

Construction and Application of Smart Learning Space in Local Universities in China

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Abstract: In the era of "Internet+", new generation of information technology such as 5G, Internet of Things, Big Data, and Artificial Intelligence are flourishing, bringing new ideas for expanding and transforming the learning space. Smart learning environments have emerged, which are conducive to cultivating talents with values, mobility, thinking power and creative potential. Therefore, it is urgent to build a smart learning space with the help of various new information technologies and create to meet the innovative smart teaching model. The author tries to build a model of a virtual and real symbiosis learning space that is not limited to time and space, and serves lifelong learning, in order to promote educational reform and enhance learning experience.

Keywords: Smart Learning Space, Smart Education, Learning Space, Artificial Intelligence.

1. Introduction

In the information age, along with the emergence of technologies such as XR and AI, it has become an inevitable trend to lead the innovative development of education and teaching with smart education[1]. New teaching forms need new learning spaces to support, and the construction of smart learning spaces has come into being. Many universities in China have responded to the development of technology education, integrated more modern wisdom and applications into the teaching environment, and started to start or improve the construction of modern new intelligent learning places. For example, the Foreign Language Smart Learning Center of North China University of Technology, the new smart learning experience of Shanghai Information Technology School, and the new teacher's innovative learning space of South China Normal University, etc. In February 2019, the "China Education Modernization 2035" issued by the Central Committee of the Communist Party of China and the State Council clearly puts forward the need to "accelerate the transformation of education in the information age, build intelligent campuses, and coordinate the construction of An integrated and intelligent teaching, management and service platform. Use modern technology to accelerate the reform of talent training mode and realize the organic combination of large-scale education and personalized training." Building a student-centered teaching environment and an intelligent learning space with the participation of teachers, forming an intelligent learning and teaching ecology, can effectively promote the development of personalized teaching, advance the implementation of intelligent teaching, realize profound changes in education informatization, and finally establish a new education ecology of lifelong learning system.

2. The Connotation of Smart Learning Space

Smart learning space is not a new concept. Chinese and foreign scholars mainly describe it from four dimensions: hardware, technology, function, and service.

Huang et al. (2012) believed that an intelligent learning environment is an interactive tool that can sense the learning situation, identify the characteristics of learners, provide appropriate learning resources and convenience, and can automatically record the learning process and evaluate the learning results, so as to promote effective learning of learners[2].

Zhu (2016) believed that the intelligent learning space is a learning space under the intelligent learning environment. It should have ten major functional features, including location awareness, situational awareness, social awareness, interoperability, seamless connection, adaptability, ubiquity, whole-process recording, natural interaction, and deep participation[3].

Lee et al. (2014) believed that the smart space should include embedded network sensors and intelligent devices to provide users with a variety of useful services, and tracking and identifying users is its most important function[4].

Kim et al. (2013) pointed out that the intelligent learning environment aims to provide learners with autonomous learning, self-motivation, and personalized services. The focus of intelligent learning it supports is learning content and people, not equipment[5].

Based on the above analysis, this paper adopts the following definition: Smart learning space refers to a learning field that uses modern intelligent equipment and technology to connect reality and virtual space to help school administrators and teachers accurately judge learning behavior, adapt to learners' differences, provide learning resources to meet personalized learning needs, and support the coexistence and parallel of multiple learning paradigms[6].

Smart learning space is the high-end form of digital learning environment, the demand of students for the development of learning environment under the background of information society, and the support conditions urgently needed for the current reform of learning and teaching methods, representing an important development direction of education informatization.

3. Construction of Smart Learning Space

As the field of learning in the new era, intelligent learning space can be seen as the common derivative of the three terms of classroom, classroom and learning environment. It

involves not only the physical field suitable for collective face-to-face learning, but also the supporting system of shaping the learning atmosphere and learning environment for classroom activities. Therefore, this paper proposes a framework model of intelligent learning space with virtual and real symbiosis, as shown in Figure 1.

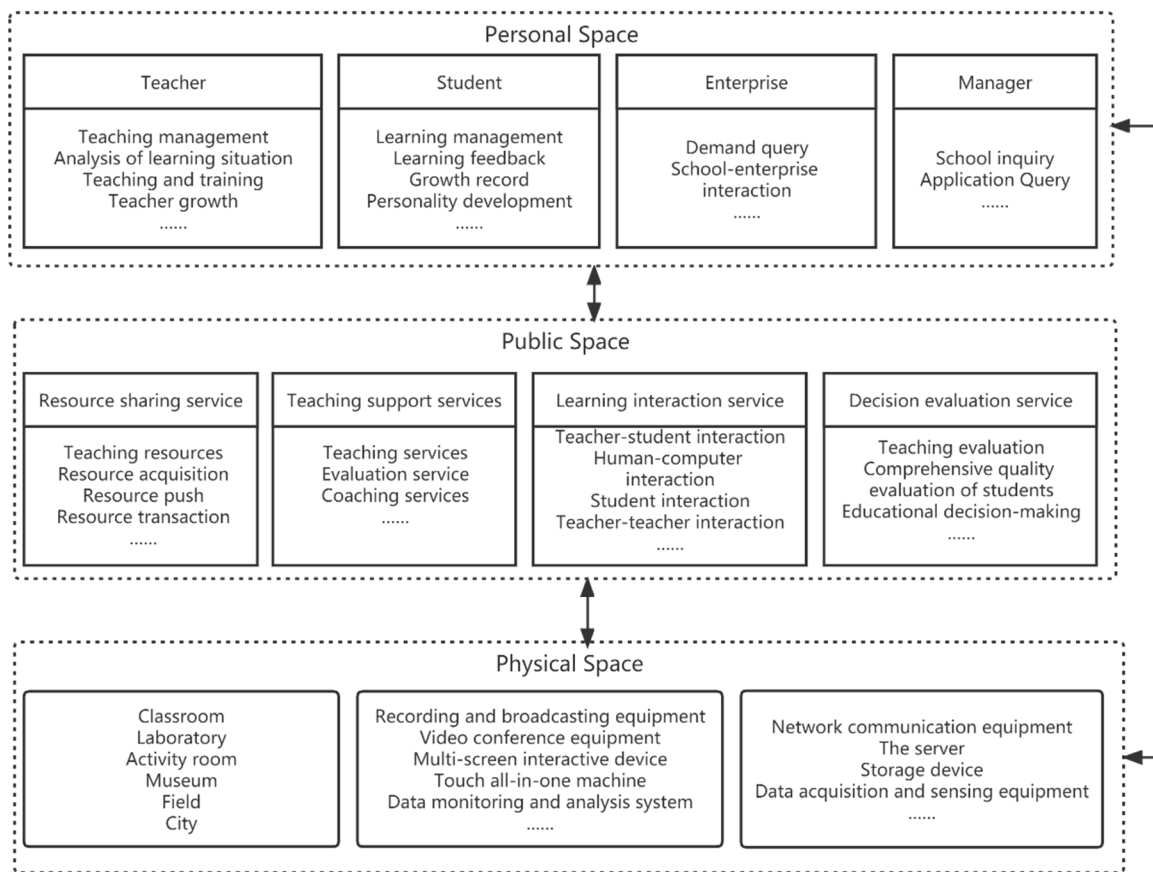


Figure 1. Smart learning space construction model

3.1. Physical space equipped with intelligent software and hardware

Physical space is the basic layer of intelligent learning space and an important data source. Physical space is mainly composed of various learning places and their appendages, such as classrooms, laboratories, activity rooms, museums, cities and fields. These places are equipped with a variety of intelligent equipment and software systems, which are the main fields for teachers and learners to carry out teaching and learning activities[7], and can provide a variety of intelligent teaching services for teachers and students. For example, functional modules such as teaching content presentation, teaching process recording, teaching interaction and environmental management of smart classrooms and laboratories; The sensor equipment and corresponding network facilities can be intelligently controlled through the classroom and the experimental Internet of Things system to provide refined data for the analysis of teaching situation, the analysis of learning situation, the prediction of teaching effectiveness, and the improvement and feedback of teaching process; The integrated automatic recording and broadcasting system and virtual simulation experiment system can break the space-time limit of students' learning; The whole physical space is connected to the campus network to realize the

seamless integration of physical space and virtual space. At the same time, the school reconstructs the teaching space, designs new teaching forms, builds flexible and changeable interactive classroom, multi-screen discussion classroom, multi-window interactive classroom, remote interactive classroom, special seminar room, autonomous and cooperative learning space, individual autonomous learning space, campus learning partner assistance space, exhibition learning space, to adapt to different levels and different types of teaching models and student autonomous learning models, and fully utilizes teachers, students The needs of teaching subjects such as enterprise tutors.

3.2. Virtual space for providing services and support

Virtual space is mainly composed of personal space and public space. Personal space is a place for personalized learning and work. Its basic functions include personal management, technology management, resource management, application management and community management, including teachers and students, enterprises and managers. The public space mainly provides resource sharing services such as acquisition, push and transaction of teaching resources, teaching and learning support services with teaching, evaluation and counseling functions, learning

interaction services supporting interaction between teachers and students, human-computer, students, teachers and teachers, and decision-making evaluation services with teaching evaluation, comprehensive quality evaluation of students, and educational decision-making evaluation functions.

Virtual space and physical space composed of personal space and public space are virtual and real, integrating people (stakeholders), things (technology and environment), environment (educational situation), events (educational activities), and pulse (internal connection of knowledge) into one[8], supporting the interconnection of various roles, realizing information barrier-free, enabling learners to obtain real learning experience, and promoting education intelligence and fairness.

4. Application of Smart Learning Space

4.1. Reform teaching mode

Through the construction of learning space, teachers can create courses, create course resources, set up question banks, take exams, push materials, sign in, quiz, quiz, voting, questionnaires, discussions and other daily teaching activities online, thus breaking through the time and space boundaries of traditional classroom teaching, combining the online learning platform service system and offline classroom teaching, implementing a new model of project-based teaching, inquiry-based teaching, blended teaching with the course as the unit, learning process assessment as the guide, and The new mode of project-based teaching, inquiry-based teaching and blended teaching is implemented with the course as the unit, learning process assessment as the guide and learning task completion as the goal, which realizes teaching process monitoring, learning progress tracking, examination coordination management and service personalization. The construction of learning space can not only guarantee the normal implementation of teaching activities under special circumstances such as epidemic, but also give full play to the advantages of online and offline teaching, optimize the teaching process and improve students' learning effect.

4.2. Transforming learning styles

Through the construction of learning spaces, the absolute control of teachers over students is completely broken, the freedom of students is increased, the depth and breadth of students' learning is extended, and the concept of "student-centered" is fully reflected, so that students can make full use of the rich and diversified resources and services integrated in learning spaces for independent learning according to their own learning needs. Learning. The intelligent, visual and intuitive personalized learning system can push relevant exercises to each student's different knowledge weaknesses for consolidation and practice, reducing ineffective practice and improving learning efficiency. At the same time, the construction of the learning community has moved from offline to online and offline together, enabling real-time interaction between students and teachers and between students across classes, schools and regions, answering questions and solving problems on difficult points between teachers and students, and exchanging learning experiences between students and teachers, so that the initiative, enthusiasm and creativity of learning can be improved, problem-solving ability, innovation awareness and innovation

ability can be cultivated, and employment The competitiveness and social adaptability will be improved.

4.3. Reshape evaluation methods

Through the Smart Learning Space, learning assessment can be evidence-based, moving from empirical assessment to developmental assessment based on scientific data analysis. Teachers can dynamically collect students' learning data in real time through classroom emotion recognition and analysis, classroom behavior recognition and analysis, and classroom interaction recognition and analysis, and conduct data mining and learning analysis on the big data generated during the learning process to scientifically and accurately assess students' current level and problems, and then provide targeted interventions to timely adjust the teaching schedule and teaching methods and provide precise teaching tailored to each student's specific We provide precise teaching for each student's specific problems. At the same time, we focus on the subjective assessment based on students' self-assessment and mutual assessment, based on which we can accurately send students personalized learning resources to stimulate their interest in learning and improve their learning efficiency. At the school level, we use technologies such as the Internet of Things and smart wearable devices to build an accurate management and testing system, a smart education system that combines moral, intellectual, physical, aesthetic and labor education, and writes, records, organizes and selects students' comprehensive quality assessment process data in the smart learning space to promote educational equity.

4.4. Improve teaching management

The teaching backstage management system supervises, controls and evaluates all aspects of teaching systematically, including teachers' teaching work evaluation, professional evaluation, course evaluation, students' evaluation and college evaluation. By collecting all kinds of data and information in the process of teaching operation, it can serve the teaching management and decision making of the school. The background management system of the platform supports the analysis and evaluation of teaching effect of big data, and through the data generated in the statistical teaching process can make comprehensive and visual statistical analysis of teachers' teaching, students' learning and course access, etc., implement multi-dimensional three-dimensional portrait, carry out scientific evaluation and analysis, realize teachers' accurate teaching, students' personalized learning and management's scientific decision-making, so as to achieve the goal of improving To achieve the goal of improving the efficiency of education and teaching management.

4.5. Promote teachers' professional development

Through the construction of learning spaces, schools can build cross-school, subject and professional teaching teams based on master teacher studios and virtual teaching and research rooms. Through organizing special training, expert reports, seminars and exchanges, teachers and education and teaching managers can update their concepts and improve their professional abilities and space application capabilities. The teaching team collectively discusses and formulates course teaching contents, teaching methods and evaluation methods, collectively researches and sharpens lessons, organizes teachers to participate in universal training such as modern education technology and online teaching, organizes

and conducts outstanding teachers to deliver public lessons and timely promotes excellent experiences in order to promote teachers' professional development.

5. Conclusion

Smart learning spaces will usher in a new ecology of education for all and for all. However, we need to know that the application of smart learning spaces requires schools to provide various guarantees in terms of systems, personnel, resources and security. For example, teachers' use of the space to carry out innovative teaching and resource sharing will be included in the assessment and reflected in the title evaluation, merit evaluation and reasonable rewards, so as to encourage teachers to apply the space on a regular basis; students' online learning behaviors, abilities and achievements will be included in their comprehensive quality evaluation, so as to motivate them to apply the space actively; technical support and service cooperation with third-party enterprises will be carried out to guarantee the smooth use of the learning space; and cooperation with We actively cooperate with other universities and invite famous teachers who are experienced in teaching in other universities, especially in the use of online teaching and learning space, to conduct training for teachers; set up a research team related to smart teaching in the school and carry out continuous research; build or introduce national, provincial and university-level high-quality course resources; build a perfect network security defense system to ensure the safety of information, content and data in the learning space.

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