Comparative Analysis of the Effect of Online Education and Game Education on Students' Study

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Abstract. In the context of the Coronavirus disease 2019 (COVID-19) epidemic, offline learning is undoubtedly limited, so online education is becoming increasingly significant. The authors collected data related to online teaching and educational games and compared their advantages and disadvantages from the perspectives of learning engagement and popularity. It was found that online lectures and educational games scored high on the dimensions of students' learning motivation, understanding engagement, and enthusiasm to participate, especially online educational games, which perform well in stimulating students' interest in learning, enhancing their sense of belonging to the group, and creating a better learning atmosphere. However, users' popularity of online classes and online educational games varies significantly. In contrast to the vast number of users of online classes, educational games are not universally accepted as a way of education in China. It is analysed that the main reason is that Chinese parents and teachers are biased against learning through games. It is challenging to connect learning with games, especially in China. Therefore, it is recommended that the mixed teaching mode of traditional teaching as the primary and game education as the auxiliary can be piloted before large-scale promotion.

Keywords: Online Education; Game Education; Learning Engagement; Popularity.

1. Introduction

Since January 2020, the Coronavirus disease 2019 (COVID-19) outbreak has been widespread in most countries worldwide. Due to the novel coronavirus's extreme infectivity and the young students' immunity to coronavirus being relatively weak, such measures protect students as class suspensions in case of a large-scale epidemic outbreak [1]. Most of the time, the duration of measures to deal with sudden outbursts is unpredictable, even in extreme cases such as multiple outbreaks that keep students' home for a whole semester. However, if teachers only require students to study at home and read books by themselves, students' learning effects and grades cannot be guaranteed. Therefore, it is necessary to adopt online teaching methods to alleviate the stagnation of course progress caused by the suspension of classes.

There was much research on online learning even before the pandemic [2]. After 2020, online teaching platforms that once were relatively niche have become increasingly popular, such as MOOC, Zhihuishu, and so on. Many schools have converted the original face-to-face courses into online courses on those online teaching platforms. Research on online education is also becoming increasingly popular. However, most research is still focused on the network broadcast course or video recording course, and the research on other online teaching methods is relatively few. At the same time, although educational games are not the mainstream at present, and there are only a few educational games that are highly praised, however, based on the existing research analysis, educational games have the advantages that other teaching methods do not have and have great potential in the future [3].

At the same time, foreign language teaching requires students to develop their listening, to speak, reading, and writing abilities. Therefore, in language teaching, great importance is attached to the interaction between learning and teachers. However, affected by the epidemic, students are unable to interact with teachers normally. This will undoubtedly significantly reduce the quality of language teaching. At present, the most common way to solve this problem is to use an online course platform or conference platform to carry out interactive teaching in the form of live broadcasting. However, some reasons make the effect of this teaching method does not meet people's expectations.

With the development of informatization, foreign languages and online learning are becoming more and more common and necessary, especially in the current COVID-19 environment. The research on interactive online-assisted learning is of great significance to future teaching practice. On the one hand, online education can help students continue to study while not needing to go to school, alleviating the epidemic's adverse impact on learning. On the other hand, online education can provide students in remote areas with the same level of education as students in big cities, which helps provide equal access to education for all students.

Based on this, research about the webcast courses and educational games based on the existing materials for foreign language teaching is of great importance. Some aspects of the two kinds of online education, such as the way of interaction, advantages, and disadvantages, will be emphatically compared in order to analyze which type of interactive aid for foreign language learning is better.

2. Online Education

2.1 Learning Engagement

Fredricks [4] (2004) proposed that online learning engagement refers to learning the positive state of online learning activities, including cognitive engagement, emotional engagement, and behavioral engagement. Cognitive engagement refers to students' use of thinking or mind in the learning process, including attention and effort, as well as the use of cognitive strategies and metacognitive strategies. Emotional engagement is the relevant experience generated by learners in the process of participating in online learning, such as interest, sense of belonging, self-efficacy, etc. Behavioral engagement refers to learning communication between learners and teachers, access to learning resources and sharing, and learners' reflective activities. These things can be roughly summarized into five categories: learning atmosphere, learning motivation; learning behavior; learning results; learning satisfaction.

Table 1. Results of four online teaching modes.
(Reference: http://qikan.cqvip.com/Qikan/Article/Detail?id=7106487682)

	Learning atmosphere	Learning motivation	Learning behavior	Learning results	Learning satisfaction	Overall
Live telecast teaching	3.678	3.835	3.403	3.590	3.625	3.650
Video teaching	3.489	3.673	3.205	3.377	3.486	3.483
Phonics Teaching	3.625	3.773	3.426	3.558	3.585	3.605
Character teaching	3.515	3.603	3.411	3.409	3.573	3.524
Chi-square	5.294	7.930	11.519	8.393	2.886	7.857
P value	0.151	0.047	0.009	0.039	0.409	0.049

In order to understand the impact of online learning on students' learning, the authors referred to relevant literature. The data of undergraduates from seven national "double first-class" universities in the Wuhan area are selected as the research object. The analysis is proposed from the perspective of the degree of learning engagement and the popularity of this learning method.

The overall score of the online teaching mode in colleges and universities is (3.564 ± 0.710), the score of the learning atmosphere dimension is (3.603 ± 0.795), the score of the learning motivation dimension is (3.716 ± 0.756), the score of learning behavior dimension is (3.403 ± 0.803), the score of learning result dimension is (3.5501 ± 0.802), and the score of learning satisfaction dimension is (3.596 ± 0.770). Overall, the effectiveness of online teaching in colleges and universities is close to a decent level, which means the online learning engagement is not bad at least.

However, among the five analysis dimensions, learning motivation scores the highest, and learning behavior scores the lowest. The results of questionnaire data also show that students' learning behavior is poor, which has a significant gap with the generally high learning motivation. While the majority of the students believe that their engagement in online learning is not that good, compared with offline classes in the classroom, but their learning consciousness has improved.

2.2 Popularity of Learning Online

First of all, college students have a high acceptance of online learning. The interviewees all said that they had the experience of learning online before the outbreak of COVID-19. After the outbreak of the epidemic, online teaching was basically carried out in all courses. The primary learning platforms are DingTalk, WeChat, QQ, XueXiTong, MOOC, etc.

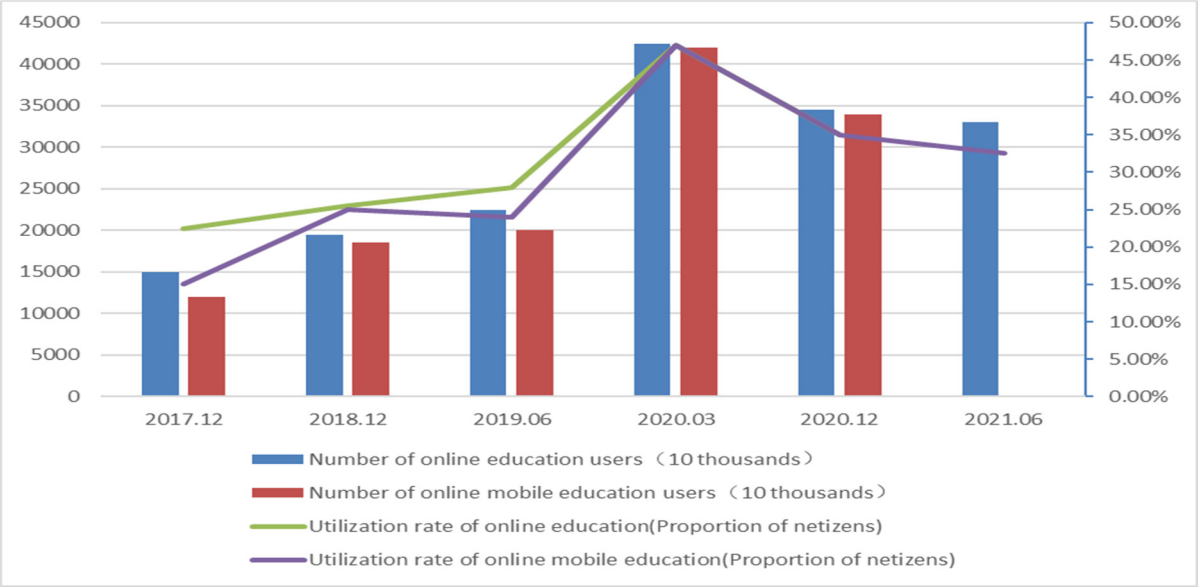

Figure 1. 2017-2021 China's online education user scale and utilization rate.
(Reference: https://www.qianzhan.com/analyst/detail/220/220415-56959e2d.html)

For example, MOOC platforms can make available globally Ivy-League quality education, provided there is access to the Internet [5]. So, it can be seen that online learning is very convenient. What is needed is a device that can access the Internet. And in the context of the epidemic, many schools in many countries require students to take online classes, which also makes online learning a mandatory requirement, which also reflects the great popularity of online learning.

The authors selected the relevant data of online education population in China from 2017 to 2021 online. The scale of online education users has grown during the 5 years, which was the peak (423.25 million). In December 2020, the number of online education users in China reached 342 million, 81.25 million less than that in March 2020, accounting for 34.6% of the total Internet users; The number of mobile online education users reached 341 million, a decrease of 79.5 million over March

2020, accounting for 34.6% of mobile Internet users. Reasons for this strong rate of growth include increased student access to course offerings, especially to non-traditional learners, and an opportunity for institutions to lower costs [6]. Although there is a decrease, the scale of online education in China is still massive, which means that the popularity of online learning is very high. With the positive progress in epidemic prevention and control, universities, middle schools, and primary schools have basically restored regular teaching orders, and the number of online education users has further dropped. However, it still maintains a good state, and the industry is developing well.

3. Educational Games

3.1 Learning Engagement

A comparative experiment of a middle school showed that the experimental class that used educational games in teaching was superior to the control class that did not use educational games in terms of the mean values of cognitive participation, performance participation, and emotional participation.

In other words, the application of educational games in teaching was conducive to promoting students' learning engagement.

The questionnaire shows that 72% of the students in the experimental class who used educational games used educational games to self-study before consulting the textbook. Also, 63% of the students in the experimental class agreed that "when I study in class, I think for myself rather than just waiting for others to answer." It can be seen that educational games can stimulate students' learning initiative; In terms of performance participation, 81% of the students in the experimental class thought that after using educational games, they would be more focused in class, and their mind wandering would be reduced. All in all, this study fully demonstrates that educational games can significantly improve students' involvement in learning, thus improving students' academic performance.

Csikszentmihalyi's Flow theory [7] can be used to explain the improvement of students' engagement with educational games. Educational games can make students enter the state of flow by balancing students' skills and the difficulty of task challenges. They can actively improve their skills and face more difficult challenges to gain more happiness so as to devote themselves to learning fully.

Table 2. Average value of learning Engagement questionnaire. (Reference: https://kreader.cnki.net/Kreader/CatalogViewPage.aspx?dbCode=CMFD&filename=1022404335.nh&tablename=CMFDTEMP&compose=&first=1&uid=WEEvREcwSlJHSldSdmVqMDh6cEFFeWVNM3ZSZ05lcWRqS3JUck9ZVXFVND0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4IQMovwHtwkF4VYPoHbKxJw!!)

	Classes	N	Average Value
cognitive participation	experimental class	39	18.0000
	control class	40	14.5750
performance participation	experimental class	39	19.0769
	control class	40	16.0750
emotional participation	experimental class	39	22.2051
	control class	40	20.9000

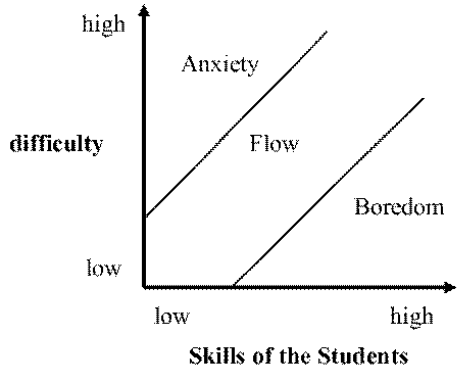

Figure 2. Three path models of flow [7]

3.2 Popularity of Educational Games

At present, the penetration of educational games in most developing countries and some developed countries is still not very high. As the arrangers of class content, most teachers lack information on how to effectively use digital games in their teaching. They are worried that the use of educational games in the curriculum may lead to the loss of classroom discipline [8]. In addition, some teachers think that the current commercial educational games have some shortcomings or are not suitable for use. In a survey of primary school teachers in the Czech Republic, more than 37 percent of respondents felt that the current educational games, although they may be related to the curriculum content, are too loose and still need to be improved [9]. At the same time, many parents prefer traditional teaching methods [10], and confuse educational games with recreational games, so they see them as one of the reasons for students' unsatisfactory performance. According to the survey of 858 parents by Bourgonjon, more than half of the parents oppose the use of video games in school teaching, and they believe that this teaching tool lacks efficiency and reliability [11], and its educational function is not enough to offset the harmful effects of video games.

However, with the development of the Internet and electronic devices, educational games as a means of education are slowly being accepted by people. According to Metaari: Global Educational Games Market Research Report 2019-2024, the global Ball educational games products and services witnessed a five-year compound annual growth rate (CAGR) of 33.2% during 2019-2024. The pace of growth, though slower than in previous years, is still average. This fully shows that educational games are developing rapidly and have great potential in the future.

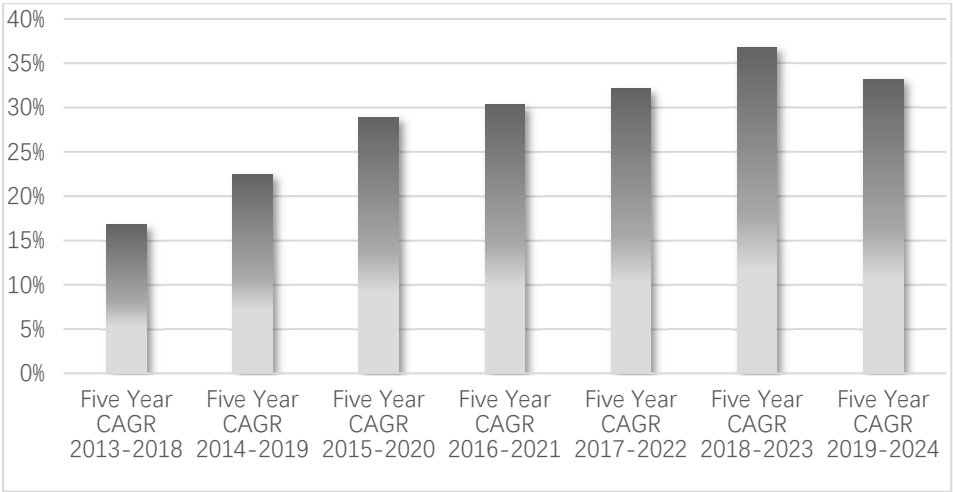

Figure 3. Global Educational Games Market Grows at a CAGR over a five-year period. (Reference: https://zhuanlan.zhihu.com/p/106634529)

4. Comparison

4.1 Comparison of the Two Educational Approaches in the Learning Engagement Aspect

Online lectures and educational games scored higher on the dimensions of students' learning motivation, learning engagement, and enthusiasm to participate in classroom performance, which indicates that the online educational approach can indeed arouse students' interest in learning and desire to participate in classroom communication and with the teacher.

In the analysis, this phenomenon is due to the fact that online education is more flexible, novel, and interesting, and can hold students' attention for a more extended period of time. In addition, the online virtual interaction relieves social pressure, and students who are shy and have social anxiety are encouraged to participate actively in communication sessions and group activities. In particular, online educational games provide a gradual balance between a learning difficulty and students' desire to win the game, thus enabling students to take on challenges and improve their abilities with a more positive mindset. Overall, online education, especially online educational games, performs well in stimulating students' interest in learning, enhancing their sense of belonging to the group, and creating a better learning atmosphere.

In comparing the effectiveness of online lectures and online educational games, it should not be overlooked that although learning through educational games is slightly more effective than learning through online lectures, these two emerging learning methods are generally less effective than traditional offline teaching.

Researchers believe that the reason why learning through educational games is slightly more effective than learning through online lectures is that students need to follow the teacher's ideas consciously and actively during online lectures. In the absence of supervision and care, students tend to be distracted and unable to maintain their attention for a long time. In contrast, educational games are more intense and exciting, and students are readily immersed in a state of mental flow during learning through educational games. In the process of learning through educational games, students can easily immerse themselves into the state of mind flow and thus maintain their concentration.

The reason for the poor performance of the two emerging methods of online instruction and educational games in terms of learning outcomes is that teachers cannot adjust the difficulty and pace of instruction in a timely manner by observing students' expressions and body language. The content of these two educational methods is designed for average students, which leads to a slowdown in the progress of highly effective students and a gradual lag in the progress of less effective students without special attention from the teacher. Secondly, deeper and more difficult knowledge is often taught through heuristics and interactive discussions to enhance understanding. At the same time, online communication has blurred sound and images due to poor signal, which makes communication more difficult and reduces communication efficiency and feedback frequency. Therefore, it is difficult for online teaching to convey more in-depth and challenging content to students as efficiently as offline teaching. Moreover, long-term online teaching tends to cause physical inertia among students, and the long-term absence of face-to-face communication with peers and the environment where they do not see their peers can lead to a sense of psychological isolation and loneliness. Therefore, the researchers concluded that the two emerging methods of online instruction and educational games are generally less effective in terms of learning outcomes.

4.2 Comparison of the Two Educational Approaches in the Popularity Aspect

The popularity and demographics of online classes and online educational games vary significantly among users. While online classes are widely popular among students, especially college students, online educational games are not as popular among Chinese students, mainly primary and secondary school students.

Researchers attribute the high popularity of online instruction to the fact that students were generally forced to adapt to online instruction after the 2020 epidemic shut down offline instruction and that students were still psychologically willing to accept online instruction even after the

epidemic had subsided and schools gradually resumed offline instructional activities. Moreover, major online learning platforms seized the opportunity during the epidemic to provide complete learning and communication software for online learning, which facilitated the efficient and orderly delivery of online classes. The more fundamental reason is that, with the development of China's manufacturing industry, China has become the manufacturing center of the world's electronics industry. At the same time, the income level of residents has steadily increased. The popularity of consumer electronic products such as cell phones has also increased, so online classes have a good material foundation in China. Overall, the online teaching method not only has a large market in China and is widely accepted by several student groups but also has high popularity among students.

In contrast to the vast number of users of online classes, educational games are not universally accepted as a way of education in China.

Researchers have analyzed that the main reason is that Chinese parents and teachers are biased against learning through games. Specifically, referring to the results of a survey on teaching in elementary school, Chinese teachers generally believe that video games cause students to lose focus and become less engaged in their studies, and less than 10% of teachers show a good understanding of the advantages and disadvantages of using educational games for learning and are willing to try them in their teaching practices. Parents and teachers tend to associate low student achievement with addiction to games, so they are psychologically reluctant to accept that students learn through educational games.

In addition, the author argues that in Chinese classrooms, teachers are often in a hurry to advance the teaching schedule and are busy completing teaching targets, while learning through playing games is less efficient and, at the same time, has the added difficulty of maintaining classroom discipline. Hence, teachers are objectively unable to allow students to adopt educational games for learning.

5. Conclusion

In summary, this paper argued that from the perspective of learning participation, game education is more effective than online teaching because educational games are more novel, exciting and attractive, and students can easily immerse themselves in thinking in the process of learning through educational games, so as to maintain focus. Also, it can improve students' interest in learning and activate the classroom atmosphere and even plays a positive role in improving students' comprehensive language application ability and promoting the divergence of thinking. In contrast, the popularity of game education is far less than that of online teaching education. Although online teaching has been popularized in schools at all stages of the epidemic, game education is still far away from being popular, mainly because teachers and parents have prejudices against it, believing that games will affect learning, and it is difficult to link them together. Because of this situation, the authors believe that it is feasible to carry out a small-scale pilot project of the mixed teaching model, which is a mainly online teaching and supplemented by game education.

This article analyzes the advantages and disadvantages of online teaching and game education, as well as the reasons. It puts forward some relevant suggestions which may be conducive to the development and promotion of game education and provide a reference for later generations.

Finally, the research in this paper is not discussed in different courses. Perhaps in various course fields, other interaction methods have totally different impacts. In the future, the operability of the above-related variables can be further refined to facilitate in-depth research on this topic.

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