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Education communication in the vision of intelligent education

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***Abstract*—The theory of educational communication is the theoretical basis of educational technology, and its content is continuously improved with the development of teaching media. With the advent of the "wisdom era," educational communication theory has also produced new changes. This study first introduces the theory of educational communication from the perspective of educational communication and educational communication system, and then explains the concept of wisdom education from the historical development and technical support of wisdom education. Taking the wisdom education environment as the background of the times, this paper elaborates the influence of wisdom education on the various elements of the education communication system, and proposes a new concept of education communication under the smart learning environment. Based on the above analysis, this paper gives the means to improve the effect of educational communication in the context of intelligent learning: improving the quality of information sources, playing the role of the recipient, eliminating interference and paying attention to the systematic design of the educational communication process.**

Keywords—smart education, educational communication, smart learning environment, technology

I. INTRODUCTION

Educational communication is a branch of communication, which is an information exchange activity between educators and the educated. Due to the high correspondence between the education process and the communication process, since the 1940s, people have begun to use the theory of communication to study the educational process, and to improve the teaching effect with the guidance of communication theory[1]. With the continuous development of educational media, educational communication has gone through different stages of development. In recent years, with the development of artificial intelligence, sensor and rich media technology, intelligent education has become a research hotspot in the field of educational technology[2]. As the theoretical basis of education technology, spread of education research must follow the practice of the education informationization synchronous development, but the related research in recent years, with wisdom education perspective to observe the spread of education research seldom appear, so this article will point to study, hoping to inherit the wisdom of scholars in the field of education concept, continue to promote the development of education dissemination theory.

II. OVERVIEW OF EDUCATION COMMUNICATION

A. Education Communication

From the beginning of the 20th century to the 1940s, the mass use of communication media during the war period aroused people's strong concern about information and communication issues, and all kinds of communication media developed rapidly. Thus, communication science gradually took shape in the United States, where the communication industry was most developed at that time. The establishment of this new discipline makes people re-examine their fields from the perspective of communication, and the field of education is no exception, which is the initial origin of educational communication. Since then, the study of educational communication has been deepened along with the study of the process of media-assisted education. After the stage of audio-visual education and audio-visual communication, AECT, which marked the establishment of educational technology, appeared in the early 1970s, and the two terms "educational communication" and "educational technology" co-existed.

Although there is a high degree of overlap between the development process of educational communication and the production process of educational technology, the development of both of them depends on the influence of the media on education, but they are not the same. According to the definition of Nan Guonong and Li Yunlin, educational communication refers to an activity in which educators select appropriate information content according to certain purposes and requirements and transmit knowledge, skills, thoughts and ideas to specific educational objects through effective media channels[3]. Education communication is a big branch of communication. Its communication mode has similarities with mass communication, but the characteristics of education communication are different from general mass communication. It has its own characteristics: the certainty of communication goal, the systematic nature of communication content, the relative specificity of receivers, the relative guidance and control of transmitters, and the diversity of communication media [1]. According to the development of educational media, educational communication has passed the stage of visual communication,

oral communication, text communication, electronic communication, and network communication. Nowadays, when the "wisdom age" [4] is coming, new changes will take place in education communication.

B. Education Communication System

Education communication is a complicated process. The research on the composition of education communication should not only focus on each element in the process, but also make a comprehensive analysis from the perspective of the whole system. At this time, it is necessary to use the system theory to find the elements, structure and environment of education communication system in the process.

1) Educational communication as a system

Ludwig von Bertalanffy, the founder of the general system theory, defines the system as follows: The definition of the system can be determined as the total (collection) of the components (elements) that are in a certain relationship and related to the environment. It can be seen that the system has the following characteristics: holistic, structural, hierarchical, dynamic. To study educational communication with systematic thought, educational communication has all the characteristics of the above systems.

2) Elements of educational communication system

There have been many kinds of divisions of educational communication elements in history. The analysis shows that the four elements of "educator", "educational information", "educational media" and "educated" are basically recognized.

In the field of communication, educators are the coders, senders, and controllers of educational information. The teacher first collects, selects and codes the educational information according to the teaching objectives, completes the responsibility of the education "gatekeeper", and then selects the appropriate way to spread according to the type of educational information, and finally gives feedback to the educated according to the effect of the communication – form a teaching evaluation.

Information is the unity of symbol and meaning. Educational information is the communication content -- knowledge, skills, thoughts and so on -- of the sender and receiver in the process of educational communication, which is also composed of symbol and meaning. Educational information is an important content in the process of education communication to help students achieve educational goals. It is scientific, systematic, targeted, hierarchical, ideological and novel.

Educational media is an important part of the educational communication channel. Whether it is print media or electronic media, it often affects the dissemination efficiency of educational information. Every educational media has its own advantages and disadvantages. Educators should choose appropriate educational media according to students' learning rules, the essential characteristics of knowledge and the ultimate goal of teaching.

In the process of educational communication, the educated people mainly complete the following tasks: 1 receiving educational information. The educated person decodes the educational information transmitted by the educator, and the decoding effect is related to the student's own knowledge level and learning attitude. 2 Conduct self-propagation. According to the constructivist learning theory, students are the active constructors of meaning, which is related to the self-propagation of the educated. 3 feedback propagation effect. The educatee is the key factor for the success of education communication. When feedback the communication effect, the educatee's identity changes into the identity of the communicator, which makes the whole communication process have a complete loop.

3) Education Communication System

The sum of elements and their connections and relationships is called the structure of the system. The structure of the above four elements in the educational communication system is shown in the following figure:

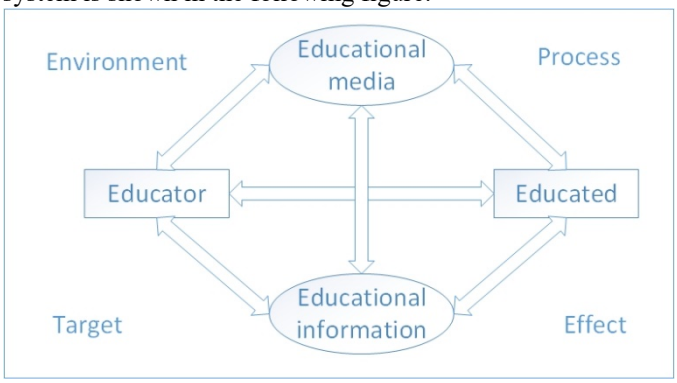

Figure 1 educational communication system

In addition to the four elements of educators, educational information, educational media, and educatees, the education communication system also includes the environment, goals, processes, and effects. The four elements have six relationships in the educational communication system: the relationship between educators and educators, the relationship between educators and educational information, the relationship between educators and educational media, the relationship between educators and educational information, and educated people. Relationship with educational media, educational media and educational information.

Relationship between educators and educates: there are social relations, educational relationships and psychological relationships between educators and educated people [5]. A healthy teacher-student relationship with teachers and students as the main body. Harmonious psychological relationship can improve the efficiency of education communication, improve the quality of education and teaching, and is an important auxiliary to establish a good educational relationship.

The relationship between educators, educatees and educational media: Educators and educatees are human beings. Educational media is a machine tool. The relationship between educators, educators and educational media is a human-machine relationship. As an intermediary of educators, educatees and educational information, the relationship between educational media and the transmitter and receiver affects the quality and effect of educational communication.

The relationship between educators, educatees and educational information: Educational information is the main content of communication in the educational communication system and a necessary condition for the establishment of educational communication. The communication effect depends on whether the receiving degree of educational information reaches the set teaching target. The relationship between educators, educatees and educational information is the most influential relationship in the educational communication system.

III. OVERVIEW OF WISDOM EDUCATION

China's education informatization has gone through the development period of multimedia teaching and the enlightenment period of network education, multimedia application period and network construction development period, as well as the continuous construction and application of network[6]. At the present stage, smart education has become an inevitable trend in the development of education informationization. The teaching process will usher in significant changes in teaching philosophy, teaching structure, teaching methods and other aspects. The education communication system in the traditional classroom will undergo significant changes in the environment of smart education.

A. The origin and development of smart education

"Smart" in "Smart Education" in Chinese is literally translated as "wisdom" in English. The Cambridge online dictionary explains "wisdom" as "Ability to Use Your Knowledge and Experience to Make Good Decisions and Judgments[7]", "Wisdom" in China means "the ability to understand things and solve problems quickly, flexibly and correctly.[8]" It can be seen that "wisdom" in the Chinese context is the fundamental interpretation of the ability to analyze and solve problems. In recent years, with the application of new generation information technologies such as Internet of Things, cloud computing, big data, and ubiquitous networks in education, the “wisdom” in Chinese has begun to have a broader meaning, and became the meaning of ”smart” gradually.

Chinese scholar ZHU Zhiting defines "smart education" as follows: " The basic connotation of smart education in the information age is to promote learners to learn smartly by building smart learning environments and using smart pedagogy, thereby enhancing the expectation of cultivating people with high-Intelligence and productivity, using appropriate technology to intelligently participate in various practical activities and continuously creating products and values to achieve a learning environment. To adapt, shape and choose the learning environment, living environment and working environment.[6]”

At 2008, the concept of Smarter Planet was first proposed by s. j. Palmisano, then CEO of IBM, in his report smart Planet: the next generation leadership agenda[9]. "Smart Earth" expresses IBM's vision of how to use advanced information technology to build this new world operational model, using a new generation of information technology (such as sensing technology, Internet of Things technology, mobile technology, etc.) on the planet. Almost everything can be perceived, interconnected, and intelligent[10]. Since then, the idea of "smart" has been introduced into various fields, and the field of education is no exception. In 2012, IBM announced the smart education framework. From the perspective of technical characteristics, IBM plans to consider big data, cloud computing, artificial intelligence and other key technologies as its indispensable and important components, and the IBM smart education plan is more embodied in the three aspects of personal orientation, service and experience [11]. Subsequently, the US Department of Education issued the document "Change American Education: Technology-Enhanced Learning - National Education Technology Program 2010" (NET P2010) in the second half of 2010[12], and gave the research and work direction of the United States in smart learning , South Korea proposed the "Promoting Smart Education Strategy" proposal in 2011[13]. The proposal clearly pointed out that Korean education should implement the change of smart education concept. As early as 2006, the Singapore government has already developed the in2015 plan, which plans to build a smart information and communication ecosystem between 2006 and 2015, and to include smart education as a major development [14]. Under the background of smart education, China has formulated the "Development Plan for the Ten Years of Education Informatization (2011-2020)", and proposed a staged development goal of achieving comprehensive integration and partial innovation by 2020, and demanding that " To drive the modernization of education with educational informationization, to break through the difficulties in the development of education in China, and to promote the innovation and reform of education[15]".

B. Technical functions in intelligent learning environments

1) The learner analysis function brought by artificial intelligence technology

Artificial intelligence technology can provide learner modeling technology, learning analysis technology and knowledge base learning resource retrieval technology for smart learning [16]. Learner modeling refers to the analysis and processing of learner related information [17]. The related information is divided into two types: learner's individual information and learner's situational information. According to the stability of information, individual information can be further divided into relatively stable continuous information and dynamic information that changes with context and time. Learning analysis technology [18] " The object of analysis is students and their learning environment, the purpose of which is to evaluate students, find potential problems, understand and optimize learning.". Unlike learner modeling, the analysis content of learning analysis is the information generated by learners in the learning process. Using automated interactive text analysis techniques such as participation analysis, social network analysis, and content analysis, information such as learner participation in learning, social network of learners, and learning content of learners' attention can be obtained. The retrieval technology of knowledge base learning resources is presented by text mining technology, knowledge base technology and multimedia semantic analysis technology.

2) Information support function brought by sensor technology

Sensor technology is one of the important technical supports for the development of Internet of things. Wireless

sensor network, fiber optic sensor and multi-sensor fusion technology all bring massive information support for intelligent learning [16]. Wireless sensor network makes scene recognition and environmental monitoring possible.

3) Rich media technology brings the learning carrier function

Rich Media technology provides a better user experience for smart learning, and the development of learning terminal technology provides a vehicle for ubiquitous learning [16].

IV. THE EDUCATIONAL COMMUNICATION UNDER THE SMART LEARNING ENVIRONMENT

A. The impact of the smart learning environment on the various elements of the educational communication system

1) The impact of smart learning environment on educational communicators

The strong technical support of the smart learning environment seems to make students and technology become the main body of educational communication. Educational communicators seem to have a great influence on their identity: "the gatekeeper" has become "the guide" , and "the controller" has become "the observer". Educational communicators seem to have changed from active to passive, but in fact, the concept of smart education puts forward higher requirements for the leading classroom ability of education communicators, including the strict formulation of educational objectives, the strict supervision of teaching process and the clear guidance of student's learning. Under the guidance of constructivist theory, teachers should build scaffolding for students and help students to construct their own knowledge with the help of the technical means of smart learning environment. Educational communicators will face new challenges in terms of the change of teaching structure, the application of teaching methods and the selection of classroom management methods.

2) The impact of smart learning environment on educational information

It can be seen from the above that artificial intelligence provides learner modeling technology, learning analysis technology and knowledge base learning resource retrieval technology, which makes the disordered educational information in the original network communication can be based on student learning. It needs to be easy-to-search, cross-platform, and structured educational information. It not only has strong protection in breadth and depth, but also provides personalized push learning services based on learner's learning analysis technology. At the same time, the logical structure of the educational information is not destroyed. That is to say, the biggest characteristic of the educational information in the intelligent learning environment is that it is personalized and structured. The educational information has experienced a dramatic increase in the number from the traditional classroom to the network communication. From the network communication stage to the intelligent learning environment stage, the educational information is more focused, and the quality leap is generated on the basis of sufficient quantity.

a) The impact of the smart learning environment on the media

The artificial intelligence technology, sensing technology and communication technology used in the smart learning environment support education communication to realize the functions of learner modeling, learning resource mining, learning environment monitoring, interaction, etc. Therefore, the educational media supported by smart learning is different from the previous ones. It is need to be fully digital and mobile, so more smart classrooms choose to use tablet as the main media, and there is the electronic textbook in the tablet. What communication media need to achieve is a seamless connection of technologies. All learning terminals can be seamlessly connected, virtual environment and physical environment can be seamlessly integrated, learning resources can be seamlessly linked, formal learning and informal learning can be seamlessly combined, and so on.

3) The influence of the intelligent learning environment on the educated

Most of the educated people in the smart learning environment are "indigenous peoples" living in the Internet age. These people are more accustomed to digital learning than the learners of past era. The smart learning environment will provide each learner with the "new wisdom" based on information technology, which may change the way, breadth and depth of students' cognitive world. In the smart learning environment, the learning analysis technology will provide different learning content according to the learner's learning preferences, cognitive characteristics, learning habits, etc., and fully satisfy the individual needs of the learner. At this time, the learner's initiative will be maximized and the subjective status of the learner will be highlighted in the process of educational communication. This puts higher demands on the educated, and the learner can gradually exercise critical thinking ability and collaboration ability in this process. At the same time, the ability to use knowledge to solve practical problems will be increased.

B. The influence of intelligent learning environment on important relationships in educational communication system

1) influence on the relationship between educators and educatees

The student-centered and teacher-led relationship is a teacher-student relationship advocated by the existing teaching model, which still holds true under the concept of intelligent education. However, based on the change of roles of the educator and the educated in the intelligent learning environment, this relationship will also be affected.Because the study analysis the existence of the technology and knowledge base learning resources retrieval technology, the strong dependence of the educatees to educators between will be transferred to the man-machine or companion, to achieve the established teaching goal, educators must have the effect of guide students meaningful learning, due to the intelligent learning environment can provide detailed information about the learners, the educator of the boot process will be more directional, so learning environment impact on the relationship between teachers and students depends on the wisdom educators teaching idea and utilization degree of environmental information.

2) The influence on the relationship between educators, educatees and educational media

Intelligent learning environment provides powerful technical support for the educated and the educated, and it has the greatest influence on man-machine relationship. In the learning environment of the past, the teaching media as the medium of information communication between educator and educatee, educators can be according to the established teaching goals and learners characteristics were free to choose, in the intelligent learning environment, based on large data analysis techniques can provide very comprehensive information and education, etc., learners by educators education media freedom selectors into education media "passive users". Therefore, in the intelligent learning environment, educators and educatees should use the information provided by teaching media in a moderate manner according to teaching objectives, types of educational information and students' cognitive laws, and should not rely on technology completely. They should transform "media-assisted" into "media-dominated" and lose the dominant position in man-machine relationship.

3) The influence on the relationship between educators, educatees and educational information

Different from the traditional classroom, where educational information mainly comes from educators and textbooks, and different from the chaotic and disorderly educational information in the network era, the intelligent learning environment where educational information is systematic knowledge in line with students' personalized learning characteristics.This characteristic will lead to different learners in different may accept different education information, educators in the use of intelligent learning environment provided by the education information, can be on the basis of this phenomenon help educatees to establish a correct concept of learning: some knowledge just for an explanation to the world, and is not the only sure answer, by the educators should be in the process of education information to build their own point of view, critically about education information, choose the education information correctly.

C. The new concept of educational communication under the influence of smart education

1) Focus on personalized education communication

The smart learning environment breaks the teacher-centered communication mode in the traditional classroom and truly realizes the learner-centered and personalized education communication. The smart learning environment uses artificial intelligence technology to acquire learner information at any time, including the learner's cognitive characteristics, learning style, learning interest, domain knowledge level, learning theme, emotional state, etc., At the same time, it can also identify the learning situation, that is, the geographical location and technical environment of learners. Then adjust the learning content at any time based on learner information and learning situations. In the learning process, the interactive text, video and audio, and system log are used to analyze the learner's learning characteristics, and the learner's learning process is automatically recorded to complete the learner's learning evaluation. This process of education communication fully considers the individual differences of learners, reduces the noise in each communication stage, and provides timely feedback, making the education communication system in a good cycle, changing the mass communication trend of traditional classroom, and forming a new idea of personalized education communication.

2) Participatory and interactive educational communication

HUANG Ronghuai and others have established a smart learning environment system model [16]. The two main elements are the learning community and the teaching community. Regardless of the learning environment supported learning style is a wise self-study, Investigative learning, learning by working, learning by doing or classroom learning, teaching and learning community can be seamless communication, education participation of students in the process of transmission is greatly improved, between students and teachers can communicate cross-platform, across time, across space collaboration. The smart learning environment can also use the learner analysis technology to divide the learning community and the teaching community freely according to the characteristics of learners and the characteristics of teaching tasks, so as to improve the interactive efficiency in education communication. Educatees can be active communicators in this kind of education communication system, instead of passive receivers of education information. In the traditional education communication, one-way communication is only a possible choice in the smart learning environment. In this environment, interpersonal communication and other forms of communication without strict restrictions are more common.

V. COUNTERMEASURES TO IMPROVE THE EFFECT OF EDUCATION COMMUNICATION IN THE CONTEXT OF INTELLIGENT LEARNING

After the spread of education, certain effects will be produced. This effect is reflected in the changes in the knowledge, ability, and behavior of the educated. The ultimate goal of educational communication is to achieve the established teaching goals, and the degree to achieve the ultimate goal shows the effect of educational communication. In the smart learning environment, improving the effect of educational communication can start with improving the quality of information sources, giving play to the subjective role of the receiver, eliminating interference and paying attention to the systematic design of the educational communication process.

A. Improve the quality of educational information sources

1) Improve teachers' TPACK ability

In modern times, the mainstream approach to integrating information technology with curriculum is TPACK. TPACK is a new form of knowledge that integrates subject content knowledge, pedagogical knowledge and technical knowledge. It is not a simple addition of the three kinds of knowledge, but a kind of "subject pedagogical knowledge integrating technology" that integrates with each other [19]. In the process of teaching should not only focus on course content, teaching method and technology - the three factors of knowledge, more attention to the interaction between the three - this will form four kinds of new knowledge, the discipline teaching content knowledge (PCK), integrated technology of knowledge (TCK), integrated

technology of pedagogical knowledge (TPK) and integration of technical subject teaching knowledge (TPACK). TPACK ability is exactly what teachers need to have in the context of smart learning. Teachers should balance subject content, teaching method and technology in accordance with specific teaching situation to promote the occurrence of smart learning and the emergence of smart behaviors [10]. Teachers can conduct TPACK knowledge learning through technology mapping, designing learning technology, using learning activity types in teaching plans and micro-teaching [20], so as to better control the process of education communication.

2) The correct choice of educational information

Educational information must be scientific, systematic, and interesting. The presentation of educational information needs to be clear and recognizable. These two requirements for educational information can be easily achieved in a smart learning environment, so the appropriate control of educational information has become the top priority in the selection of smart educational information. The knowledge base learning resource retrieval technology provides students with personalized and massive learning resources, but it also brings great challenges to the educational communication process: asynchronous learning problem caused by knowledge content difference, attention transfer problem caused by rich resource content, difficulty problem of teaching evaluation. For these issues, the joint efforts of educators and recipients are needed. The artificial intelligence learner analysis technology can help teachers understand the learner's learning situation, so teachers can monitor the learner's learning process strictly; teachers can realize the information sharing between teachers and students and between students and students by designing the discussion and cooperation among students; teachers should take stratified teaching as the main teaching goal to ensure that all students achieve the set minimum goal. Rich teaching experience can help teachers control the teaching pace; students need to have a strong ability to identify and screen information, as well as a strong self-control to achieve better education communication effect.

3) Eliminate various interferences

First of all, we must play the role of redundant information. According to the cognitive characteristics of students, the use of educational media to provide interesting resources related to the curriculum, and the appropriate emphasis and repetition of important educational information are all the use of redundant information, whether it causes students' unintentional attention or intentional attention. Both can enhance the effectiveness of educational communication. In the smart learning environment, the quantity and quality of such resources are greatly improved. Educators should make full use of these resources and reasonably choose teaching methods.

Rational use of multiple media. Since the use of the tablet in the smart learning environment is more common, and the "indigenous people" in the network era are different from the traditional network "immigrants" in media awareness, the communicator should pay attention to matching different educational information with a variety of teaching media forms. Cross-applying the listener's audiovisual senses and controlling the media learning time can achieve the purpose of slowing down the learner's learning fatigue and focusing attention.

4) Emphasis on the system design of the educational communication process

Education communicators should be performed at education system from the point of view of the teaching design, pay attention to the spread of the relationship between educators and the educated, attaches great importance to the education of information filtering and the selection of media education, pay attention to the coordination of human relations, from the perspective of education dissemination effect the teaching process, the education process as a whole system to carry on the design, not only pay attention to the various elements in the system design, pay more attention to the relationship between the elements, using communication perspective on teaching the design process.

B. Giving play to the subjective role of the receiver

Recipients are in a dominant position in the smart learning environment and have a strong initiative in the selection of educational information. Therefore, in the smart learning environment, learners should give full play to the dominant role. The technical support in the smart learning environment can help learners to better understand their learning characteristics and cognitive styles, but it doesn't mean that rely solely on technology under the condition of intelligent push can study more "smart". Learners should also make efforts to enhance their learning motivation, cultivate their character and will, improve their learning methods, and maximize their own efforts, so as to obtain higher learning ability than their original level in the relatively closed technical analysis push.

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