

# The Study on the Distance Teaching Form Innovation based on the Virtual Value Chain Angle

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**Abstract:** Based on the internet and the education sharing economy, the distance teaching form innovation corresponding to the form (binary system), which includes campus form innovation (virtual campus, smart campus) and classroom form innovation (virtual classroom, smart classroom). The distance teaching form innovation corresponding to the distance system virtual value chain, which including campus form innovation (virtual campus, smart campus) and classroom form innovation (virtual classroom, smart classroom). The distance teaching form innovation corresponding to the content (cooperation) virtual value chain, which including teacher form innovation (The distance teaching form innovation corresponds to the content (cooperation) virtual value chain, which includes teacher form innovation (virtual teacher, robotic teacher), credit form innovation (school credit bank, virtual credit) and certificate form innovation (1+x certificate, virtual certificate). The distance teaching form innovation based on the virtual value chain angle, it's helpful to build the first class brand of distance education. The distance teaching form innovation based on the virtual value chain angle, it's helpful to build the first class brand of distance education.

**Keywords:** Virtual Value Chain; Distance Education; Teaching Form Innovation; Virtual Classroom

## 1. Introduction

With the changes in education market demand (virtual demand, intelligent demand), technological paradigm change (virtual technology, Internet technology), changes in

the concept of education (shared education, intelligent education), the role of physical teaching gradually become limited, the days of physical teaching is dominating the world is gone, in the form of (bit) virtual value chain and the content of the (cooperative) virtual value chain as a characteristic of the distance virtual Distance virtual teaching, characterized by the virtual value chain of form (bit) and content (cooperation), has begun to quietly enter the stage of education sharing economy. Based on the virtual value chain of distance learning form of virtualization innovation, the existence of external organizations of educational resources, knowledge networks for the use of the method of the university and a highly efficient to meet the dynamic needs of students, to achieve the maximization of the value of the students of the form of teaching, is attracting the widespread attention of distance education and virtual education community.

## 2. Virtual Value Chains and Innovation in Distance Learning Formats

### 2.1 Education Sharing Economy and Virtual Value Chains

#### 2.1.1 Education sharing economy

Education sharing economy refers to relying on the Internet medium, weakening the right to own knowledge, strengthening the right to use knowledge, online sharing of teachers, courses and other teaching resources, to realize the value-added knowledge island into a knowledge network, and ultimately to obtain the knowledge value-added or increased revenue. The essence of education sharing economy is the change of the supply side of education, integrating offline high-quality and characteristic teaching resources, realizing the transformation of online knowledge (information) islands into knowledge

(information) networks, and realizing the positive externalities of knowledge into education dividends. The education sharing economy has revolutionized distance education, requiring the supply side of distance education to change its mental model, i.e., from the supply of teaching resources of a single teaching business unit (SBU) to the supply of teaching resources of a teaching business system (SBS), which in turn will lead to the evolution of China into a learning organization with a common vision of lifelong learning. China will evolve into a learning organization with a common vision of lifelong learning and independent learning, and eventually the demand side will evolve from high-cost, low-dividend knowledge islands to low-cost, high-dividend knowledge networks [1].

#### 2.1.2 Virtual value chains

Teaching Value Chain (Teaching Value Chain) refers to the collection of various value-creating activities within the school, specifically including campus, classroom, teachers, credits, certificates and other value chain links. Virtual Value Chain (Virtual Value Chain) is divided into Form Virtual Value Chain and Content Virtual Value Chain. The essence of Form Virtual Value Chain is the virtual space corresponding to the Binary System (BIT) value chain in the context of Internet+, which was first put forward by two scholars such as Jeffrey F. Rayport in 1995 [2]. The virtual value chain of teaching form refers to the virtualization of various value-creating activities within the school from physical activities to bit activities, including campus form, classroom form, etc. from physical form to bit form. The essence of the virtual value chain of content is the value chain corresponding to cooperation or sharing in the context of Internet+, which was first proposed by three scholars, including Kenneth Preiss, the founder of virtual organization theory, in 1991. In 1995, two scholars, including Adam M. Brandenburger, the founder of competing strategies, and other scholars further proposed the concept of Value Net [3]. The virtual value chain of teaching content refers to the externalization of various value-creating activities from a single subject to a plurality of subjects, including teachers, credits, certificates, etc., from a single subject to a plurality of subjects, which is the application

of the sharing economy in the field of teaching value chain. A teaching value chain composed of campus, classroom, teachers, credits, certificates and other value chain links is like a wooden barrel, the Old Cannikin Theory (Old Cannikin Theory) through the lengthening of the short boards to achieve more water, that is, to strengthen part of the value chain disadvantageous links to enhance the value of the teaching value chain. The virtual value chain of teaching content corresponds to the New Cannikin Theory (New Cannikin Theory, by lengthening the long planks and assembling with external long planks to form a new barrel, realizing to fill more water), i.e., to strengthen the advantageous links of the value chain such as faculty, credits, and certificates, and at the same time to cooperate with the advantageous links of the value chain such as external faculty, credits, and certificates, so as to form an advantageous value system. The virtual value chain of teaching content implies that the teaching value chain and teaching resources are not realized by a single teaching business unit, but by a teaching business system composed of  $n$  external organizations cooperating [4].

#### 2.1.3 Relationship between the education sharing economy and virtual value chains

Under the education sharing economy model, the external cooperation and sharing of campus, classroom and other distance teaching resources are relying on the Internet medium and taking bit virtual form. At the same time, the education sharing economy cannot be separated from the external cooperation and sharing of teaching advantages and characteristic resources, and its teaching value chain is expressed as the virtual value chain of teaching content under the new barrel theory. Therefore, the education sharing economy manifests itself in the form of teaching resources (carrier form) as the virtual value chain of teaching form, and in the content of teaching resources (external cooperation) as the virtual value chain of teaching content.

## 2.2 Innovations in Distance Learning Formats

Distance education is particularly suitable for the operation of virtual value chain under the sharing economy. Teaching form is the expression of teaching carrier, teaching resources and teaching evaluation under a

certain value concept, which in teaching practice is specifically manifested in the form of teaching carrier such as campus form and classroom form, and teaching resources and teaching evaluation such as teacher form, credit form and certificate form. With the development of Internet technology and the value concept of distance learning, the form of distance learning breaks through the limitations of time and space and carriers, and innovative forms such as virtualization and externalization of teaching forms come into being. Virtualization of teaching form (bit virtual form) is specifically manifested in the virtualization of campus form, classroom form, etc., which corresponds to the virtual value chain of teaching form. The externalization of teaching form (external cooperation form) is specifically manifested in the externalization of teacher form, credit form, certificate form, etc., corresponding to the virtual value chain of teaching content. With the rise of Internet technology, distance education is no longer confined to the traditional teaching value chain, and the virtualization of campus and classroom forms has greatly reduced the operating costs of the value chain of distance education. Relying on the Internet platform and education sharing economy, the forms of teachers, credits and certificates have been extended from inside to outside the school, and the homogenization and internalization of teachers, credits and certificates have evolved into cooperation and externalization, which has greatly enhanced the effectiveness of the value chain operation of distance education.

### **3. Innovations in Distance Learning Forms Based on Virtual Value Chains of Instructional Forms**

Under the traditional teaching value chain, distance education relies on traditional media such as mail, telephone, and business trips to interface with remote campuses and remote classrooms, which results in higher operating costs and lower operating effectiveness of distance education, leading to the formation of long-term depreciation of distance education certificates and academic discrimination. Under the virtual value chain of teaching forms, relying on the medium of the Internet, remote campuses and remote classrooms are seamlessly connected to full-time education in the form of virtual campuses and virtual

classrooms at low cost and with high effectiveness, thus realizing effective teaching and mitigating discrimination in terms of academic qualifications.

### **3.1 Innovation in Campus Form**

#### **3.1.1 Virtual campus**

Unlike traditional physical campuses and physical campuses, Virtual Campus (VCP) is a kind of simulation campus and digital campus, which has the efficacy of the value chain of physical campuses and is conducive to the cost advantages of the teaching value chain and the advantages of resource integration and resource sharing. Virtual Campus is based on the Virtual Reality Platform (VRP) constructed to reproduce the real situation of the actual physical campus, first proposed by Kenneth Green in 1990 [5]. The features of the virtual campus include: (1) virtual simulation of the physical campus, virtualization of the carrier of the traditional teaching value chain in the form of physical campus, virtualization of the carrier of the virtual value chain in the form of teaching virtual campus form, realizing the three-dimensional roaming of teachers and students in the virtual campus system, walking freely, with immersive and role-immersive simulation effect; (2) the information flow and knowledge flow of the virtual campus has real-time interactivity and sharing, and can be used both as a supplement to the physical campus value chain and as an independent value chain operation platform for distance education. (3) The information and knowledge flow of the virtual campus has real-time interactivity and sharing, which can be used as the value chain supplement of the physical campus and as the independent value chain operation platform of distance education. For example, Shanghai Jiao Tong University, Beijing Language and Culture University and other three-dimensional virtual campuses, remote and on-campus teachers and students can conveniently enjoy various virtual campus services after applying for a virtual campus card.

#### **3.1.2 Smart campus**

The campus form corresponding to the virtual value chain of the teaching form, its virtual characteristics correspond to the virtual campus, and its wisdom characteristics correspond to the Smart Campus (Smart Campus). In January 2019, the national

standard “General Framework of Smart Campus” (GB/T 36342-2018) was formally implemented. In February 2023, the Ministry of Education (MOE) further released the standard specification of the smart education platform. Smart Campus is an intelligent campus environment based on the Internet of Things (IoT), and the design concept is to rely on Intelligent Control Technology (ICT) to digitize, integrate, and platform all kinds of information and knowledge on the physical campus, and to change the way of teachers’ lectures and the way of learners’ studies [6]. Intelligent campus manifests itself from the intelligent school gate when you step into the school, to the corresponding intelligent classrooms and intelligent buildings when you enter classrooms and office buildings, and to the corresponding electronic schoolbags, intelligent platforms and electronic police for teaching affairs, book borrowing, attendance, living and security, etc., so as to realize the remote interactive teaching and resource sharing at a low cost and with a high degree of effectiveness. For example, Tencent QQ Smart Campus has strategically cooperated with more than 10 universities, including Shenzhen University, to build a unified platform for remote smart campus based on mobile social media.

## 3.2 Innovation in Classroom Form

### 3.2.1 Virtual classroom

Virtual Classroom (Virtual Classroom), also known as the virtual classroom, is a real-time, open, remote network interactive classroom, relying on IP-based voice transmission technology (Voice over Internet Protocol, VoIP), the virtual classroom can break the boundaries of the traditional classroom, and easily realize the nationwide or even the global scope of the students in real time, Remote interaction, is the ideal remote classroom carrier for learning organizations [7]. The virtual classroom (including online classroom) has the characteristics of economy (the reduction of per capita teaching cost brought about by knowledge sharing), scale (the scalability brought about by modular integrated design, which can remotely deliver teaching content to large-scale students in multiple real-time), and flexibility (the interactive course is not subject to time and space constraints, and is opened on demand,

and the students can choose remotely and independently) that are not possessed by traditional classrooms, and through the virtualization of the classroom carriers. Through the virtualization of the classroom carrier, the value of the virtual value chain of the teaching form is maximized, and it is a model of classroom form innovation and classroom revolution. For example, the Harvard Business School has set up an online version of the virtual classroom without desks and chairs, and alumni from New Zealand, Thailand and other countries around the world have been able to engage in “immersive, scenario-based, interactive” remote and real-time online learning in the virtual classroom.

### 3.2.2 Smart classroom

Smart Classroom is an informatized classroom based on the application of “cloud, network and terminal”, which supports remote interaction, electronic teaching materials, online cooperative learning and dynamic accompanying learning evaluation. The core of Smart Classroom is the classroom utilization of Smart Classroom (an informatization teaching system relying on the teaching cloud platform and intelligent teaching terminals to realize e-learning, intelligent IOT, automatic recording and broadcasting, and remote control) to realize paperless teaching [8]. The smart classroom utilizes a combination of virtual and real smart classroom carriers, which can significantly enhance the effectiveness of knowledge transfer and effective teaching. Compared with the traditional classroom corresponding to the physical teaching value chain, the smart classroom corresponding to the virtual value chain of the teaching form can greatly enhance the value advantage of distance learning. For example, the Baidu Smart Classroom education platform has provided 4,000 primary and secondary schools, including the High School Affiliated to Tsinghua University, with more than 10 million teachers and students realizing one-stop remote services for primary and secondary education informatization.

## 4. Innovation of Distance Learning Forms Based on the Virtual Value Chain of Teaching Content

The virtual value chain of teaching content is characterized by the fact that the teaching

value chain breaks through the organizational boundaries of the initiating school and extends the value chain links such as teachers, credits and certificates from within the organization to outside the organization. In the practice of virtual value chain of distance learning content, according to the degree of externalization (virtualization) of teaching content, it is divided into two types of virtual value chain of Outsourcing Model and Alliance Integration Model [9]. The virtual value chain of the outsourcing model is characterized by the externalization (virtualization, i.e., the entirety of the 1-3 links of the value chain of the initiating school's faculty, credits, and certificates is left to an external organization). The virtual value chain of the consortium model is characterized by partial externalization (virtualization, i.e., the 1-3 links are partially left to an external organization) of the faculty, credits, and certificates links of the value chain of the initiating school, with the 1-3 links retained for partial in-house completion. The virtual value chain of the outsourcing model is a content virtual value chain with a high degree of virtualization. The virtual value chain of the consortium model is an internal virtual value chain with a lower degree of virtualization.

#### 4.1 Innovations in Teacher Patterns

##### 4.1.1 Virtual faculty

The full-time teacher form corresponds to the physical teaching value chain, and the virtual teacher form corresponds to the virtual value chain of teaching content. The essence of Virtual Teacher is that teachers break through the organizational boundaries of a single teaching business unit, and externalize teachers (external sharing). Under the entity value chain, shared academicians, remote bloggers, shared practice tutors, etc. are the embryonic applications of shared teachers, while under the content virtual value chain, shared teachers, remote teachers, virtual teams, and externalization of teachers have become the normal applications. Virtual faculty is the faculty mode of sharing economy. Relying on the online shared faculty platform (including shared faculty APP), students receiving distance education can listen to the wonderful golden lessons and one-on-one online interactions of outstanding faculty such as famous schools and teachers [10]. Virtual

teachers have three virtual (shared) value chain advantages: (1) students can remotely share online famous classes and online gold classes of national (or even global) quality virtual teacher teams without leaving their homes, maximizing the value of the students; (2) excellent master teachers carry out the transfer of externally visible and internally invisible knowledge, and the knowledge island appreciates into a knowledge network, meanwhile, enhancing the visibility of the teachers and their honorariums, maximizing the value of the teachers; (3) The initiating organizations of virtual teachers use the platform of shared teachers to realize entrepreneurial income and educational public welfare, so as to maximize the value of the initiators. For example, Guangzhou Altruistic Network Technology Co., Ltd. relies on the Shared Teacher App to realize one-stop sharing of folk excellent teachers and remote virtual teachers for hundreds of primary and secondary schools such as the Central Academy of Chinese Culture, Huang gang Middle School, etc., integrating a win-win value system.

##### 4.1.2 Robotics teachers

Robotic Teacher (Robotic Teacher) is a kind of educational and social robot with intelligence, three-dimensional realistic image and voice conversation realized by relying on Artificial Intelligence (AI) technology, intelligent agent technology, virtual reality technology, virtual human technology as well as natural language processing and speech synthesis technology. The essence of robot teacher education is a virtual teacher (software) system based on AI technology and big data. With the progress of AI technology, robot teachers have developed from single language education and simple tutoring education to compound knowledge education and remote classroom education. Robot teachers are characterized by the form of virtual, can work 24 hours a day, tireless, no need to take leave, and physical teachers together constitute a virtual teacher consortium of virtual and real complementary, which in turn enhances the teaching value of the content virtual value chain. For example, relying on artificial intelligence technology, Japan's Tokyo University of Science robot teacher "Saya" has six kinds of expressions and can give elementary school students lessons; Jinjiang College robot teacher "Xiaomei" can

not only give college students lessons in accordance with the PPT, but also can carry out simple communication [11].

## 4.2 Innovation in Credit Patterns

### 4.2.1 Credit bank

The School Credit Bank is a system for certifying, storing and converting the results of inter-temporal learning, such as “intermittent” learning, part-time study and lifelong learning. The credit bank certifies all kinds of learning results at all levels, stores credit and converts academic certificates or qualifications. The credit bank tends to articulate and mutual recognition and credit certification of all levels and types of learning achievements across time and space of undergraduate, specialized, higher vocational, secondary and other types of full-time education system and self-test, adult examination, training, network education and other types of part-time education system. The inter-professional and inter-temporal learning outcomes can be stored in the credit bank after they have been certified by the credit bank. If they meet the conditions for mutual recognition, they can be converted between various levels and types of credits. Learners who have stored a certain number of credits can remit them for mutual recognition of academic certificates or qualifications [12]. The essence of a credit bank is an alliance of learning achievement certification, credit conversion and mutual recognition of certificates formed by the government, industry, enterprises, vocational schools, universities and distance education institutions, which is a virtual value chain of teaching content that externalizes learning achievements. Relying on the credit bank, all levels and types of distance learning resources can be shared, and the fragmented time of students can be utilized, as well as breaking the time and space limitations of learning, and realizing the horizontal communication and vertical articulation of different types and levels of learning achievements. With the deep reform and evolution of credit banks, the role of this virtual value chain of teaching content in enhancing the value of distance learning and lifelong learning is becoming more and more significant.

### 4.2.2 Virtual credits

Traditional credit is when a student completes all the credits in a single teaching business unit,

while virtual credit is when a student completes all the credits in multiple teaching business units. From the perspective of virtual credit initiating organizations, credit initiating organizations only provide some credit modules for students to study, while outsourcing other credit modules to external teaching business units, and the external organizations provide other credit modules for students to study. In the practice of virtual credits, the most common is that the sponsoring organization outsources the practical training (experiments, internships) credit module, virtual simulation credit module, vocational qualification credit module, compound professional credit module, special skills credit module, etc. to remote cooperation units or professional institutions to complete [13]. This kind of sponsoring organization completes part of the credit module and virtualizes (externalizes) the other credit modules, which is the application of the virtual value chain of content in the credit link. With the increasing demand for complex talents in the society, the initiating organization completes part of the professional (skill) credit module, and the external organization cooperates to complete other professional (skill) credit module, and the initiating organization and the external organization jointly build the content virtual value chain with complementary advantages and shared teachers, which is conducive to completing the goal of cultivating complex talents at low cost and with high effectiveness. Cross-border (distance) virtual credit practice, such as Zhejiang University, Hunan University and other cross-region, professional Chinese-foreign cooperation, mutual recognition of credits; domestic (distance) virtual credit practice, such as Guangdong Province, the establishment of the education alliance system in the Greater Bay Area and exchange and cooperation mechanisms, mutual recognition of teachers in the Greater Bay Area, mutual recruitment and mutual recognition of cooperation credits project.

## 4.3 Innovation in Certificate Forms

### 4.3.1 1+X certificates

The essence of 1+X certificate (academic certificate + several vocational skill level certificates) is to evaluate talents with multiple certificates and external certificates instead of

the traditional one-dimensional and internal certificates. 1+X certificate transforms certificates from being issued by a single teaching business unit (school) to being issued by multiple teaching business units (school external organizations) by adding X vocational (professional) skill level certificates on top of one academic certificate (professional) skill level certificates on top of one academic certificate. This kind of innovation in the certificate chain, in which internal and external certificates jointly constitute the teaching value chain, is conducive to enhancing the multiple skills of students and their competitive edge in employment under the virtual value chain of teaching content. 1 is physical, physical (internal) qualifications; X is virtualization (externalization), virtual (external) skills; 1+X synergistically enhances the competitiveness of the certificate link of the virtual value chain. 1+X certificate is a combination of virtual and real, internal and external fusion of the multiple evaluation mechanism and the multiple education mechanism, which makes use of the external high-quality skills and implicit knowledge to enhance the sum value of the virtual value chain. For example, in March 2023, the 1+X certificate system will be extended to 10 fields in colleges and universities nationwide on a pilot basis [14].

#### 4.3.2 Virtual certificate

Virtual Certificate refers to the externalization of certificates, that is, instead of a single teaching business unit evaluating learning results and issuing certificates, the initiating organization issues some of the certificates, while other certificates are issued by external organizations. In the virtual certificate practice, the virtual certificate of the outsourcing mode is generally issued by the initiating organization to determine the certificate brand of a certificate or a part of the certificate, and more than one certificate is outsourced to an external organization to issue on its own. For example, 1+X certificate is one of the forms of virtual certificate in outsourcing mode. The virtual certificate of the consortium mode is generally a teaching business system or certificate alliance formed by the initiating organization and external organizations with complementary advantages to jointly issue more than one certificate using the certificate brand of the initiating organization. For

example, the Wuhan Seven Schools Consortium implements cross-college joint education and issues joint certificates, dual-degree certificates, multi-degree certificates, and so on [15]. Compared with physical certificates which are one-dimensional certificates, the essence of virtual certificates is multiple certificates. It can be applied not only to academic and degree certificates, but also to non-academic, skill and vocational qualification certificates. The gold content and brand influence of virtual certificates depend on the comprehensive strength of the initiating organizations of the virtual value chain and external organizations as well as the degree of complementing each other's strengths and weaknesses. Relying on the new barrel theory and the virtual value chain, it is possible to build a virtual certificate alliance for mutual recognition, sharing of high-quality resources, and a first-class gold brand of virtual certificates for distance education and composite education.

### 5. Summary of the Study

The essence of the education sharing economy is the change of the supply side of education, which corresponds to the virtual value chain of teaching content based on the new barrel theory. The education sharing economy relies on the Internet medium and corresponds to the virtual value chain of teaching forms based on the virtual form of bits. Distance education is particularly suitable for the operation of virtual value chains in the sharing economy. Relying on the Internet platform and the education sharing economy, distance education is no longer confined to the traditional teaching value chain, and the virtualization of the campus form, classroom form (bit form), and the virtualization of the teacher form, credit form and certificate form (cooperative content) is conducive to the value-adding of knowledge islands into knowledge networks. The innovation of distance learning forms based on the virtual value chain of teaching forms includes the innovation of campus forms (virtual campus, smart campus) and classroom forms (virtual classroom, smart classroom), which is conducive to the reduction of the operating costs of the virtual value chain of distance learning. Formal innovation in distance learning based on the virtual value

chain of teaching content includes innovation in the form of teachers (virtual teachers, robot teachers), credits (credit bank, virtual credits) and certificates (1+X certificates, virtual certificates), which is conducive to the enhancement of the competitive advantage of the virtual value chain of distance learning. Distance learning form innovation based on virtual value chain is conducive to building a first-class brand of distance learning.

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