

# **Ph.D. Dissertation**

## **An Empirical Study on Online Learners’ Continuance Intention in China**

中国におけるオンライン学習者の持続意向  
に関する実証分析

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# Preface

With the increasing popularity of multimedia technology and the Internet, information technology is changing the mode of manufacturing, work, life, and learning in society since the 1990s, and this change is growing with time, which not only brings us into the information society but also provides a powerful driving force for the reform and development of education. Meanwhile, information technology promotes the development of education from the preindustrial community to the postindustrial community and has accelerated the process of education informatization.

In the era of the knowledge economy, knowledge occupies a dominant position in the entire production process. It is crucial to acquire adequate knowledge when considering the improvement of corporate competitiveness or the realization of individual value. Being educated is a crucial way to acquire knowledge, and education fair is a significant basis of social justice. The Universal Declaration of Human Rights (UDHR) is a milestone document in human rights history, and Article 26 of it stipulates that “everyone has the right to education. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.”, and Article 46 of the Chinese Constitution also stipulates that “Citizens of the People’s Republic of China have the right and obligation to receive education.” Internet eliminates the constraints of time and space and has constructed an extremely huge online world where users gather and communicate with each other. Various specific applications are constantly being developed in education, society, entertainment, management and other fields. Forums, discussion groups, blogs, online game communities, online comment communities, online Q&A communities, online gambling communities, online shopping communities, public accounts, various applications, etc., provide people with a new way of living, including communication, learning, work, entertainment and lifestyles, etc. However, the most important application areas in the online world are learning and education.

With the development of the Internet and mobile Internet, the deep integration of education and the Internet has become the frontier direction of educational innovation and

reform. The online education has shown a rapid development trend in terms of market size and the number of learners, driven by the advancement of information technology and the emerging of online learning concepts such as massive open online courses (MOOC). Online education has become a hot field in the Internet industry, which not only brings enormous business opportunities but may also trigger a fundamental change in learning modes in the near future. The emergence of online education provides a feasible way to optimize the allocation of educational resources so that people in developed or remote areas have the same educational opportunities. Online learning has become an inevitable requirement for people to adapt to social changes.

Online education, or E-learning, is a teaching method that uses the Internet as a medium to apply information technology and the Internet technology for information dissemination and rapid learning. Therefore, the development of online education is simultaneously affected by the development of information technology and mobile Internet technology, and the development of education and training itself. Traditional education and training relied heavily on and emphasized the instructors' professional knowledge and teaching skills. Especially in school education, education is centered on teachers, and the teachers arrange the teaching, implement the teaching, and correct the homework after class. As the research on adult education and training continues to mature, the student-centered view is increasingly recognized.

In the meantime, according to the perspective of human resource management, training can be divided into six links: training demand analysis, training plan formulation, training preparation, training implementation, training evaluation and training improvement. In the training demand analysis, the capability of the training subject needs to be analyzed. Therefore, education and training platforms pay more and more attention to learners' acceptance of the knowledge and skills rather than simply imparting knowledge, skills or ideas step by step, which is also in line with the definition of the essential elements of education in pedagogy, namely, educator, the educated, and educational influence.

With the explosive development of information technology and mobile Internet technology, the importance of big data technology has attracted more and more attention from various industries. Big data refers to a large amount of complex data that traditional

data processing methods cannot process. Through big data technology, it is possible to accurately analyze the consumers' behaviors and provide a basis for decision-making with data support, so that various business activities can be carried out in a targeted manner. It can be noted that the integration of big data and the education industry can help educators more accurately understand the knowledge, skill level, learning habits and other information of the educated, so as to improve the teaching process and ultimately improve the quality of teaching.

Meanwhile, artificial intelligence technology in recent years has also emerged, which will definitely have a profound impact on the entire education and training industry. The online education industry, integrating information technology on the mobile Internet, will also be affected by the trend of big data and artificial intelligence technologies, and new growth points will also emerge. Online education has a significant difference from traditional education in many ways. First of all, it breaks through space and time limitations when compared with the traditional education model, so that education and teaching activities can be expanded and extended to outside the classroom. Especially with the development of mobile Internet, education and teaching activities can be carried out anytime and anywhere. Secondly, the sharing of high-quality online education and teaching resources is realized through online education. It expands the radiation range of high-quality educational resources and effectively meets people's needs for high-quality education resources. Learners in developed and underdeveloped areas can enjoy high-quality education resources simultaneously, and the price of resources is lower and even free. Therefore, the online education market has developed rapidly in recent years. Entrepreneurs, schools and countries are speeding up the layout of online education, and access to the Internet for education will become a significant event in the history of human progress.

Thirdly, it breaks through the limitations of traditional education mode on the aspect of student training. Online education and online courses can allow students to arrange class hours reasonably and have self-study. Finally, online education has broadened students' channels to acquire knowledge and information and break through the traditional mode



dominated by instructors. Instructors are no longer a dominant position in class, and the knowledge students draw online may be more comprehensive and profound.

Online education in China is developing at a rapid pace due to its unique advantages, and its sustainable development is becoming increasingly crucial especially amid the COVID-19 pandemic. The learner's choice to receive online education is just making the initial selection, it is even more important whether they can persist in completing the entire learning process. While online education is developing rapidly, the two aspects of "learners' low retention to adopt online learning technologies" and "the serious loss of learners" have also received increasing attention. The initial dropout rate of MOOC, which is based on social media technology and collaborative learning concepts, is very high, and many online education institutions are also plagued by high churn rates. The widespread phenomenon of learners' loss not only affects the income of online education institutions, but also wastes the early economic and energy investment of online learners, which is not conducive to the healthy development of online education. Therefore, it has received wide attention from the practice and academic circles. Although online education has been promoted to various levels of learners, the problems of high dropout rates and low retention still exist. Thus, this study attempts to understand learners' continuance intention in an online learning environment and examines the factors influencing online learners' continuous retention in the context of China and highlighted the implications of the findings to facilitate the sustainable development of online education. The research model of influencing factors and study hypotheses were constructed based on multiple theoretical and synthesized perspectives, such as the information system success model, interactions between students, content and instructors, and the theory of perceived value.

To achieve the stated objectives, the author conducted a questionnaire survey, in which 382 valid responses were collected from Chinese respondents from 32 provinces in China in April and May 2020. Furthermore, this study primarily employed Structural Equation Modeling (SEM) and Partial Least Squares Structural Equation Modeling (PLS-SEM) to test the constructed model. Structural equation model is composed of two sets of theoretical models: measurement model and structural equation model. The model composed of latent variables and observed variables is a measurement model, which expresses the linear

relationship between latent variables and observed variables. The results indicate that service quality, course quality, and student-instructor interaction have indirect and positive effects on learners' continuance intention for online learning, while the variable of perceived value is a significant mediator for online learners' retention and has a direct influence on their continuance intention. Student-student interaction and student-content interaction do not have direct or indirect effects on online learners' continuance intention.

The author believes this study will contribute to a better understanding of the factors influencing learners' continuance intention toward e-learning, which can help promote the sustainable development of online education in China. Research on online education has broad significance in education and social development.

**Keywords:** continuance intention; online learning; perceived value; student-student interaction; student-instructor interaction; student-content interaction

# **Chapter 1. Introduction**

## **1.1 Research Background**

The United Nations formulated the Sustainable Development Goals (SDGs), which are a collection of 17 long-term development objectives, to replace the Millennium Development Goals and serve as the guiding spirit of the global development work from 2015 to 2030 [1]. The 17 goals are about taking the path of sustainable development and addressing development issues in social, economic, and environmental areas [2]. The world has a population of 7.5 billion, and the earth's natural resources are limited, so each of us and society as a whole must learn to live together in a sustainable way.

Among them, SDG 4 is dedicated to ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all. Acquiring high-quality education is the basis for improving people's lives and achieving the objective of sustainable development. Human beings need to know what everyone does today will have an impact on people's lives as well as the earth in the future, and take responsible actions based on this understanding. Education for sustainable development (ESD) is able to change people's way of thinking and makes people strive to achieve a sustainable future.

UNESCO aims to improve access to quality education for sustainable development at all levels and in all social contexts, to achieve social transformation through reorientation of education and to help people acquire the knowledge, skills, values, and behaviors needed for sustainable development. It also encourages all to be responsible people, actively address challenges, respect cultural diversity, and contribute to a more sustainable world.

The international community is increasingly aware that education for sustainable development (ESD) is an essential part of quality education and an important driving force for sustainable development. The sustainable development goals adopted by the international community for 2015-2030 include education for sustainable development. Target 4.7 of SDG 4 on education relates to education for sustainable development and related approaches like global citizenship education. UNESCO coordinates the global action

programme (GAP) on education for sustainable development. As one of the most significant components of quality education, online education has unique characteristics that facilitate the sustainable development of education, such as low cost, convenience, flexibility, repetition, high efficiency, low threshold, rich teaching resources, and broadly accessible user groups, which provide e-learning an edge over traditional learning in a classroom setting [3]. Likewise, online education has the potential to offer learning opportunities to new learners, and to fundamentally transform learning delivery and the competitive landscape. Online learning breaks through time and place constraints by providing learning experiences to distant learners and allowing flexible learning modes so that learners can freely select their learning path and pace in accordance with their real conditions and benefit from contingent teaching [4]. The concept and pattern of online education have changed dramatically from the distance education model at the end of the 20th century to the popular business online education platform model in modern times. It has also gradually transformed from the sharing of static resources to the use of an interactive open classroom and online learning.

In recent years, the online education model has been continuously upgraded with the help of information technology. With the launch of the 4G network and the popularity of smartphones, apps have also become a convenient and easy-to-use learning tool. Similarly, various online education platforms are constantly emerging and taking shape. Statistics from professional website e-student.org show that the corporate e-learning sector is expected to grow by as much as 38 billion USD from 2020 to 2024. The major EdTech companies, such as Coursera, are already valued at well over 1 billion USD, and they will be the driving force of the entire online education industry [5]. Meanwhile, according to iResearch data, the scale of China's online education market exceeded 320 billion RMB in 2019, with a 28.1% increase year-on-year. Higher education and vocational training accounted for 74.6% of this figure and K12 education 21.3%. Thus, the online education market is still dominated by adult education, but the share of K12 education is growing. It is also expected that the growth rate of the market will remain between 19 and 24% in the next three years [6].

With the rapid development of online education, the problems of a high dropout rate and low retention of online learners have become increasingly prominent. The student

dropout rate at the Open University, a renowned online educational institution in the UK, was up to 78% [7]. Data from a survey conducted by Duke University in North Carolina showed that the dropout rate of the Massive Open Online Course (MOOC) was up to 90% [8]. A report on the development of online education in the United States stated that high dropout rate is the primary obstacle for the future growth of online education [9]. Thus, this study aimed to explore the factors influencing learners' continuous use of online education, so as to put forward corresponding countermeasures to promote the sustainable development of online education in China.

There are several reasons why Chinese learners are selected as subjects of this study. On the one hand, China has formed a huge online education market during and after the epidemic in 2020. Therefore, China has a mature online education mechanism, from elementary education to higher education to vocational skills training. China's Internet penetration rate and the scale of the smartphone market are substantial globally, and China's online education user data is easier to obtain. Hence, the study on Chinese education is more representative and typical. On the other hand, in view of the convenience of collecting questionnaire data, online learners from author's home country were selected as the subjects of this study.

## **1.2 Research Questions and Significance**

Specifically, the author examined the following three research questions:

(1) What are the main factors influencing learners' continuance intention in an online education environment?

(2) Are all our hypotheses valid? How can the results be explained?

(3) What are our recommendations for the improvement of the online education environment?

Among the three research questions in this study, the second one relates to the nine hypotheses that the author framed to predict the determinants of online learning continuance intention. Furthermore, the validity of the hypotheses was verified, and correlations were described.

To address the research questions in this study, an online survey was conducted, and 382 valid responses were collected from Chinese respondents from 32 provinces in China in April and May 2020. Additionally, statistical analysis was conducted primarily through Structural Equation Modeling (SEM) and Partial Least Squares Structural Equation Modeling (PLS-SEM) to verify the reasonability of the constructed model. The principal conclusions are as follows: the factors of service quality, course quality, and student-instructor interaction indirectly influence online learners' continuance intention, while the variable of perceived value is a significant mediator with a direct influence on online learners' continuance intention. However, the variables of student-student interaction and student-content interaction do not have direct or indirect effects on online learners' continuance intention.

### **1.3 Research Outline**

The rest of the thesis is composed of five sections, which are arranged as follows. Section 2 describes literature review, which primarily introduces theories and definitions for concepts such as online education, information systems success model, perceived value, interaction, and continuance intention. Section 3 outlines the nine hypotheses and the research model constructed to determine the factors influencing learners' retention in an online learning environment. This section also describes the questionnaire design and content as well as the data analyses and hypotheses test results. In Section 4, the discussion is presented, and the implications of this study are outlined in Section 5. This section also highlights some limitations of this study and future study.

## **Chapter 2. Literature Review**

The concept of lifelong learning has been widely recognized in society nowadays, which is focused on personal development and viewed as a self-initiated education with the purpose of achieving personal fulfillment. Lifelong learning is from prenatal education when a child was born, to school education in elementary school, junior high school, high school, technical school education, college, undergraduate, master, vocational education, and even university education for the elderly after retirement. It seems that everyone is living in an era of lifelong learning nowadays. In order to meet the growing demand for learning, many schools and educational training institutions have seized business opportunities and provided a series of targeted educational products, strengthening the supply of educational outcomes, and the entire education industry was booming. At the same time, with the explosive development of information technology and mobile Internet, more and more enterprises have begun to merge with mobile Internet, leading these enterprises to break through the bottleneck and search for new development opportunities, and the same is true for the education industry. The integration of the mobile Internet and the education industry has contributed to the full flourish of the online education industry.

### **2.1 An Overview of Online Learners' Continuance Intention**

Previous studies have identified critical variables for analyzing online learning continuous retention, and the frequently adopted theoretical perspectives in this field are the technology acceptance model (TAM), expectation confirmation model (ECM), and the information system (IS) success model. A wide arsenal of research in this area involves an extension or the combination of these theories. Lee M. C. synthesized the ECM, TAM, theory of planned behavior (TPB), and flow experience to construct the hypotheses model and analyzed online learners' continuous use. The ECM proposed three variables-satisfaction, confirmation and post-adoption expectations-to explain learners' continuous usage of online learning platforms. However, learners' behavioral intention toward online learning systems

is also affected by other factors; therefore, this study uses multiple theories to bridge the gaps that would otherwise have remained had each theory been considered independently [10].

The IS success model tends to emphasize the significance of technology in dealing with learners' behavioral intention, and many prior studies have constructed hypotheses on online learning behavior, based on the IS success model. Dağhan et al., combined technology continuance theory, IS success model, cognitive model, and IS ECM to construct their integrated model. They argued that online learning environment usage could be confirmed by system quality, service quality and information quality variables [11]. Aldholay et al. designed an extended IS success model in which transforming leadership plays the role of a mediator between perceived quality and actual use in the context of Yemen [12]. Mohammadi integrated the IS success model and TAM to predict e-learning outcomes users' intentions in Iran. They found that system quality and information quality were the significant factors driving learners' using e-learning, and perceived learning assistance was also affected by satisfaction and intention [13]. However, most studies that implement the IS success model seem to concentrate on the variables in the technology dimension and individuals' experience, and neglect the evaluation of other environmental intervening variables, such as perceived interactivity [14]. Therefore, our study explored online learning behavioral intention by combining the IS success model with interaction theory.

The author synthesized these two theoretical perspectives for three reasons. First, the IS success model is widely adopted in exploring continuous IS usage, but it concentrates on the overall quality of IS; other variables, such as e-learning environmental opinions, are hardly mentioned. Although many scholars have explored other variables, such as perceived ease of use, perceived usefulness, confirmation and outcome expectations when considering the IS success model, interaction between students, instructors and content are seldom examined. Thus, the author combined these two theoretical perspectives to analyze continued online learning adoption.

Second, learners' perceived interaction with others is an essential factor in the e-learning environmental dimension when they consider online learners' behavioral intention [14]. However, most studies on interactions in this area merely mention the concept of



“interaction” and seldom explore its three dimensions-between students, instructors and content-concretely. Liu et al., conducted research on learners’ continuous retention in one-to-one online learning, in which instructor-learner interaction was primarily examined; and interaction feedback was found to be significant for online learning outcomes [15]. Liu I.F. et al., extended the TAM model to explore factors that affect the intention to use in an online learning community, and used perceived interaction as one of the variables that facilitate better learning outcomes [16]. As for the literature on multi-dimensional interaction, Moore G. examined the significant role of interactions between students, instructors and content because improving cooperation and communication with online learners was one of the indicators for success of an online learning environment [11,17]. You et al. investigated the influence of student-student interaction, student-instructor interaction, and student-content interaction on online learning retention from the perspective of moderation and mediation of academic emotions [18]. Hone reported the factors affecting MOOC retention and found that MOOC course content and interaction with instructors were significant predictors for MOOC retention, mediated by the perceived effectiveness of the course [19]. Although these studies considered multi-dimensional interaction in an online learning community, most of them only focused on student-instructor interaction or student-student interaction, and they have been quite silent on the integration of three-dimensional interaction and other variables. Thus, the integration of these two perspectives related to technical and environmental dimensions provided an answer to the knowledge gap.

Third, ECM and IS success model posit the significant association between satisfaction and behavior intention [10,13]. Thus, most of studies adopting these two theories primarily view satisfaction as the mediator or significant variables. Brady and Robertson provided that perceived value was the primary factor influencing purchase intentions in the study of service value in the USA and educator [20]. Dağhan et al. explored the continuous intention towards online learning usage and proposed a model to explain the determinants of it. They also suggested the association between overall quality variables, perceived value and continuance intention in online learning [11]. Therefore, this study adopted perceived value as a mediating variable to construct hypotheses and the model.

In addition, some outstanding related studies in the area of online learning usage are

listed in Table 1:

Table 1 Outstanding related studies in the area of online learning usage

Researchers	Independent Variables	Dependent variables	Key findings
Gokhan et al. [11]	information, system and service quality	Confirmation, satisfaction, outcome expectations, satisfaction, utilitarian value, perceived value, perceived usability	Confirmation of the usage of online learning environments could be explained by information quality, system quality and service quality variables.
Opoku et al. [21]	information, system, service quality, perceived usefulness	User satisfaction, Intention to use	System quality is a strong predictor of perceived usefulness with the e-learning system.
Lee et al. [10]	Confirmation, perceived usefulness, perceived ease of use, perceived enjoyment, concentration	Satisfaction, attitude, subjective norm, perceived behavior control	Satisfaction has significant effect on continuance intention, followed by perceived usefulness, attitude, concentration, subjective norm, and perceived behavior control as significant but weaker predictors.
Alraimi et al. [22]	Perceived openness, confirmation, perceived reputation	Perceived usefulness, satisfaction, perceived enjoyment	MOOCs is significantly influenced by perceived reputation, perceived openness, perceived usefulness, perceived enjoyment, and user satisfaction.
Wu B. et al. [23]	Individual-technology fit, Task-technology fit, openness, reputation, social recognition, social influence	perceived usefulness, perceived ease of use, attitude	Perceived usefulness and attitude are critical to the continuance intention to use MOOCs; perceived ease of use, task-technology fit, reputation, social recognition and social influence are found to play important roles in predicting continuance intention

Moon et al. [24]	Perceived playfulness, perceived ease of use, perceived usefulness	Attitude toward using, behavioral intention to use	perceived ease of use and perceived usefulness as well as perceived playfulness has a strong significant influence on attitude
Hone et al. [19]	Interaction, content	perceived effectiveness	MOOC was a significant predictor of MOOC retention, mediated by the effect of content on the Perceived Effectiveness of the course. Interaction with the instructor of the MOOC was significant predictor of MOOC retention.
Yu et al. [25]	student-student interaction, student- instructor interaction, student-content interaction	enjoyment, anxiety, boredom	Students' interaction and academic emotions are related to learning persistence. Enjoyment, anxiety and boredom had mediating and moderating effects on the relationship between students' interaction and learning persistence
Joo et al. [26]	self-determination, perceived usefulness, perceived ease of use	satisfaction	Both perceived ease of use and perceived usefulness had a positive influence on students' satisfaction
Roca et al. [27]	Perceived autonomy support, perceived competence, perceived relatedness	perceived usefulness, perceived playfulness, perceived ease of use	Applying SDT to e-learning in a work setting can be useful for predicting continuance intention.
Pituch et al. [28]	System functionality, system interactivity, system response, self- efficacy, Internet experience	perceived usefulness, perceived ease of use, use for supplementary learning	System functionality, perceived ease of use, and perceived usefulness affect use of supplementary learning. System functionality, system interactivity, perceived usefulness, perceived ease of use, and use of supplementary learning affect use of distance education.

Karaali et al. [29]	social experience, facilitating conditions, anxiety	perceived usefulness, perceived ease of use, attitude towards use	Social influence, perceived usefulness, and attitude affect continuance intention.
Limayem et al. [30]	Perceived usefulness, confirmation	Satisfaction, IS continuance intention, prior behavior	Perceived usefulness and satisfaction affect continuance intention
Liao et al. [31]	Perceived usefulness, disconfirmation, perceived ease of use	Subject norm, satisfaction, perceived behavior control	Subjective norm and perceived behavioral control are motivators of continuous use. Perceived usefulness has a direct effect on behavioral intention.
Larsen et al. [32]	Perceived task- technology fit, perceived usefulness, confirmation	Utilization, satisfaction	ask-technology fit as well as variables from PAM explain users' IS continuance intention
Alzahrani et al. [33]	System quality, service quality, information quality	User satisfaction, behavioral intention	Quality factors have a strong influence on satisfaction, behavioral intention, and variance in actual use. Information quality is the strongest predictor to measure user satisfaction, and satisfaction has a strong effect on students' behavioral intention to use the system.

## **2.2 Education for Sustainable Development**

Sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is a way of understanding the world and the method for solving global problems [34]. With a global population of 7 billion people and limited natural resources, each of us and even the whole society must learn to live together in a sustainable way. Everyone needs to take responsible actions based on the understanding that what every people does today will have profound impacts on people's lives and the planet in future. Sustainable Development Goals will guide the people's action in the coming generation. Education for Sustainable Development (ESD) has been on political research agendas since the 1980s. It was emphasized that education is the significant factor to attain sustainable development and education is a key factor to change [35]. Our most significant challenge in this new century is to turn the idea that sounds abstract into reality for all the people's sustainable development worldwide. Education for Sustainable Development (ESD) empowers people to change their thinking and strive to achieve a sustainable future, and it aims to help people develop the attitudes, skills and knowledge to make informed decisions for the benefit of themselves and others, now and in the future, and act upon these decisions. The United Nations Decade of Education for Sustainable Development (2005-2014) is the lead agency, and seeks to integrate the principles, values, and practices of sustainable development into all aspects of education and learning, in order to address the social, economic, cultural and environmental issues everyone is facing in the 21st century.

The Universal Declaration of Human Rights, adopted in 1948, stated that "everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit" [36]. The rise of the ideological trend of social learning and lifelong learning in the 1960s is the reflection on the inadequacy of traditional school education.

There is an intimate relationship between Education for Sustainable Development (ESD) and online education. The development of the Internet has shortened the distance among

people, and online education has the advantages of low price, rich learning content and wide dissemination of high-quality educational resources. The development of online education will provide technical support for everyone to receive an equal education. The Sustainable Development Goals (SDGs) of the United Nations and Education for Sustainable Development (ESD) can be widely publicized through the media of online education. Furthermore, children in impoverished areas acquire more chance to acquire abundant educational resources, which is more convenient than traditional education. If these children have the opportunity to receive and learn scientific knowledge, in the long run, it is more conducive to solving the problems of poverty and gender equality, and beneficial to environmental protection in these areas, thus enabling human beings to achieve the goal of sustainable development.

## **2.3 Online Education**

### **2.3.1 Definition and Connotation of Online Education**

Although there is no universal definition of online education in the academic field, online education is often used alternately with the following terms in academic and practical areas: online learning, E-learning, distance education, open education, web-based education and virtual education. Among the similar terms mentioned above, “distance education” and “open education” emphasize the form of education; the terms “online learning”, “E-learning or electronic learning”, “web-based education”, and “mobile learning”, which are often used in the same way as “online education”, emphasize more on the adoption of information technology approach of education mode. “Online learning” and “E-learning” are more frequently used in the business field, while “distance education” and “open education” are more frequently utilized in the field of higher education.

The term “education” in online education refers to education in a broad sense, including not only school education within the system, but also various training and counseling outside the system. It includes not only the education granting academic qualifications but also non-academic education.

Gilly Salmon believed that the term “online” in “online education” originated from the telephone age, and today’s “online” mainly refers to “online networking”, “computer-based learning”, “e-learning” or “mobile learning”. Training and learning based on computer-mediated communication is the most common online educational form [37]. Gilbert proposed that online learning environment can be divided into three types: fully web-based learning, blended or hybrid learning format and traditional classroom using web learning supplements [38].

### 2.3.2 Development of Online Education in China

Due to the uneven distribution of educational resources in China, high-quality educational resources are often focused on first-tier cities like Beijing, Shanghai and Shenzhen, which contributes to the formation of educational inequality. Otherwise, there is a principle of “enrollment in school nearby” and only students who live in corresponding school districts can take advantage of this policy and enter schools of high educational quality, which also resulted in the rocketing up of housing price nearby schools [39]. Therefore, there is an enormous demand for high-quality educational resources in second and third-tier cities. Meanwhile, owing to the increasing learning pressure of K12, the blowout growth of competition pressure in society and the fast rhythm of life in the first-tier cities, the need for learning and improving themselves has also increased. The rise of online education has met these exuberant educational needs. When online education sprouted in China, it attracted widespread attention. Many traditional education institutions completed the Internet transformation and absorbed a large amount of investment in a short period of time to achieve leapfrog development.

Otherwise, conventional education enterprises have accelerated the transition to online education and have begun to try the offline to online (O2O) model. Using their accumulated abundant customer resources, the Internet giants built online education platforms to move into the education market and prepare for their strategic deployments, such as Netease Cloud Classroom, Tencent Classroom, Baidu Education, Taobao University, Ding Talk, etc.

The preschool education market developed slowly and accounted for a small proportion of less than 1%. K12 education in China primarily refers to the three stages of elementary school, junior high school, and high school. Students in these stages are facing more substantial academic pressure and have a massive demand for discipline education. Thus, the content of K12 education in China is mainly in terms of subject education of elementary school, junior high school, and high school, and subjects aimed at cultivating interests and skills account for a small proportion, which is also true for online education. The imbalance of K12 education resources in the east and west also needs to be solved urgently. In order to help children improve their grades, parents have a strong willingness to purchase high-quality products. Online education can meet the purchasing needs of parents. Therefore, China's K12 online education market accounts for 17.9% as of the end of 2020, and it is expected to increase continuously in the future [40].

Higher education and academic learning objects are students in universities who relatively have more free learning time and an exuberant thirst for further knowledge so that they can select courses of their interest and supplement the knowledge learned in classrooms. Therefore, the online education market can be divided into higher education and academic learning, occupation education, K12 education and preschool education. In terms of higher education and academic learning, online courses are presented in MOOCs and SPOC (Small Private Online Course). MOOCs have broader participants in colleges and universities.

Similar to MOOCs in other countries, MOOCs in China also have general problems such as high dropout rate, lack of innovation, and personalized teaching. The MOOCs in domestic colleges and universities lack a systematic curriculum construction and an effective learning effect evaluation mechanism. As a result, MOOCs can only be utilized as an assisted learning tool for extracurricular learning, which is difficult to reflect students learning level, and intensifies the phenomenon that students cannot persist in completing MOOC courses.

### 2.3.3 Development of Online Education in Japan

Online education in Japan can be traced back to correspondence education in the 1940s when the mainstream media was postal correspondence, radio, and television. With the



development of information and communication technology, there were cases of using internal computer networks to teach in the 1980s. The Japan University / Unix Network (JUNET) was founded in 1984, representing the start of Internet connection services in the education sector; by the mid-1990s, the Unix network replaced the short-lived computer intranet, and e-learning on the Internet has become the primary means of online education in Japan. Japan's information and communication technology have been in a leading position globally for a long time. The Japanese government has positioned information and communication technology as a national strategic industry as early as 1994. Over the past decade, online learning and teaching possibilities have greatly increased, including self-learning options such as those offered by platforms and applications for professional knowledge, hobby, curiosity learning, etc. and personal and group lessons through video supported by social network media, namely Skype and Zoom which is one of the most popular tools for online learning during the COVID 19 pandemic. The 21st century provides a timely opportunity for the government to highlight the Information Technology (IT) Revolution and educational reform as important national policies. However, due to the slow changes in school education laws and regulations, and the large expenditures required for educational informatization software and hardware facilities, the development of online education in Japan is unique from other countries.

Schools around the world have been forced to close their doors during the coronavirus pandemic in 2020, keeping an estimated 1.5 billion students out of classrooms for weeks or even months. A survey by the education ministry in mid-April 2020 shows how little Japanese public schools have adapted. It found that only 5% of local governing bodies across the country planned online classes while schools were shut due to the pandemic. In contrast, 100% of them planned home study with textbooks or printed materials. The teachers considered providing online lessons but gave up the idea because they were worried about inequality. Not all their students have access to both a computing device and reliable internet service. People are too worried about egalitarianism. That's one of the major reasons schools are still sticking to the conventional education style in which students sit passively in classrooms with pencils and notebooks. Nationwide school closures have highlighted the importance of ICT both in schools and at homes. It's time to build a new education system or "hybrid learning" that combines traditional methods with digital or online learning, which ultimately provides students with more creative opportunities. Ultra-egalitarian principles

that stress the same education under the same environment are hindering the spread of online learning.

#### 2.3.4. Advantages (Characteristics) of Online Education

People are living in an era of information explosion and the age of the knowledge economy, wherein knowledge plays a leading role in the whole process of production. Effective acquisition of knowledge is vital for the improvement of business competitiveness and the realization of individual value. With the growing popularity of the Internet, there has been a digital revolution that has brought along many new things like email, e-shopping, e-working, and also e-education [41]. E-education or online education is one method to increase knowledge and skills through information and communications technology. As a new mode of education, online learning provides an opportunity for the reform and innovation of the education sector with its open, personalized, and networked characteristics. The emergence of online education provides a feasible way to optimally allocate educational resources, allowing people in underdeveloped areas to have equal access to such resources.

The online learning market has been expanding at a quick pace in recent years because of the rapid development of information and communications technology and changes in people's lifestyles, especially due to the global coronavirus (COVID-19) outbreak in 2020. The pandemic accelerated the growth in the number of online learners in 2020. According to the 47th China Statistical Report on Internet Development, the number of online learners has reached 342 million, accounting for 34.6% of the total netizens in China in December 2020. With regard to the usage of Internet access devices, about 99% of Internet users use mobile phones as one of the devices to surf the Internet, and the number of mobile phone online learners has reached 341 million, accounting for 34.6% of the total mobile phone users in China. With the prevention and positive control of the epidemic, the normal teaching order in universities, middle schools and primary schools has basically been restored [42]. Meanwhile, the user size of online education has dropped after March 2020, but it still increased by 109 million compared with the user size before the epidemic (in June 2019). The global online learning industry is increasing at an annual growth rate of 19% or more

and is projected to become a 243 billion USD industry within the next two years. The United States dominates the global online education market. However, regions such as Europe, Latin America, and Asia are also starting to become increasingly important players in the industry [5].

Although the student number and market scale are growing rapidly, there is also a growing concern over the issue of high dropout rates in the online learning environment [43]. MOOC College, the largest Chinese MOOC learning community in the world, launched a survey of Chinese MOOC learners for three consecutive years from 2013 to 2015. The results showed that the dropout rate in China is roughly equivalent to that in other countries. It also revealed that the MOOC completion rate is less than 10% [44]. According to the MOOC learners' survey in 2014, the MOOC user size has increased from 130,000 to 650,000, but the "dropout rate" is still relatively high. At least half of the registered students do not attend classes, and only about half of the students present eventually complete the course.

## **2.4 Information Systems Success Model**

After summarizing and analyzing theoretical and empirical information system research conducted by many scholars several decades ago, Delone and McLean initially proposed the information systems (IS) success model, which was used to interpret the success of information systems under various conditions [45,46]. The IS success model or Delone and McLean IS success model is an information systems (IS) theory which seeks to provide a comprehensive understanding of IS success by explaining the relationships among six of the most critical dimensions of success along which information systems are commonly evaluated. The IS success model has been cited in thousands of scientific papers and is considered to be one of the most influential theories in contemporary information systems research.

Delone and McLean divided information systems success into six dimensions, that is, system quality, information quality, use, user satisfaction, individual impact, and organizational impact [47]. Seddon revised the model, preserving most of the elements of the D&M model while using "usefulness" as the mediator [48]. User satisfaction also

contributes to continuance intention toward a system, while information system success will bring benefits to individuals, organizations, and society.

Delone and McLean revised the model proposed in 1992 (Figure 3), adding a new dimension of service quality [11, 44, 49]. In the process of implementation of an information system, users consider not only the system but also the services. Therefore, service quality also facilitates the success of an information system. The concept of usage intention was also involved in the model. Since the IS success model was put forward, it has been widely used in the application and verification of enterprise and government information systems. Consequently, the model has evolved and is composed of six dimensions, that is, system quality, information quality, service quality (SQ), intention to use, user satisfaction, and net benefits [49, 50] (Figure 4).

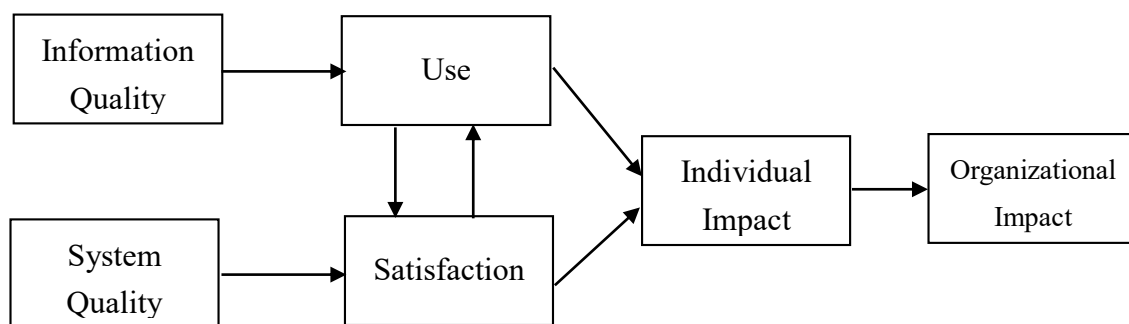


Figure 1 Delone and McLean IS success model (1992)

As regards the first three dimensions of the IS success model, system quality refers to the technical efficacy of the concerned system in terms of ease-of-use, functionality, reliability, flexibility, data quality, portability, integration, and importance; information quality is correlated with semantic success and system outputs in terms of accuracy, timeliness, relevance, and consistency; and service quality is characterized by the support users get from the IS department, such as empathy from personnel and responsibility [44, 48, 49].

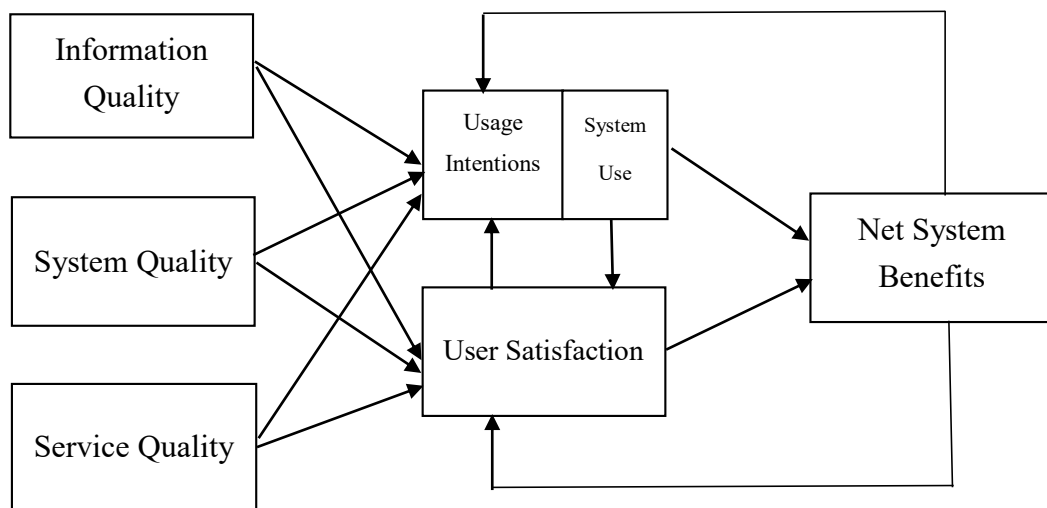


Figure 2 Delone and McLean IS success model (2002)

## **2.5 Interaction in Online Education**

Interaction has long been viewed as a crucial component in the field of education, and it is a concept introduced from social psychology into the field of teaching. Although this concept does not have a clear and widely accepted definition, the essential characteristic of interaction or interactivity is reciprocal behaviors that involve two or more subjects and their dealings. Interaction in education refers to the reciprocal behavior between the learner and the learning environment, which can be described as instructional interaction in the educational environment [51, 52]. Instructional interaction is aimed at helping learners change and achieve their goals [53]. Michael G. Moore listed three types of interactions in distance education, that is, student-student (SS) interaction, student-instructor (SI) interaction, and student-content (SC) interaction [17]. No single medium is superior to another in terms of supporting the educational experience. Student-instructor interaction currently has the highest perceived value among students, and thus commands a competitive market value [51]. Additionally, student-instructor interaction can offer assistance that is emotional, organizational, or instructional in nature [54]. Student-content interaction is characterized by learners' internal didactic conversation or "talk to themselves" when they interact with textbook, lecture or other content, and this type of interaction is dependent on self-motivated capability. Student-Student interaction is sometimes an extremely essential resource for learning. A group of fellow learners are invaluable to both learners and instructors in application and evaluation.

## **2.6 Perceived Value**

Perceived value (PV) was first examined as an economic concept, but it is also regarded as an essential competitive strategy [55]. This concept can be defined as the consumer's evaluation of the utility of a product or service based on perceptions of what is received and what is given [56]. Perceived value is often considered to be a concept of equity, which means the evaluation of fairness, utility, or perceived cost of the offering [55,57]. Different values can be perceived by customers, such as functional value, social value,

emotional value, epistemic value, and conditional value [58]. For this investigation, perceived value was defined as consumers' overall assessment of what is received relative to what is given [59, 60]. Although it is considered an economic concept, perceived value can also be utilized in other fields like online education in that it is context specific and varies across service settings and individuals. Babin et al. classified perceived value into two different types, namely hedonic and utilitarian. Hedonic value is the value of enjoyment [61].

Many scholars have carried out various studies on the dimension of perceived value. Zeithaml et al. considered consumers' perceived value as the trade-off between perceived benefits and perceived sacrifice, thus producing an overall evaluation of the utility of a product or service [59, 62]. Mizik and Jacobson held the view that perceived value is the core consequence of marketing activities in that it is crucial for acquiring long-term business success [63].

Consumers are transforming from material consumption in the past to the consumption mode with new connotation and characteristics of emotional and spiritual consumption. Perceived value is considered as a significant factor to attract and maintain consumers in this transformation process, so it is also a significant sector in enterprises' strategy.

## **2.7 Continuance Intention in Online Education**

Intention is interpreted as an individual's views or ideas on things, thus resulting in subjective thinking. There is no unified definition of this concept in relevant research on continuance intention. The behavior of continuous use depends on users' continuance intention (CI), and Bhattacharjee employs the expectation confirmation theory to further interpret and comprehend this concept [64]. Expectation confirmation theory is widely applied in the literature on consumer satisfaction, purchase intention, and brand promotion. Initial acceptance of online learning is the first step in receiving online education. Only when learners have the intention to continue participating in learning activities can online learning play its commercial and educational role effectively. The issues of "high dropout rate" and "low completion rate" have restricted the sustainable development of online education.

Hence, the continuance intention of online learners has been viewed as a crucial driver in promoting the development of online education.

Meanwhile, definitions of constructs in this study are proposed in Table 2:



Table 2 Definitions of constructs

Constructs	Definition	Source
Service Quality	Global judgement, or attitude, relating to the superiority of the service.	Parasuraman et al. (1985) [65]
Student-Student Interaction	Learners' engagement (reciprocal relationships) in the learning and teaching process. It also refers to dialogue between and/or among different participants in online learning environments.	York, Cindy S. et al. (2012) [66]
Student-Instructor Interaction	Students and instructor's engagement (reciprocal relationships) in the learning and teaching process.	York, Cindy S. et al. (2012) [66]
Student-Content Interaction	Interaction with content refers to a one-way process of elaborating and reflecting on the subject matter or the course content	Yu et al. (2020) [25]
Perceived Value	The consumer's evaluation of the utility of a product or service based on perceptions of what is received and what is given.	Petter et al. (2008) [47]
Continuance Intention	The subjective probability that the learner will continue using Web-based learning	Mathieson (1991)[67] Bhattacharjee (2001) [68]

## Chapter 3. Research Methodology

### 3.1 Research Model

Based on existing theories and research related to online learning continuance intentions described in Section 2, nine research hypotheses were constructed (as shown in Figure 5), which indicate the factors of and mediators for online learners' continuance intentions.

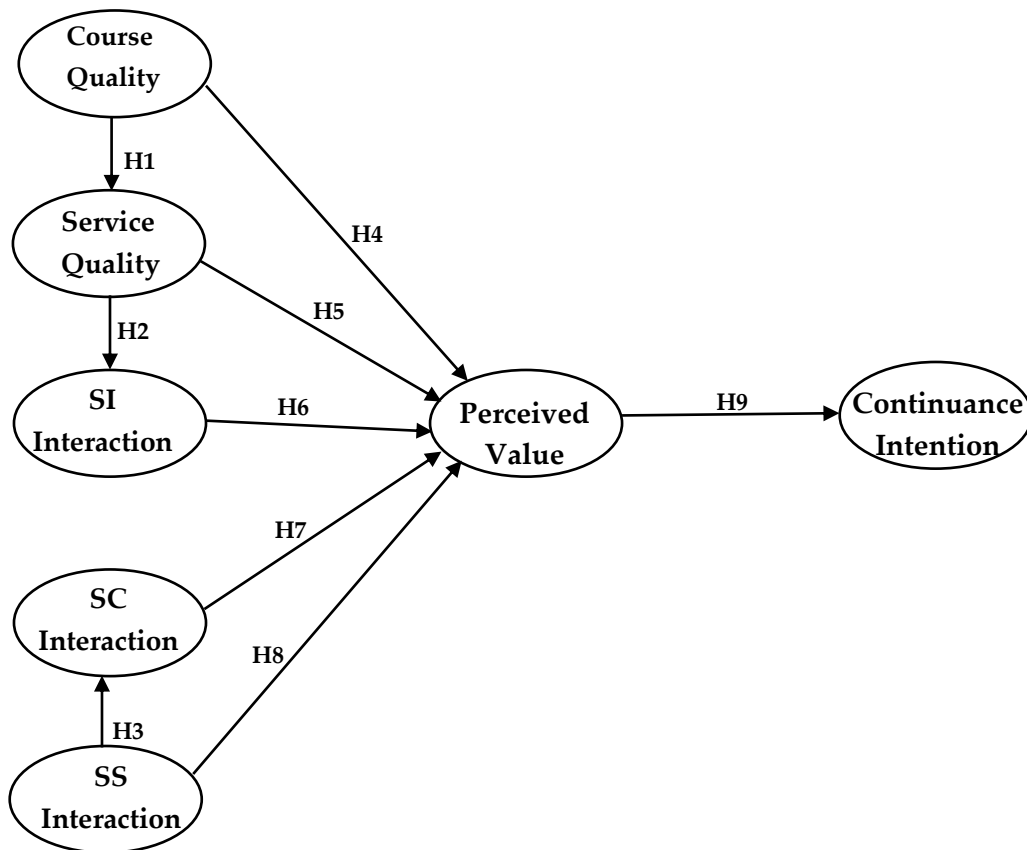


Figure 3 Research model for continuance intention toward online education.

### 3.2 Research Hypotheses

This study primarily adopted the information systems (IS) success model and the concept of interaction to explore the variables influencing learners' perspectives about online education. Among the six dimensions of the IS success model, course quality refers to the quality of e-learning system outputs, which include course knowledge and the authority of teaching content [49]. Information quality captures the content issue of the information system [46]. Hence, course quality and information quality have a similar connotation. In this study, course quality (CQ) replaces information quality in order to emphasize its pedagogical implications because the quality of well-designed courses is considered more crucial in the context of online education [14]. As a crucial dimension of perceived quality, service quality, which refers to the whole gamut of support received from the service provider, has started playing an increasingly significant role [46]. Broadly speaking, the improvement of course quality plays a considerable role in optimizing service quality. In this case, there is an intimate correlation between course quality and service quality. Therefore, the relationship between course quality and service quality is proposed in hypothesis 1.

**Hypothesis 1 (H1):** *Course quality has a positive effect on service quality.*

The interaction between human beings and the environment is considered a crucial aspect in understanding an individual completely [69]. Students view student-instructor (SI) interaction as the most reliable element [51]. Furthermore, service quality is characterized by the overall support that users get from support providers, including support received from online learning platforms or systems [50]. High levels of service quality of support providers will promote a smoother interaction between students and instructors. Therefore, the hypothesis on the relationship between service quality and student-instructor interaction is as follows:

**Hypothesis 2 (H2):** *Service quality has a positive effect on SI interaction.*

Anderson suggested that the developments in information technology, improvements in storage capability, and increase of functionality offer the opportunity to transform student-student (SS) interaction and student-instructor (SI) interaction into enhanced modes of student-content (SC) interaction [51]. In the context of a new technical revolution, student-student interaction enables students to understand the learning content in a more intellectual way and gradually change their cognitive structure. Therefore, the hypothesis on the relationship between student-student interaction and student-content interaction is as follows:

**Hypothesis 3 (H3):** *SS interaction has a positive effect on SC interaction*

Zeithaml believed that consumers' perceived value is their overall perception of products based on a cost-benefit analysis [56]. Patterson and Spreng pointed out that the comprehensive trade-off between perceived gains and losses is the essence of consumers' perceived value in their comprehensive evaluation of products and services [62]. When learners select an online course to pursue, course quality is one of the important issues to be considered. At the same time, course quality also has a significant influence on learners' decisions regarding whether to continue online learning after a period of time. As course quality increases, online learners' perceived value of courses is likely to increase, which would facilitate their retention in online courses. Therefore, the hypothesis on the relationship between course quality and learners' perceived value is as follows:

**Hypothesis 4 (H4):** *Course quality has a positive effect on learners' perceived value.*

Sassere et al. observed that service quality includes two parts, service results and the method of providing services [70]. Roca et al. held a view that service quality is intimately correlated with confirmation and thereby the perceived usefulness of online education [71]. Wang et al. suggested that service quality influences perceived value and user satisfaction, which also affects learners' loyalty and continuance intention [72]. Consequently, the hypothesis on the relationship between service quality and learners' perceived value is as follows:

**Hypothesis 5 (H5):** *Service quality has a positive effect on learners' perceived value.*

Interaction implies mutual exchange among human beings or between humans and content that may include knowledge [72]. Based on this perspective, three types of interactions in the context of online education are proposed: SI interaction, SC interaction, and SS interaction. Interaction in online courses allows students to be participants rather than listeners, which prompts students to increase their perceived value of courses. As a result, the hypotheses on the relationships between the three types of interactions and learners' perceived value are as follows:

**Hypothesis 6 (H6):** *SI interaction has a positive effect on learners' perceived value.*

**Hypothesis 7 (H7):** *SC interaction has a positive effect on learners' perceived value.*

**Hypothesis 8 (H8):** *SS interaction has a positive effect on learners' perceived value.*

Tam, J. L. M. provides evidence that perceived value is more effective than consumption in stimulating consumers' purchase intention and purchase behavior, and it plays a significant mediating role in the model [20]. Woodruff, Flint, and Gardial state that value can be approached in three different directions: values, desired values, and value judgments. In the online education environment, the category of value judgments implies learners' perceived value of online courses [73]. In this case, the higher the perceived value of a product or service is, the stronger is the willingness to continue using that product or service [74]. Thus, the hypothesis on the relationship between perceived value and learners' continuance intention is as follows:

**Hypothesis 9 (H9):** *Perceived value has a positive effect on learners' continuance intention.*

### 3.3 Questionnaire Content and Composition of Respondents

The questionnaire, which was designed based on existing questionnaires and literature, comprised 7 constructs and 27 related items. The questionnaire was distributed as an online survey hosted by a professional online survey platform (<https://www.wjx.cn>). Data was collected from 399 respondents living in China in April and May 2020, but 17 responses were determined to be invalid because they included doubtful answers or were provided by respondents with no e-learning experience. Thus, survey data from 382 respondents was considered to be valid and utilized in this study. These respondents were all Chinese who came from 32 provinces across the country and had previous online learning experience. The questionnaire scale was designed using a five-point Likert scale, with the response options from 1 to 5 being “Strongly Disagree,” “Disagree,” “Neutral,” “Agree,” and “Strongly Agree,” indicating the degree of agreement [75]. Table 3 summarizes the demographic profile of the respondents to the online survey. Specifically, it can be seen that about 62.57% of the respondents are women and around 37.43% men. Most of the respondents are between the ages of 18 and 25. As for occupation, most of the participants are students because they have more free time and a need for online education. It is worth noticing that undergraduate students account for 68.85% of the respondents and that nearly half of the learners engage in less than 10 hours of online learning per week.

Table 4 summarizes the questionnaire content. As shown in the table, there are 7 constructs that correspond to 7 variables in the model introduced before. Every construct has several related items, which were framed as questions in the questionnaire. For example, CQ1, 2, 3, 4, and 5 are five related questions of the construct Course Quality. As mentioned above, every question or item had five choices in the questionnaire. As for indicators of per factor, if only two variables load on a factor, there will likely be bias in the parameter estimates, but “for three or more indicators per factor, this bias nearly vanishes” [96]. Thus, it is better to have at least 3 indicators for every construct when the questionnaire was designed. Otherwise, Boomsma has also advised that it is dangerous to use sample sizes smaller than 100, giving the additional qualification, “if the researcher wants a low risk of drawing the wrong conclusions, he should have a sample size of at least 200” [97]. In this

study, 382 samples are collected, which meets the requirements of related literature. Meanwhile, in order to avoid subjective design of the questionnaire and make the questionnaire more objective, the author referred to the existing questionnaires of many scholars, and selected questions that appear more frequently, and modified some words but the meaning is the same or similar.

Table 3 Sample demographics (n=382).

Variables	Classification	Frequency	Percentage (%)
Gender	male	143	37.43
	female	239	62.57
Age	less than 18	3	0.79
	18~25	287	75.13
	26~30	73	19.11
	31~40	16	4.19
	41~50	3	0.79
Occupation	students	287	75.13
	employees	52	13.61
	civil servants	16	4.19
	teachers	18	4.71
	others	9	2.36
Education level	high school	13	3.4
	junior college	40	10.47
	undergraduate	263	68.85
	master	55	14.4
	doctoral	11	2.88
Online learning time per week	0-10h	197	51.57
	11-20h	115	30.1
	21-30h	46	12.04
	more than 31h	24	6.28



Table 4 Summary of the questionnaire content.

Construct	Items
Course Quality (CQ)	CQ1 The online learning service provides courses I need.
	CQ2 The online learning service provides courses that could help me improve skills.
	CQ3 The online learning service provides courses that are easy to understand.
	CQ4 The online learning service provides courses that demonstrate high reliability.
	CQ5 The online learning service provides courses that are all-dimensional and accurate.
Service Quality (SQ)	SQ1 The online learning system helps me acquire knowledge more efficiently.
	SQ2 The online learning system provides excellent service to users.
	SQ3 The online learning system can provide quick feedback to my request.
SS Interaction (SSI)	SSI1 I can communicate with peer students quickly and easily.
	SSI2 I can communicate with peer students about professional knowledge most of the time.
	SSI3 I have frequent communication with peer students in online learning.
	SSI4 I maintain a close relationship with peer students in online learning.
	SII1 I have frequent interaction with instructors during online classes.
	SII2 The instructors provide different ways for learners to interact with instructors.

SI Interaction (SII)	SII3	I can get quick feedback from instructors.
	SII4	I can easily communicate with instructors via online learning.
	SII5	The instructors provide professional instruction to counsel learners.
SC Interaction (SCI)	SCI1	The online learning system helps me understand the learning content more deeply.
	SCI2	The online learning system prompts me to preview and review the learning content on time.
	SCI3	The online learning system inspires my enthusiasm to acquire knowledge.
Perceived Value (PV)	PV1	The online learning system is useful to me in improving my skills and knowledge.
	PV2	The online learning system plays a significant role in the process of learning.
	PV3	Through the online learning system, I accomplished what I planned to do with this course.
	PV4	I use the online learning system to gain knowledge more efficiently compared with traditional ways of learning.
Continuance Intention (CI)	CI1	1. I will continue to pursue courses online in the future.
	CI2	2. I will recommend others to pursue learning courses online in the future.
	CI3	3. I will frequently pursue courses online in the future.

### 3.4 Structural Equation Modeling (SEM)

Structural equation model, abbreviated as SEM, is a comprehensive statistical analysis method that combines factor analysis and path analysis. It can not only study the internal

structure relationship of variables, but also the relationship between variables. SEM is able to measure multiple variables and allow errors. Observed variable, also called measurement variable and manifest variable, refers to those variables that can be directly observed and measured, such as social demographic characteristics of people. Observed variables are items in the questionnaire, and unique variable is a variable that cannot be actually measured and exists in the experiment and in the observed variable.

Structural equation modeling is an advanced statistical technique that has many layers and many complex concepts. Researchers who use structural equation modeling should have a good understanding of basic statistics, regression analyses, and factor analyses. Building a structural equation model requires rigorous logic as well as a deep knowledge of the field's theory and prior empirical experience. SEM allows questions to be answered that involve multiple regression analyses of factors. At the simplest level, the researcher posits a relationship between a single measured variable and other measured variables. The purpose of SEM is to attempt to explain "raw" correlations among directly observed variables.

Many concepts such as psychology, education, and society are difficult to measure directly and accurately so that these variables are called latent variables, such as intelligence, learning motivation, learners' satisfaction, family socioeconomic status, and so on. Therefore, observable indicators can be used to indirectly measure these latent variables. Traditional statistical methods cannot effectively be utilized to deal with these latent variables, while structural equation models can deal with latent variables and their indicators at the same time. Commonly used analysis software for structural equation modeling includes LISREL, AMOS, EQS, and MPlus. Structural equation models can be divided into measurement models and structural models. The measurement model refers to the relationship between indicators and latent variables. The structural model refers to the relationship between latent variables.

### **3.5 Data Analyses and Results**

Anderson and Garbing have indicated that there can be a rigorous analysis of the measurement model (outer model) and structural model (inner model) when SEM is utilized

as the research methodology [76]. Many psychological, educational and social concepts cannot be measured and observed directly, such as attitude, behavior patterns, cognitions, social experience and emotions. These abstract concepts are called latent variables or latent constructs like course quality and service quality in Figure 6. Thus, sets of observed variables are used to measure latent variables. As shown in Figure 6, there are 7 latent variables, and every latent variable has several observed variables. For example, the latent variable of course quality, abbreviated as CQ in the model, has 5 observed variables shorted as CQ1, CQ2, CQ3, CQ4, and CQ5 in the model. It is also called measurement model which focuses on how one or more latent variables are measured, or represented by a set of observed variables.

The relationship between measurement model (outer model) and questionnaire design will be introduced briefly here. For example, as narrated before, the latent variable of course quality has 5 observed variables used to measure course quality variable in the model. Thus, 5 questions related to course quality will be designed.

The focus of measurement model analysis is the relationship of the observed to the latent variables. Anderson and Garbing proposed that the analysis of measurement model is to verify reliability, convergent validity, and discriminant validity. Convergent validity, an essential parameter in social science research, indicates the degree to which two measures of constructs that theoretically should be related are in fact related, and reflects the correlation of different indicators for the same construct, whereas discriminant validity refers to the degree to which two conceptually similar concepts are in fact distinct. For example, as for course quality variable, convergent validity is to measure whether there is a close relationship among CQ1, CQ2, CQ3, CQ4 and CQ5. Discriminant validity is to measure there is no close relationship between course quality and service quality.

To examine the measurement model in this study, the author employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to perform confirmatory factor analysis (CFA) to determine the reliability, convergent validity, and discriminant validity of the model (Figure 7). The reliability of the measurement model was examined utilizing the composite reliability (CR) value. Fornell and other scholars hold the view that convergent validity should be analyzed using average variance extracted (AVE), composite reliability

(CR), Cronbach's alpha (CA), and factor loading values [77]. Factor loading was higher than 0.7, demonstrating a great model fit.

In Table 5, every construct has several items which correspond with questions designed in the questionnaire. For example, CQ (course quality) has 5 items, CQ1, CQ2, CQ3, CQ4, and CQ5, which correspond with five questions related to course quality. Table 5 shows that the values of factor loading exceed the threshold of 0.7. Meanwhile, the values of AVE, CR, and CA should be higher than 0.5, 0.7, and 0.7, respectively [78, 79]. The result indicates that AVE ranged from 0.580 to 0.811, CR was between 0.847 and 0.928, and CA ranged from 0.734 to 0.884. In this case, all these constructs have satisfactory reliability and convergent validity based on criteria cited from Fornell and Larcker [77].

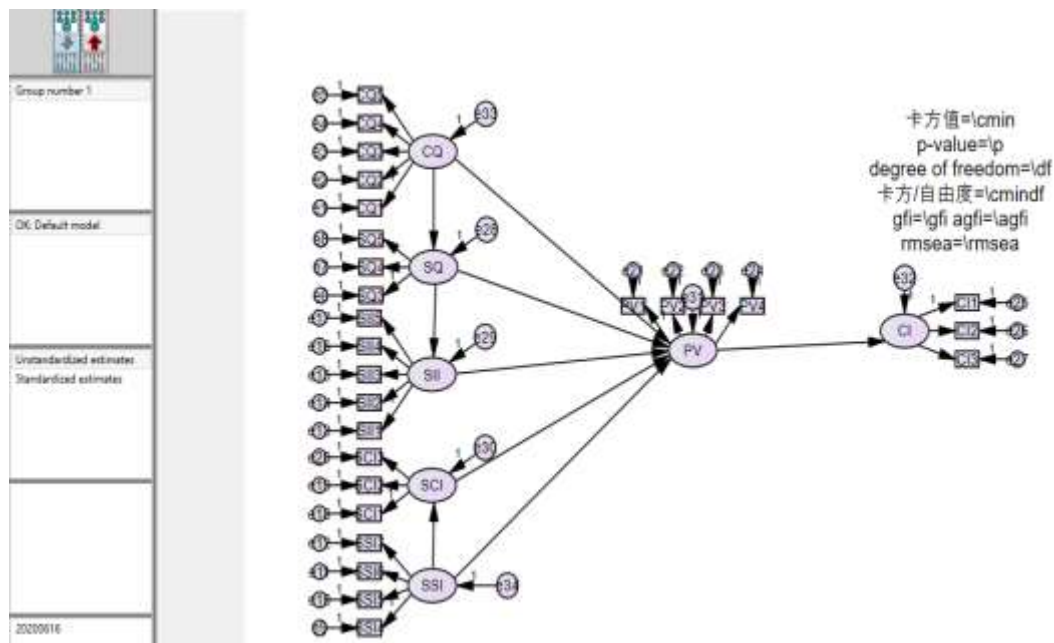


Figure 4 Structural Equation Modeling (SEM)

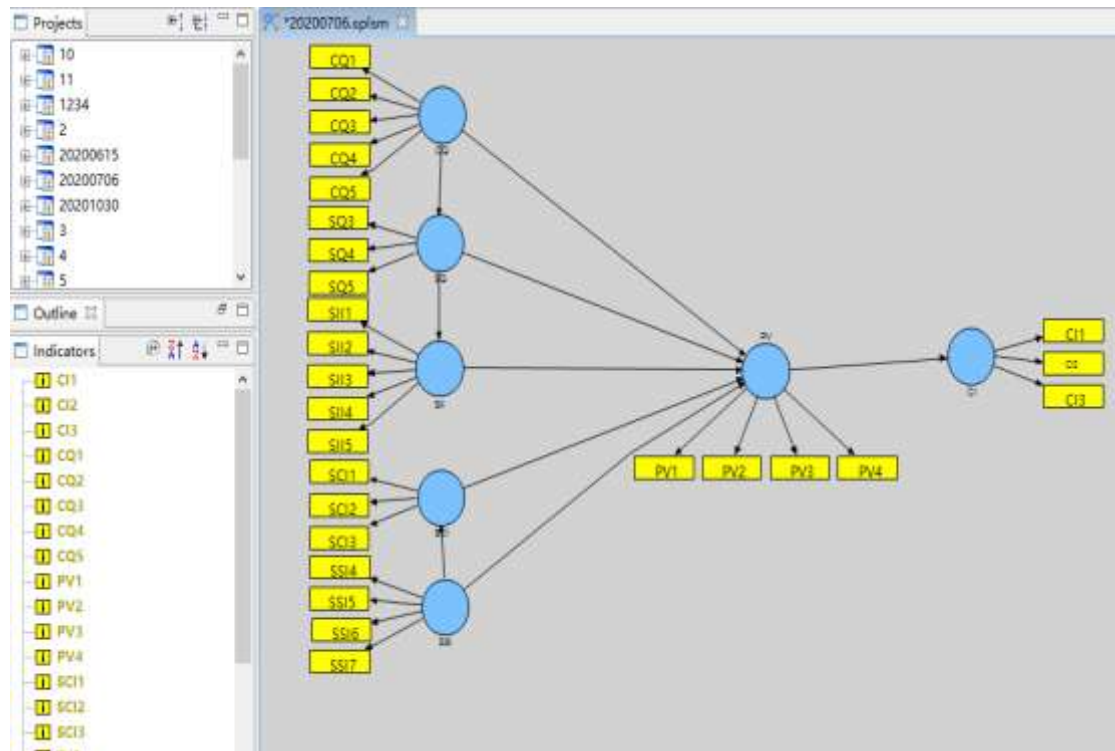


Figure 5 Partial Least Squares Structural Equation Modeling (PLS-SEM)

Table 5 Summary of the outer model.

<b>Construct</b>	<b>Items</b>	<b>Factor Loading</b>	<b>AVE</b>	<b>CR</b>	<b>CA</b>
CI	CI1 <- CI	0.908	0.811	0.928	0.884
	CI2 <- CI	0.900			
	CI3 <- CI	0.894			
CQ	CQ1 <- CQ	0.734	0.635	0.897	0.856
	CQ2 <- CQ	0.769			
	CQ3 <- CQ	0.827			
	CQ4 <- CQ	0.844			
	CQ5 <- CQ	0.805			
PV	PV1 <- PV	0.839	0.677	0.893	0.841
	PV2 <- PV	0.827			
	PV3 <- PV	0.853			
	PV4 <- PV	0.770			
SCI	SCI1 <- SCI	0.848	0.670	0.859	0.754
	SCI2 <- SCI	0.811			
	SCI3 <- SCI	0.795			
SII	SII1 <- SII	0.702	0.619	0.890	0.846
	SII2 <- SII	0.805			
	SII3 <- SII	0.829			
	SII4 <- SII	0.835			
	SII5 <- SII	0.757			
SQ	SQ1 <- SQ	0.831	0.654	0.849	0.734
	SQ2 <- SQ	0.852			
	SQ3 <- SQ	0.737			

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	SSI1 <- SSI	0.737			
SSI	SSI2 <- SSI	0.728			
	SSI3 <- SSI	0.809	0.580	0.847	0.758
	SSI4 <- SSI	0.770			

---

Notes: CI=Continuance Intention; CQ=Course Quality; PV= Perceived Value;

SCI=SC Interaction; SII=SI Interaction; SQ=Service Quality; SSI=SS Interaction



Discriminant reliability is to measure there is no close relationship or there is great difference between two different constructs. Discriminant reliability is primarily examined by two methods. The first is that the square root of AVE value should exceed the values of correlation constructs, which can be manifested in the inter-construct correlations in Table 6, indicating satisfactory discriminant validity [80,81]. In Table 6, the bold is the square root of AVE value which is obviously higher than other values. The second criterion relates to the comparison between the values of the constructs' item loading and cross loading of other variables. Cross loading implies how strongly each target item loads on the non-target factors. Table 7 shows that all of the item loading values are higher than the cross-loading values of potential variables. For example, the value of CI and CI1 is higher than that of CI and CQ1. The value of CI and CQ1 is related to cross loading. In this case, discriminant validity of all the constructs is considered to be significant. It also indicates that each construct in the model is actually distinct and has sufficient discriminant validity. Among all the item loadings in the table, Course Quality (CQ) values are the highest, which implies that the correlation between the items and construct is the highest.

Table 6 Inter-construct correlations

	CI	CQ	PV	SCI	SII	SQ	SSI
CI	<b>0.901</b>						
CQ	0.504	<b>0.797</b>					
PV	0.722	0.571	<b>0.823</b>				
SCI	0.081	0.066	0.088	<b>0.818</b>			
SII	0.437	0.420	0.542	0.039	<b>0.787</b>		
SQ	0.495	0.639	0.562	0.038	0.497	<b>0.808</b>	
SSI	0.112	0.066	0.069	0.643	0.049	0.039	<b>0.762</b>

Table 7 Results of factor analysis with overall samples

	CI	CQ	PV	SCI	SII	SQ	SSI
CI1	<b>0.908</b>	0.487	0.677	0.075	0.400	0.466	0.087
CI2	<b>0.900</b>	0.431	0.624	0.045	0.430	0.431	0.104
CI3	<b>0.894</b>	0.443	0.648	0.099	0.353	0.441	0.113
CQ1	0.369	<b>0.734</b>	0.363	0.078	0.286	0.430	0.058
CQ2	0.449	<b>0.769</b>	0.431	0.098	0.294	0.464	0.112
CQ3	0.383	<b>0.827</b>	0.456	0.045	0.331	0.508	0.094
CQ4	0.400	<b>0.844</b>	0.523	0.056	0.375	0.543	0.034
CQ5	0.413	<b>0.805</b>	0.484	0.000	0.375	0.582	-0.020
PV1	0.583	0.504	<b>0.839</b>	0.079	0.468	0.511	0.062
PV2	0.608	0.497	<b>0.827</b>	0.076	0.463	0.455	0.014
PV3	0.591	0.528	<b>0.853</b>	0.066	0.492	0.516	0.053
PV4	0.599	0.337	<b>0.770</b>	0.067	0.350	0.355	0.105
SCI1	0.035	0.029	0.041	<b>0.848</b>	0.039	0.004	0.594
SCI2	0.075	0.086	0.143	<b>0.811</b>	0.047	0.071	0.458
SCI3	0.097	0.054	0.041	<b>0.795</b>	0.010	0.026	0.513
SII1	0.275	0.200	0.375	0.070	<b>0.702</b>	0.300	0.053
SII2	0.312	0.348	0.410	0.080	<b>0.805</b>	0.380	0.100
SII3	0.347	0.348	0.398	0.014	<b>0.829</b>	0.418	0.029
SII4	0.392	0.371	0.487	-0.011	<b>0.835</b>	0.424	-0.004
SII5	0.379	0.363	0.450	0.013	<b>0.757</b>	0.417	0.023
SQ1	0.429	0.578	0.510	0.049	0.369	<b>0.831</b>	0.022
SQ2	0.405	0.577	0.464	0.061	0.394	<b>0.852</b>	0.021
SQ3	0.365	0.374	0.379	-0.027	0.456	<b>0.737</b>	0.056
SSI1	0.108	-0.004	0.047	0.492	0.025	0.044	<b>0.737</b>
SSI2	0.073	0.041	0.010	0.465	0.041	-0.011	<b>0.728</b>
SSI3	0.075	0.110	0.088	0.514	0.077	0.087	<b>0.809</b>
SSI4	0.086	0.049	0.060	0.485	0.003	-0.007	<b>0.770</b>

Regarding the analysis of the structural model in this study, the model's goodness-of-fit and overall explanatory power were considered. Goodness-of-fit analysis refers to how well a model fits a set of observations. Measures of goodness of fit typically summarize the discrepancy between observed values and the values expected under the model in question. Table 8 lists some fit indexes, recommended value, and real results of this study. Fit indexes are as follows: the chi-square statistics minimum discrepancy per degree of freedom (CMIN/DF) is 1.961, goodness-of-fit index (GFI) 0.895, adjusted goodness-of-fit index (AGFI) 0.874, comparative fit index (CFI) 0.938, and root mean squared error approximation (RMSEA) 0.05. They all meet the recommended value of the index [82].

Table 8 Indicators of model goodness-of-fit

Fit Index	Recommended Value	Results in this study
CMIN		617.668
DF		315
Chi-square Statistic		
CMIN/DF	$\leq 3.0$	1.961
GFI	$\geq 0.80$	0.895
AGFI	$\geq 0.80$	0.874
CFI	$\geq 0.90$	0.938
RMSEA	$\leq 0.08$	0.05

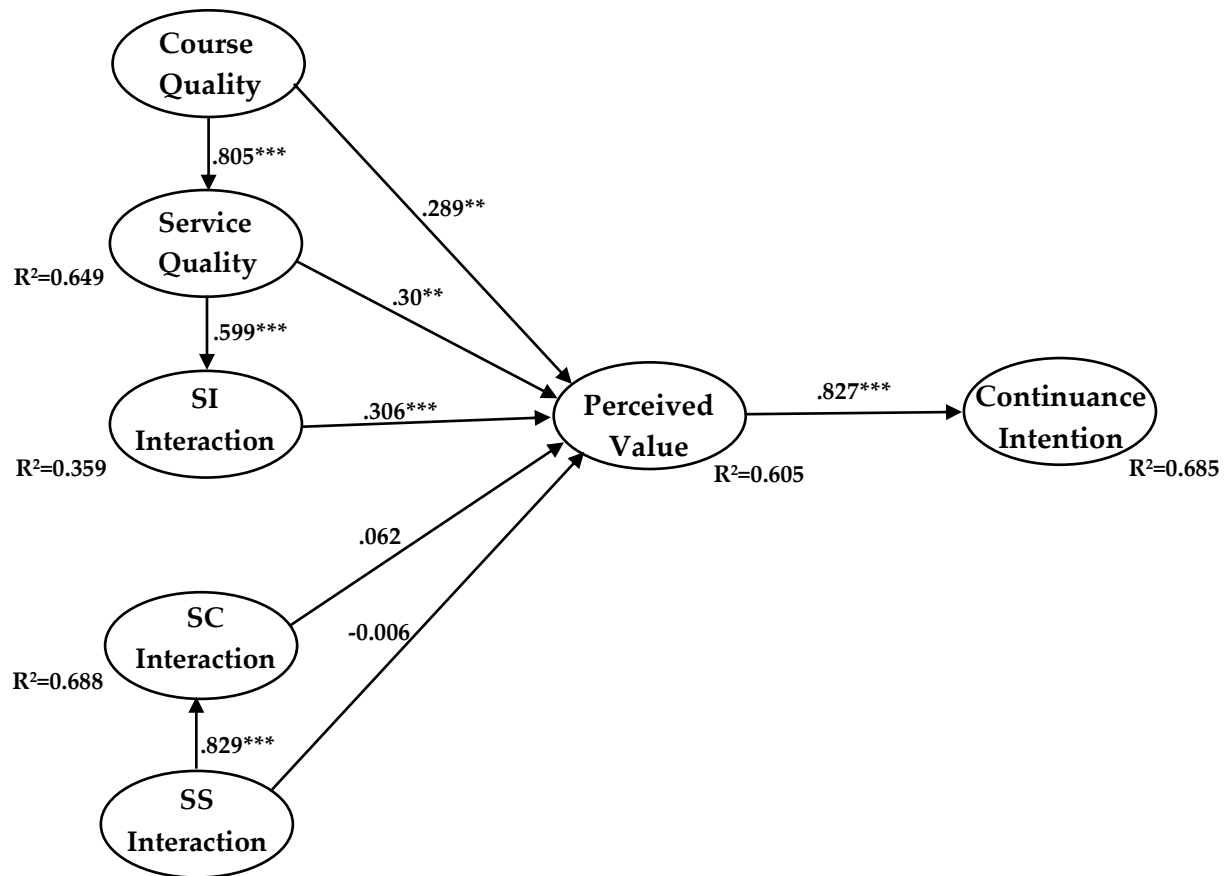
### 3.6 Hypotheses Tests Results

As for the analysis of the standardized path coefficient, as shown in Table 9, the CR value should be higher than 1.96, and the path is proved to be significant when the P value is less than 0.05. It is evident that Hypothesis 7 and 8 are not acceptable. It also manifests that student-instructor interaction has a more salient influence on learners' perceived value for online courses. Perceived value has the most significant effect on online learners' continuance intention. Additionally, in Figure 8, the R-square value demonstrates the model's explanatory power for every variable. The overall explanatory power of the model in this study has an R-square value of 68.5% for continuance intention in online learning. Service quality has an R-square value of 64.9% and perceived value 60.5%, implying an acceptable power of this model to explain continuance intention in an online learning environment.

Table 9 Standardized estimates

H#	Path	S.E.	C.R. (>1.96)	P	Standardized Path Coefficient	Y/N
H1	Service Quality <-- Course Quality	0.087	10.292	***	0.805	Yes
H2	SI Interaction <-- Service Quality	0.074	8.182	***	0.599	Yes
H3	SC Interaction <-- SS Interaction	0.112	9.632	***	0.829	Yes
H4	Perceived Value <-- Course Quality	0.127	2.919	0.004**	0.289	Yes
H5	Perceived Value <-- Service Quality	0.132	2.602	0.009**	0.3	Yes
H6	Perceived Value <-- SI Interaction	0.073	4.784	***	0.306	Yes
H7	Perceived Value <-- SC Interaction	0.106	0.539	0.59	0.062	No
H8	Perceived Value <-- SS Interaction	0.137	-0.056	0.955	-0.006	No
H9	Continuance Intention <-- Perceived Value	0.069	14.333	***	0.827	Yes

Notes: \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .



. Notes: \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

Figure 6 Results of the research model tests

## Chapter 4. Discussion

As a new learning mode, online education has the characteristics of openness, repeatability, low cost, etc., which provide a new opportunity for educational reform and innovation in the Internet era. The principal issue of online education at present is the high dropout rate of online learners. While we recognize the significance of online education nowadays, it is still necessary to explore the issue of continuance intention in an online learning environment. Based on the results of the analyses in this study, the following findings were reached:

The relationship between variables is also an important part that cannot be ignored. The testing results in section 3 demonstrated that H1, 2, and 3 were confirmed, implying that course quality, service quality, and student-instructor interaction have correlations and influences with each other. Student-student interaction was found to have a positive effect on student-content interaction. The results obtained also showed that H4, 5, and 6 were supported, demonstrating that course quality, service quality, and student-instructor interaction are secondary determinants of online learners' continuance intention, and these variables had a direct effect on online learners' perceived value. The results supported Hone's research which reported the factors affecting MOOC retention and found that MOOC course content and interaction with instructors were significant predictors for MOOC retention [19]. Meanwhile, this result was also consistent with the study of Dağhan et al. who suggested the association between overall quality variables, perceived value and continuance intention in online learning [11]. Wang, Y.S. proposed an updated IS success model in the context of studying e-commerce system success and showed that service quality had a strong effect on perceived value, which also positively influenced intention to use in system success. Thus, our study partially supports the conclusions of Wang's research [83]. Cronin et al. assessed the influence of the drivers of quality, value, and satisfaction on behavioral intentions, which empirically verified that service quality had an indirect influence on intention to use [84]. Teas et al. built on a conceptual model to test the influence of extrinsic cues on perceived quality, perceived value, and perceived sacrifice. The results



indicated that perceived quality was a direct antecedent of perceived value, which would also act on purchase intentions in commerce [85]. Bolton et al. developed a multistage model for assessing service quality and value for customers, and this study concluded that customers' appraisal of service value was positively correlated with their assessment of service quality [86]. Cyr et al. examined the essential impact of perceived interactivity on e-loyalty and concluded that perceived interactivity positively influenced the e-loyal behavior of online users [87].

Regarding the second research question in this study, H7 and 8 were not confirmed, indicating that student-content interaction and student-student interaction did not directly influence the perceived value of online learners. This result prompts us to further analyze and compare the different effects of three interaction modes on perceived value and continuance retention. Of the three kinds of interactions in online learning, student-instructor interaction has the most substantial influence on perceived value. The reason is that when students pursue online education, the most frequent mode of interaction is that between students and teachers. Student-student interaction and student-content interaction are less utilized compared with student-instructor interaction because those two types of interactions require self-control capability. H9 was supported, revealing that the influence of perceived value on online learners' continuance intention is strongly positive, and perceived value is a mediator factor in this model.

This result was also consistent with the research conclusion of Brady and Robertson who provided that perceived value was the primary factor influencing purchase intentions in the study of service value in the USA and educator [20]. Yang et al., predicted citizens' mobile government microblog continuance in their study [88]. Although it examined the theme of citizens' government microblog continuance, it belongs to the study of information system continuous intention, thus our study has some similarities with it. Yang et al.'s study concluded that social influence, perceived interactivity, and perceived mobility positively influenced citizens' perceived value which further affected their continuous retention. Therefore, our study results were also consistent with it. The results in our study also support much literature in this area. Before pursuing online classes, students tend to have expectations about the courses, which can be considered as perceived value. The matter of

whether learners can persist in completing online learning is closely related to their perceived value of online education. The impact of perceived value on continuous learning behavior is supported by the empirical data in this study, which is also consistent with the findings of other research. Parasuraman et al. summarized the quality–value–loyalty linkage in which service quality promotes perceived value, which, in turn, is beneficial for purchasing loyalty [89]. Kim et al. explored the relationships among website quality, perceived value, information quality, and intention to use in an online shopping environment, and showed that perceived value had a positive effect on users' loyalty intentions toward apparel online shopping websites [90]. Fassnacht et al. investigated the significance of service in the context of web-based services, and the results show that web-based service quality is a positive driver of desired behavior intentions mediated by perceived value [91]. Harris et al. conducted research on four dimensions of loyalty and constructed a model by synthesizing the concepts of value, quality, trust, satisfaction, and loyalty. The study proposed that perceived value exhibited both direct and indirect relationships with continuous loyalty [92].

# **Chapter 5. Conclusions**

## **5.1 Theoretical Implications**

This study provides a critical thinking for the model construction and contributes to the theoretical literature in this field. The author considered not only the relationship between horizontal variables, but also the correlations between vertical variables. For instance, information system success theory has been frequently analyzed as the significant factor to influence online learners' continuance use. In this study, course quality replaces information quality in order to emphasize its pedagogical implications in the context of online education. On the basis of information system success theoretical perspective, the correlation between course quality and service quality was also considered in the construction of the model, which is a supplement to IS success theory, and our study also proposed the influence between student-content interaction and student-student interaction so as to have a deep understanding of interaction theory.

## **5.2 Practical Implications**

The findings in this study offer new insights and practical implications for online learning platform managers, instructors and learners themselves. The conclusions manifest that the variables of service quality and course quality have great influences on learners' perceived value and continuous pursuing online courses. If the online learning platforms are able to offer service and courses that make learners perceive the value of pursuing online courses, this would help learners persist in having these courses so that online learning platform practitioners would better attach importance to the construction of attractive and high-quality institutions that would facilitate user retention [91]. Regarding improving service quality, online learning platform managers could pay more attention to learners' feedback and reflection on courses and platform management [13]. Many scholars have proposed that information recipients have the right to choose what information they would like to receive. Too much information could result in aversion to the curriculum. Therefore,

some information such as too much advertisement on platforms during online classes should be avoided [72]. Thus, platform developers ought to avoid too much advertising in the classroom and transform the methods of advertising. Apart from this advice, online learning platforms should strengthen management and monitoring, optimize communication channels, and improve the supervision mechanism [72].

To enhance course quality, it is critical to develop a blended teaching approach that combines online and offline teaching modes. In the context of blended learning, it is essential to cultivate learners' self-regulated learning ability, and self-regulated learning could be supervised by computer-based instruction, interactions, and feedback [93]. Online learning platforms should also urge parents to supervise their children to ensure they complete the learning tasks in time, and they ought to improve learners' learning supervision mechanism after online classes. The key to the promotion of online and offline blended learning lies not in the application of technology, but in the efficacy of instructors and innovativeness of teaching mechanisms and evaluation systems in the online environment, with an emphasis on encouraging instructors to apply the blended teaching mode. Instructors should improve their professional skills, change their teaching methodology if necessary, strive to increase courses' interest, and enhance interactions with students to improve their concentration in class [13].

According to the findings in this study, student–instructor interaction has the most substantial influence on perceived value among three types of interactions in online learning, which indicates that SI interaction should be emphasized for the continuous use of online learning. This conclusion is significant, as it will serve as a focus area for future research in this field. Apart from classroom interactions between learners and instructors, it is crucial to expand communication channels and maintain the frequency of contact such as by organizing SNS (Social Network Software) groups to communicate with learners and collecting questions that learners cannot understand to solve in detail in the class [94]. As for students, they should cultivate the spirit of active participation in their courses, have clear learning motivations, improve their self-control, and actively communicate with teachers and other classmates [93].

This study also draws attention to perceived value, owing to its positive effect on

mediation. Hence, online learning practitioners must take notice of the fact that perceived value is a major determinant of the retention of online learners. If learners perceive the value of online courses in various aspects, it will bring more and more favorable comments, promote students' continuous learning, and bring more business value [83, 88].

### **5.3 Research Limitations and Future Study**

Due to the constraints of time and energy, this study has several limitations. First, valid data was collected from 382 respondents, which is more than 10 times the 27 questions included in the questionnaire. About 60% of the respondents were female, and most of the respondents were students or youth, indicating a disproportionate concentration in terms of occupation, gender, and age, which, to some extent, affected the universality of the subjects. At the time of the questionnaire survey, the electronic responses were mainly collected from the professional website. Thus, the characteristics of learners' diversity could not be determined in the study, resulting in the lack of representativeness of the sample, which may have further affected the accuracy and authenticity of the research results. Thus, the universality of the respondents is a significant factor to control in the future study. Furthermore, the online learning needs of learners are different, so a wider group of learners should be selected for future research and various approaches should be used to collect questionnaires.

Another drawback is that this study focused on online learning continuance among Chinese users and did not include users in other countries. Therefore, further study may collect statistics from different countries to test the reasonability of the constructed model. Last but not least, this study analyzed the influencing factors and mechanism of users' continuance intention on the basis of the information systems success model, the modes of interactions, and perceived value. However, online learners' continuance behavior is affected by many factors. The theoretical model of this study cannot cover all influencing factors. Other variables influencing online learners' continuous use will be explored and various statistics analysis methods will also be applied to the studies to make results more accurate and persuasive.

Regarding other future work in this field, the comparison of different areas in China, like east and west, is also a meaningful direction because there is great developing difference between these two areas in many aspects. Otherwise, blend learning has been developed in various levels of traditional campus-based education nowadays as a response to the technical advance [95]. Thus, it is also worth exploring to have a deep analysis of blend learning in the context of online learning, especially for higher education in the future study.

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# **Appendix**

## **The Questionnaire of Online Learners' Continuance Intention in China**

Dear online learning users,

With the rapid growth of the Internet in China, online education has been complementing traditional methods of teaching for knowledge dissemination, and its role is being increasingly recognized amid the COVID-19 pandemic. This survey aims to understand online learners' perception and analyze what is the main factors influencing online learners' continuance intention. This survey is anonymous, and all the answers are only used to conduct data analysis.

Thank you for your cooperation and support!

April 2020



## Personal Information

1. Gender

Male ( )      Female ( )

2. Age

Less than 18 ( )    18~25 ( )    26~30 ( )    31~40 ( )    41~50 ( )

3. Occupation

Student ( )      Employee ( )      Civil Servants ( )    teachers ( )    others  
( )

4. Education level

High school ( )    junior college ( )    undergraduate ( )    master ( )  
doctoral ( )

5. Do you have the experience of receiving online education?

Yes ( )      No (Please stop filling out the questionnaire) ( )

6. Online learning time per week

0-10h ( )      11-20h ( )      21-30h ( )      more than 31h ( )

## Overall perception for online education

In this part, the choices of ‘Strongly Disagree’, ‘Disagree’, ‘Neutral’, ‘Agree’, and ‘Strongly Agree’, are scored from 1 to 5 respectively, indicating the degree of agreement.

### 1. Course Quality

(1) The online learning service provides courses I need.

Strongly Disagree ( )    Disagree ( )    Neutral ( )    Agree ( )    Strongly Agree ( )

(2) The online learning service provides courses that could help me improve skills.

Strongly Disagree ( )    Disagree ( )    Neutral ( )    Agree ( )    Strongly Agree ( )

(3) The online learning service provides courses that are easy to understand.

Strongly Disagree ( )    Disagree ( )    Neutral ( )    Agree ( )    Strongly Agree ( )

- (4) The online learning service provides courses that demonstrate high reliability.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )
- (5) The online learning service provides courses that are all-dimensional and accurate.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

## **2. Service Quality**

- (1) The online learning system helps me acquire knowledge more efficiently.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )
- (2) The online learning system provides excellent service to users.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )
- (3) The online learning system can provide quick feedback to my request.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

## **3. Student-Student Interaction**

- (1) I can communicate with peer students quickly and easily.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )
- (2) I can communicate with peer students about professional knowledge most of the time.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )
- (3) I have frequent communication with peer students in online learning.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )
- (4) I maintain a close relationship with peer students in online learning.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

## **4. Student-Instructor Interaction**

- (1) I have frequent interaction with instructors during online classes.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )
- (2) The instructors provide different ways for learners to interact with instructors.  
Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

- (3) I can get quick feedback from instructors.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

- (4) I can easily communicate with instructors via online learning.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

- (5) The instructors provide professional instruction to counsel learners.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

## **5. Student-Content Interaction**

- (1) The online learning system helps me understand the learning content more deeply.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

- (2) The online learning system prompts me to preview and review the learning content on time.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

- (3) The online learning system inspires my enthusiasm to acquire knowledge.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

## **6. Perceived Value**

- (1) The online learning system is useful to me in improving my skills and knowledge.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

- (2) The online learning system plays a significant role in the process of learning.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

- (3) Through the online learning system, I accomplished what I planned to do with this course.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

- (4) I use the online learning system to gain knowledge more efficiently compared with traditional ways of learning.

Strongly Disagree ( ) Disagree ( ) Neutral ( ) Agree ( ) Strongly Agree ( )

## **7. Continuance Intention**

(1) I will continue to pursue courses online in the future.

Strongly Disagree ( )   Disagree ( )   Neutral ( )   Agree ( )   Strongly Agree ( )

(2) I will recommend others to pursue learning courses online in the future.

Strongly Disagree ( )   Disagree ( )   Neutral ( )   Agree ( )   Strongly Agree ( )

(3) I will frequently pursue courses online in the future.

Strongly Disagree ( )   Disagree ( )   Neutral ( )   Agree ( )   Strongly Agree ( )

Thank you for your cooperation!