game and provides a basis for the development of computer gamification teaching [2].

On the basis of previous researches, it tries to explore the application of computer education games to the teaching model from the perspective of developing children's multiple intelligence. The teaching content in primary and secondary schools and teaching schedules are strictly limited, and even higher grades are faced with the pressure of further studies. Therefore, whether from the perspective of teachers or from the perspective of students, they need to try a new type of teaching form. In particular, computer games that once were denied by everyone are still more difficult [3]. Therefore, this article attempts to study this topic from preschool children. Starting from multiple intelligence theory, this issue is studied from the nature of children's game.

2. Literature review
In recent years, the educational value of computer games has begun to attract the attention of all parties, and a number of stand-alone educational software and gamification learning platforms have emerged [4]. However, domestic computer gamification teaching has just emerged, and its related research has
only just begun and is in a very immature stage [5]. On the one hand, the lack of game products is mostly directed at young children, and some games are difficult to support game teaching smoothly. On the other hand, related teaching theories, method support, teaching modes and teaching strategies of computer gamification teaching have not yet formed systematically research results.

In 1985, the United States compiled a computer game software called *Where is Carmen Santiago in the world?*. This popular software has become a pioneer in the integration of education and entertainment. Experts and scholars around the world have conducted a lot of experimental research on computer games, and the University of Texas has developed computer games that can be applied to teaching, business and government work [6]. In 1998, the college set up a program called EnterTech, which used the simulation software to educate a group of welfare-care recipients about the initial vocational skills and achieved unexpected success. In the United States, a new research - the Serious Game [7] was raised in 2004. The game uses computer games that originally belong to pure entertainment in the fields of education, medicine, training, situational simulation, propaganda, defense and opinion polls. But it still has the entertainment of game [8].

3. Methodology

3.1. Multiple intelligence theory
Dr. Gardiner has been studying for many years in the development of human cognitive ability. In the *Mind Framework* published in 1983, his “Multiple Intelligence Theory” strengthened his cross-cultural perspective on human cognition. He believes that in addition to the two basic intelligences of speech-language intelligence and logic-mathematical intelligence, there are six other kinds of intelligence. They are visual-spatial intelligence, music-rhythm intelligence, body-sports intelligence, interpersonal-communication intelligence, self-reflection intelligence, natural observation intelligence.

3.2. Situational cognition theory
Situational cognition theory is a hot topic in the field of contemporary western learning theory. It is another important research direction after the behavioral “stimulus-response” learning theory and the “information processing” learning theory of cognitive psychology following animal behavior research modeling. Since the late 1980s, situational cognition has become an important learning theory that can provide meaningful learning and promote the transformation of knowledge into real life situations. Situational cognitive theory believes that learning is to obtain a lot of factual knowledge. In addition, the formation of personal knowledge structure comes from the general cultural practice in a certain social context. Learning requires learners to participate in genuine cultural practices. The research shows that the knowledge gained in a particular situation is more useful than the so-called general knowledge.

3.3. Incentive theory
Incentives, as an act of mobilizing people's enthusiasm, have existed since ancient times. As long as there is a certain population, there are incentives to be active in strong or weak way. In various activities such as education and games, incentives also occupy a pivotal position. They only use different expression ways. The motivation in education is to study how to improve learners’ motivation for learning and how to obtain the best learning outcomes. For games, motivation is the playability of the game, that is, how to make the player enjoy the game.

3.4. Immersion theory
Immersion theory points out that challenges and skills are the main factors that affect immersion. If the challenge is too high, users will lack control over the environment, causing anxiety or frustration. Conversely, the challenge is too low and users will become bored and lose interest. Immersion mainly occurs in the balance between the two. In 1985, Massimini discovered that when challenges and
techniques must be to a certain extent, immersive experience can happen. When both are low, the user's mentality is indifferent.

4. Results and discussion

4.1. Computer game guide model

The computer game guide model aims to guide children to acquire new knowledge, consolidate and migrate the old and new knowledge through the computer games. In addition, teachers provide face-to-face guidance. In the whole process of learning, computer games have taken on the responsibility of half the teachers and provided guidance and assistance to children. Children can learn from the in-game book, sage or teacher, or actively explore the learning under their guidance. Meanwhile, student can use the knowledge and skills they have learned to complete the game. Teachers' guidance and help in class will improve the learning effect. The practical process of computer game mode is shown in figure 1.

![Figure 1. The practical process of computer game guidance mode](image)

Based on the multiple intelligence theory, this paper discusses the application mode of computer education games in teaching. Therefore, it is necessary to closely surround the multiple intelligence theory to develop children's multiple intelligence and to develop game teaching from the perspective of multiple intelligence. The structural diagram of gamification teaching based on the multiple-intelligence theory guide model is shown in figure 2.

![Figure 2. Schematic diagram of the guide mode of computer education games](image)
4.2. Computer game diagnostic mode
Children's diagnosis and evaluation of learning effects through educational games can also serve to test and consolidate knowledge. When carrying out diagnostic teaching, it is also necessary to select educational games. The way to play games can be single-player games that are played against time, or multiplayer games that can be played against other students. Teachers can understand the level of children’s mastery by checking the status of each game. If the children are well mastered, the teachers can be summarized for the next stage of teaching. If there is some lack of knowledge, teachers can make timely remedial teaching. The practical process of computer game diagnosis mode is shown in figure 3.

![Figure 3. The practical process of computer game diagnosis model](image)

4.3. Computer game inquiry mode
The essence of the computer game inquiry mode is not to directly inform children about the concepts and cognitive strategies that constitute teaching goals. Instead, teachers use computer games to create an intellectual environment that enables children to discover the discipline's content elements and cognitive strategies through inquiry. The practical process of computer game inquiry mode is shown in figure 4.

![Figure 4. The practical process of computer game inquiry model](image)
The use of computer game inquiry mode also needs to focus on the development of children's multiple intelligence. Although there are not many games available for exploration, this model is a very suitable way to improve children's independent exploration ability. This article only uses a limited number of game cases for application analysis.

4.4. Computer game practice mode

Computer game practice mode is designed to enable children to use computer games to carry out game exercises to achieve the purpose of consolidating knowledge and evaluating the effect of learning. Exercises are repeated responses to learning tasks. In general, children have a relatively shallow understanding of the knowledge they have just begun to learn and fail to understand thoroughly. Through practice, we will continue to consolidate our knowledge so that the shallow knowledge will become complete knowledge. This is an important part of the teaching process. The computer game practice mode is to make full use of the advantages of computer games to allow children to consolidate knowledge in a stressful and pleasant atmosphere. The practical process of computer game practice mode is shown in figure 5.

![Practice flow of computer game practice mode](image)

**Figure 5.** Practice flow of computer game practice mode

Based on the multiple intelligence theory, computer game practice mode should also focus on the development of children's multiple intelligence and try to develop children's multiple intelligence in games. The schematic diagram of the multiple intelligence toolbox based on the multiple intelligence educational game platform is shown in figure 6.
Figure. 6 Schematic diagram of multi intelligence toolbox structure

5. Conclusion
The teaching content in primary and secondary schools and teaching schedules are strictly limited, and even higher grades are faced with the pressure of further studies. Therefore, whether from the perspective of teachers or from the perspective of students, they need to try a new type of teaching form. In particular, computer games that once were denied by everyone are still more difficult [3].
Therefore, this article attempts to study this topic from preschool children. Starting from multiple intelligence theory, this issue is studied from the nature of children's game. For computer education games, accommodation, guidance and utilization are fundamental. In addition, the appearance of a new thing will surely go through a process from immature to maturity. Therefore, the application of computer education games in teaching is also the same. As long as we try boldly, we will certainly find out where our educational value lies.

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