

A Review of Gamification Teaching Based on Creative Thinking Development

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Abstract. The development of artificial intelligence in education has ushered in a new spring as the country pays more and more attention to basic education curriculum and innovative talents. The development of innovative talents depends on the cultivation of ability, and the core of the cultivation of ability is the development of thinking, so it is especially important to cultivate students' innovative thinking for solving the problems of artificial intelligence applications in life. The artificial intelligence course is not only a technical course, but also involves several disciplines. Through the learning of artificial intelligence course, students can be exposed to more comprehensive multidisciplinary knowledge and find the optimal solution for existing problems, which can stimulate students' innovative thinking. This paper reviews the application of innovative thinking in game teaching method.

Keywords: Innovative thinking; Gamified teaching; Artificial intelligence courses.

1. Introduction

The purpose of gamified learning is to integrate playful elements into the learning process, create learning situations, stimulate and sustain motivation, develop learners' core literacies, and optimize learning styles and improve learning efficiency. Gamification provides a relaxed environment for the development of innovative thinking, allowing students to unleash their personalities and not be afraid of failure in the learning process. The Horizon 2020 Report (Teaching and Learning Edition) states that educators should make full use of emerging technologies to continuously optimize and innovate their teaching models, focusing on the design of learning experiences such as gamified instructional design to meet learners' needs and enhance teaching effectiveness [1]. This environment is full of challenges and timely feedback, and students are highly focused and agile in their thinking. In order to meet the new trends of future educational development, teachers have started to take the initiative to improve their own literacy and professional competence in teaching practice, design and carry out student-centered gamified teaching activities in the information technology environment, practice the concept of teaching for fun, stimulate students' learning interests, achieve improved classroom teaching effects, provide a good landing point for cultivating students' innovative thinking, and meet society's demand for innovative talents.

2. The new era emphasizes the cultivation of innovative thinking

Currently, all countries and regions in the world pay great attention to the cultivation of innovative talents as one of the key factors related to the development of their future competitiveness. In the book "The Third Industrial Revolution", there is a chapter dedicated to education, in which it is mentioned that the third industrial revolution, represented by Internet technology and new energy technology, requires a large number of innovative talents. In order to cultivate innovative talents, all countries and regions in the world pay special attention to the cultivation of young people's innovative thinking [2]. In the United States, primary and secondary school curricula contain, to varying degrees, instructional content to develop students' cognitive abilities, imagination, and creativity, and in 2010, China proposed in the National Medium- and Long-term Education Reform and Development Plan (2010-2020) to make nurturing people as the fundamental requirement of education and strive to

cultivate a large number of outstanding innovative talents [3]. The China Education Modernization 2035" points out that the country is moving into a new era, and increasing the development of innovative talents is the mission and task of building a strong education country, which is a profound innovation from the concept to the mode of nurturing people, and first-class talent cultivation and innovation ability is an important criterion to measure the level of education modernization [4].

In 2015, the Guidance on Comprehensively and Deeply Promoting Education Informatization during the Thirteenth Five-Year Plan (Draft for Comments) proposed to adhere to integration and innovation, expand the breadth and depth of education informatization applications, and vigorously improve teachers' information technology application capabilities as well as students' information literacy, innovation consciousness, and innovation ability, so as to In 2016, the State Council issued the Outline of National Innovation-driven Development Strategy, which pointed out that the whole process of education should pay attention to cultivating students' innovative thinking. In 2018, the Opinions on Accelerating the Construction and Development of New Engineering and Implementing Excellent Engineer Education and Training Program 2.0 mentioned that the construction of new engineering should cultivate talents across disciplines and specialties, and focus on cultivating students' design thinking, engineering thinking, critical thinking and innovative thinking, and enhance the spirit of innovation and innovation ability [5]. The "21st Century Skills Framework" is the key skills and important attributes that future-oriented learners must possess, among which learning and innovation skills are particularly important. In China, in December 2017, the core literacy system for student development in general high schools and the new high school curriculum standards program were officially released. In short, innovative thinking has become one of the core skills for the 21st century [6].

Game-based teaching can provide an open trial-and-error environment essential to the creation process, and AI education, as a kind of interdisciplinary education, itself focuses on the cultivation of innovative thinking ability and the improvement of innovative ability, therefore, combining AI education with game teaching can not only implement education policies and concepts, but also improve students' innovative thinking through AI courses and meet the demand of society for innovative talents[7].

3. Status of research on game teaching method

3.1 Status of foreign research

Foreign research on educational games began early, and later the focus of the research turned to how to use the game mechanics of games in educational teaching, i.e. gamification. According to Thomas Malone, the most important factor in the learning process is whether the students themselves will gain something from it, that is, their own internal motivation. Students are motivated to complete the next stage of learning by the moral or material benefits they receive after completing a certain stage of learning. Plato's integration of playfulness into the educational process was an early form of "teaching for fun" in Western educational theory. Quintilian's research shows that human beings learn through play, their brains can relax and their intellectual abilities can be developed accordingly. Froebel affirmed the importance of games and advocated the value of exploring them. Khurana found that students were interested in teachers' diverse activities in class and they motivated students to learn by designing gamified teaching activities for online education model [8].

In recent years, gamification has been studied in practice in various aspects. In medicine, Brull, S and other scholars incorporated gamification in terms of memorization of knowledge, and experimental studies concluded that nursing staff preferred gamified approaches to traditional teaching methods and that the use of gamification increased the length of memory. In terms of gamification development, Halloluwa, Thilina et al. showed that students' academic performance improved when gamification was used in their daily learning. This indicates that there are many factors to be considered when applying game-based mechanisms in the classroom. Bodnar reviewed a large body of literature on game-based instruction and investigated the current status of game-based

instruction in undergraduate engineering education disciplines and concluded that students prefer game-based instruction in the classroom. application of games in classroom teaching. The results of the study showed that the application of gamification in classroom teaching has a positive effect on students' interest in learning and the efficiency of classroom teaching. Kiili found that the experience of mindfulness in educational games can have many positive effects on students. Chi-Cheng Chang examined the differences in mind-flow experiences between game-based and non-game-based learning groups [9].

Overseas research on game-based teaching and learning is rich, and the research results also prove that the application of game-based teaching methods in classroom teaching can make students pay more attention and have a positive effect on classroom teaching efficiency and cultivating students' interest in learning. These research results provide strong support for this paper's research on the application of gamification teaching method in high school artificial intelligence curriculum.

3.2 Current status of domestic research

Compared with foreign studies related to game-based teaching, domestic studies related to game-based teaching started late, but the number of studies related to game-based teaching has been increasing year by year in recent years, and this phenomenon indicates that studies on the application of game-based pedagogy in the classroom can mobilize students' interest in learning. 2011 Horizon Report suggests that games and education complement each other as a measure that can become a basic educational technology that will enter the field of teaching and learning within two to three years and have a landmark and far-reaching effect on it . Li Yan proposed to apply gamification teaching in primary and secondary school classroom teaching to build a new teaching model, which also provides reference for other educators and provides reference for gamification teaching research .In 2013, Tao Kan argued that from the perspective of games, the future gamified teaching environment will become more and more intelligent .In 2015, Liu Jun and Zhu Zhiting deciphered the core concept of gamification and explored the drawbacks and advantages of current gamification . The study showed that the study of the application of gamification teaching method in classroom teaching, although it has a positive promotion effect on students' classroom learning efficiency, should be closely integrated with the teaching content when constructing the teaching model design, teachers always grasp the learning direction of the classroom, and students' problems are solved in time to ensure that the application of gamification teaching method in the classroom is effective [10].

In recent years, there has been a gradual increase in research on the integration of gamified teaching elements with classroom teaching in China, and the research results have good research value for the exploration of how to better cultivate students' interest in learning. Chunyan Yu proposed that only by constructing a teaching model suitable for students at this stage according to the characteristics of students at different stages can we play a positive role in promoting classroom teaching. Therefore, in this teaching study, a student-centered gamification teaching model is constructed for the problems exposed by high school students in AI classroom teaching, in which students' learning interest, teamwork ability, competition consciousness and innovation ability are cultivated so that students can be developed comprehensively, which is in line with the AI curriculum training objectives of students.

Often, people in games enjoy themselves because they are in the midst of a mind-flow experience. Numerous studies have found that there is also a closer relationship between gamification and the generation of mind flow. Wenhui Liu et al. used the mind-flow experience as one of the evaluation indicators of educational games. Yingfeng Ma and Ruonan Hu suggested that there is no significant difference in the overall level of immersion experience among different types of games and proposed strategies to induce students' mind-flow experience in each type of educational games in conjunction with the realization method of immersion experience. Yuan Yandong applied the theory of mind-flow experience to the gamification of college sports teaching and found that gamification of college sports classroom could greatly improve students' motivation, initiative and creativity in learning. Wang Yonggu made the prerequisite conditions for the stage design results to produce the mind-flow

experience by constructing a game design model to ensure that learners are always in the mind-flow state when learning through games. In their study, Liru Hu et al. found that time constraints can facilitate the integration of mindful flow experience and deep learning when mindful flow experience is stimulated in learners' nearest developmental area. From this, we can see that mindfulness flow plays an important role in the field of gamified learning.

Through the research and practice results data and content summary analysis of domestic and foreign experts and scholars, the research related to gamified teaching has emerged earlier in foreign countries and the research related to gamified teaching has gradually increased in recent years in China, which proves that the application of gamified teaching has a positive promotion effect on classroom teaching. Therefore, it is important to apply game-based teaching in high school AI courses and build a game-based teaching classroom suitable for high school students.

4. Conclusion

Under the guidance of gamification learning theory, we design a framework for designing gamification teaching activities for high school AI based on mind flow theory, expecting to cultivate students' innovative thinking ability and improve the effectiveness of AI classroom teaching through the innovative design and application research of teaching activities for AI courses.

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