

Construction and Implementation Strategy of 5G Intelligent Education Ecosystem

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Abstract. In this paper, a comprehensive analysis of 5G intelligent teaching system is made, and its characteristics and components are deeply discussed. With its advanced wireless technology and network technology, 5G technology brings unprecedented possibilities for the education sector. It can build a new atomic capacity, atomic services, thus bringing a new form for teaching applications. By introducing 5G technology into the intelligent education ecosystem, it is easier to integrate various advanced technologies, such as smart technologies, cloud technology, big data and the Internet of Things. On this basis, the construction framework and implementation path of the 5G smart education ecosystem are put forward. In addition, the specific contents and methods of the construction of the 5G smart education ecosystem, as well as the coordination mechanism between schools, enterprises and governments, are also deeply discussed. Finally, some targeted countermeasures are put forward to promote the process of educational reform.

Keywords: 5G, Intelligent education, Ecosystem construction

1 Introduction

The smart education ecosystem represents a major progress in education informatization, and the 5G smart education ecosystem is the latest embodiment of this progress. Relying on the strong support of 5G mobile communication technology, it has opened up a new way for education informatization. This system not only realizes innovation in teaching scenarios and teaching experience, such as precision teaching, personalized teaching, network collaborative teaching, etc., but further has a profound impact on the form of education [1-2]. This influence is not only the change of technology and means, but also the change of teaching methods, and even directly related to the transformation of the school form. Given that 5G technology is widely used in the commercial field and gradually penetrates into the teaching process, it is particularly important to conduct systematic research on the architecture, construction method and implementation way of 5G intelligent teaching. This will not only help us to better understand and apply 5G technology, but also help us to promote the sustainable development of education informatization.

2 Architecture And Construction Method

2.1 Key elements and characteristics

The architecture of intelligent education ecosystem can be roughly divided into three key elements: technology architecture, application form and business trend [3], as shown in Figure 1. Among them, the application form (high level) is supported by the technical architecture (the underlying layer, which consists of the data layer, the algorithm layer, the perception layer and the service structure; the trend of the business structure (and elements related to education, such as schools, enterprises, and government) through the trend of the application form, and guarantees the implementation of the application form [4].

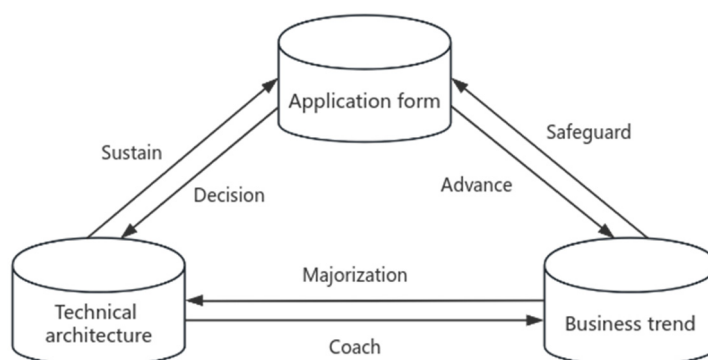


Figure 1. Key elements and relationships of the intelligent education ecosystem.

Intelligent education ecosystem is the form of ecosystem in the field of education. Therefore, in the 5G intelligent education ecosystem, the components are interrelated and interact with each other, forming the operating state and rules similar to the ecosystem. This ecological characteristic emphasizes interaction and balance, and provides a basis for the basic characteristics of intelligent education. By integrating artificial intelligence and humanistic elements into this system, we can further highlight the core characteristics of intelligent education and make it more adapt to the needs of the development of The Times. Therefore, it can be summarized as: innovation-driven, restructuring, open ecology, respect for personality, service intelligence and autonomous evolution [5-7].

2.2 The nature of 5g acting on the intelligent education ecosystem

5G is an epoch-making mobile communication network. In general, it has many technical advantages such as ultra wideb, mass connection and low latency, the system itself is open and ecological; Due to the software-defined network (SDN), network function virtualization (NFV), network slicing and other new network technologies, it is more suitable for combining with social vertical fields (such as education) [8].

The process of 5G supporting and driving the intelligent education ecosystem is shown in Figure 2. Due to its advanced wireless technology and network technology, 5G can form new atomic capabilities and atomic services, thus generating new educational application forms in the field of education. Its atomic capabilities, atomic services and educational application forms are

easier to integrate advanced technologies such as VR, AR, MR, AI, cloud technology, big data, Internet of Things (IoT), which is also the essential difference between it when acting on the intelligent education ecosystem and other mobile networks.

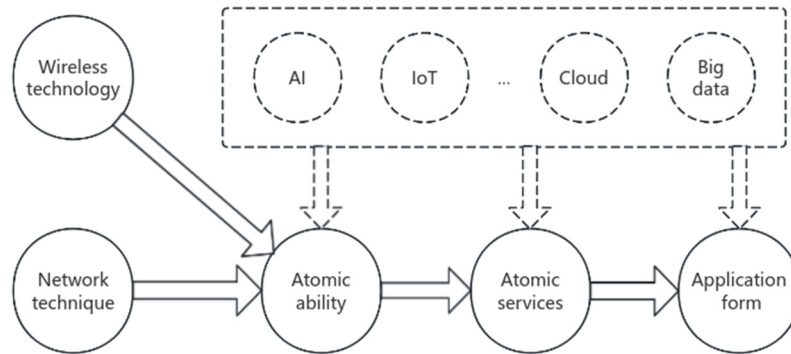


Figure 2. The process in which 5G supports and drives an intelligent education ecosystem.

2.3 Overall architecture

Through the above analysis, the overall architecture of the 5G intelligent education ecosystem can be constructed, as shown in Figure 3. The technology architecture consists of four core elements: data, algorithms, perception, and services. They form four levels and constitute a complete education system. The data layer is responsible for collecting, processing, sorting, classifying, storing and backup teaching data, which is the foundation of the whole architecture. The algorithm layer uses a variety of artificial intelligence algorithms, such as neural network algorithm, grammar analysis algorithm, personality analysis algorithm, etc., which are the key to intelligent learning and intelligent education. The perceptual layer senses students' behaviors and responses, identifying their characteristics, and those of teachers and administrators are also included. The service level provides services for specific educational systems, which can also be adopted by multiple forms of education [9]. Of course, the stratification is logically differentiated, and if it is distinguished from the entity, the technical architecture is composed of "cloud, manage, and terminal". "Cloud" has public cloud, private cloud and hybrid cloud; "manage" includes several control centers, such as data control center, intelligent management control center; "terminal" is mainly learning terminal, teaching terminal, information collection terminal, etc.

2.4 Overall construction method

Guided by "artificial intelligence service education" concept, with "5G + artificial intelligence technology" as the foundation, with intelligent campus, based on big data intelligent learning space platform, intelligent virtual assistant, three-dimensional comprehensive intelligent teaching site "artificial intelligence + education" application form, supported by intelligence, fast, comprehensive education analysis system, build intelligent education centered environment, promote the reform of talent training mode, promote the learning style, teaching methods and education mode innovation.

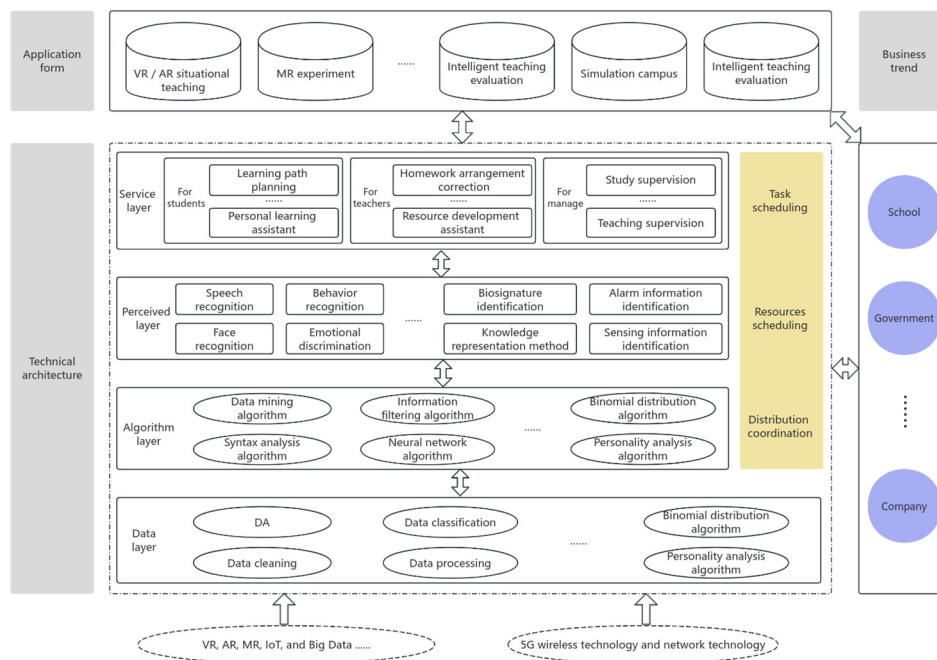


Figure 3. The overall architecture of the 5G intelligent education ecosystem.

3 Implementation Strategy

How to make good use of the 5G intelligent education ecosystem, give full play to the efficiency of "5G + intelligent education", and comprehensively improve the level of education and teaching, is a practical problem in front of us.

3.1 Build a basic platform

Building the basic platform of 5G intelligent education ecosystem is the premise of giving full play to the effectiveness of "5G + intelligent education", and the construction needs to be strengthened from the following aspects.

3.1.1 Support network.

With the expansion of 5G network coverage, its uWB connection, low latency and mobile edge computing characteristics can solve the problems of seamless interconnection, network terminals cannot effectively control, and network access quality control service and edge service buffer service when the network concurrent access is high. In order to strengthen network transmission, management capabilities and security, we can also consider a fully connected education private network based on 5G slice technology and an intelligent education edge cloud based on 5G edge computing. In addition, in order to strengthen the intelligent collection and control ability, it is necessary to carry out the whole system of Internet of Things terminals

through computers, mobile phones, iPad (tablet computer), sensors, cameras, wearable devices, etc., to realize the all-round perception of "people-thing-scene" on campus.

3.1.2 Intelligent terminal.

Developed and purchased a number of intelligent terminal devices specially designed for the featured intelligent education application scenarios. These devices play a key role in the intelligent classroom environment, such as interactive smart tablet, memory blackboard and integrated blackboard. They serve as interactive large-screen display tools for teacher electronic teaching, and are also equipped with teacher operation desk. In addition, we also introduced an intelligent learning pen, as well as a daily course recording and playback as the core, the system features "master quality courses", equipped with professional recording host, camera, microphone and other equipment. In addition, it also provides intelligent terminals that can show the unique culture of the school and class, and these devices can also be used as class clocking terminals. They not only enhance the interactive effect of teachers in the classroom, but also include terminals such as high photo instrument and mobile display platform for teachers' paper textbooks and the immediate display of students' classroom results.

3.1.3 Knowledgeware

In the operation of the system, the data are collected and analyzed deeply by using intelligent algorithms. Based on this data, a series of intelligent software with multiple functions will be developed. These software will provide identity authentication and public interface access, security authentication, cloud computing and storage services, big data analysis and decision support, as well as behavior recognition and situational awareness. In addition, the computable characteristics of 5G network will be combined to deeply study the network security mechanism of 5G network. By establishing a powerful network security verification mechanism, we can realize the intelligent analysis of massive data in 5G network. These intelligent software not only supports universal hardware, but also can adapt to specific or multiple teaching models. Our goal is to lay a solid theoretical foundation for this to promote the development and application of 5G networks.

3.1.4 Sectioning scheme

As a new type of education ecology, 5G smart education ecosystem covers a wide range of fields, including teaching, research, management, evaluation, regional governance, lifelong learning and education and public services. In this ecosystem, there are both exploration of new forms of education and innovative design of existing education models. For example, 5G interactive teaching is a new attempt. In 5G interactive teaching, we integrate different types and layouts of intelligent classrooms, and through the application of 5G technology, we transfer the traditional wired network, Wi-Fi, Bluetooth and other network carriers to high-performance 5G networks. This not only ensures the security, reliability and stability of the network, but also greatly improves the response speed, realizes maintenance free, and brings unprecedented use experience for teachers and students. Whether building or rebuilding intelligent teaching systems, 5G networks need to be divided into multiple virtual networks that meet business needs. On this basis, we have realized the independent operation of various teaching modes, making the teaching more flexible and diverse.

3.1.5 Platform connection

Education informatization requires teachers to skillfully use all kinds of teaching software, and students can also easily use all kinds of learning software. The goal of a digital campus is to ensure that all schools make full use of the software. However, the construction of the basic platform does not happen overnight. Due to the large differences in teaching equipment in different regions, each region, school and even each class needs to build a 5G smart education ecological foundation platform according to its own actual situation. In order to realize the smooth connectivity between the platforms, we need to pay attention to the following points: firstly, before the construction of the platform, unified planning is needed to guide the whole process; secondly, the intelligent teaching system should establish a set of unified standardized system and ensure that the platform interface is universal and easy to use; finally, integrate the teaching, teaching and evaluation data of each school and region, build a centralized teaching resource center and scheduling center, and include regional management measures such as remote inspection, remote supervision and remote evaluation. Through these measures, we can ensure the smooth connectivity between various platforms and promote the rapid development of education informatization.

3.2 Optimize the ecological environment of 5g intelligent education

Schools, enterprises and governments are important components of the business form trend in the 5G intelligent education ecosystem. Only when they strive to complete their respective tasks and coordinate together, can the 5G intelligent education ecological environment be optimized and promote the development of intelligent education.

3.2.1 Assignment

The implementation subject of 5G smart education includes various preschool education institutions, institutions of higher learning, vocational colleges, primary and secondary schools, and education and training institutions. These subjects shall undertake the planning, management, construction and implementation of intelligent education in their schools or institutions. At the same time, education information suppliers, education equipment suppliers, network operators, chip module suppliers, information and communication technology solution suppliers and education resources suppliers jointly participate. In order to promote the healthy development of intelligent teaching, relevant national departments have formulated relevant policies, and relevant departments in the field of industry and information technology have also formulated corresponding standards and norms.

3.2.2 Coordinated

Through the wisdom teaching related schools, enterprises and institutions, social organizations, research institutions of cross-industry, open and non-profit 5G wisdom teaching alliance, we can promote the in-depth exchanges and cooperation, realize resource sharing and knowledge transfer, give full play to their respective advantages, promote the healthy development of wisdom education. For the core problems in 5G smart teaching, we conducted collaborative research to form a representative 5G smart teaching engineering case, and demonstrated its exemplary role to the whole society.

3.3 Promote educational change

Intelligent education supported by 5G has outstanding platform advantages and can provide unlimited possibilities for education and teaching. Advanced education concepts should be integrated to promote the in-depth reform of education, promote the improvement of education level, and force the innovation of intelligent education system platform.

3.3.1 Educative reform .

The arrival of 5G technology has brought great changes to the network environment, but the transformation and upgrading of educational achievements is not a simple task. Therefore, we need a series of innovations. First of all, strengthen the training and practice of teachers' intelligent teaching ability to improve their application ability in practical teaching. Secondly, the creation of immersion temperament, so that students from passive acceptance to active participation. In addition, modern educational ideas such as "student-centered", "personalized" teaching, "output-oriented" and "green education" are integrated into them. At the same time, the traditional teaching theories, behaviorism, and constructivism to explore their expansion significance and extensibility in the new environment. Finally, mutually promote the teaching reform, teaching research reform, education management reform, evaluation reform, campus management reform and other aspects of the reform. In the process of implementation, a complete ecological system can be gradually established by easy to difficult, demonstration before popularization. On this basis, the campus is redesigned to realize the transformation from unity to personalized and self-organization.

3.3.2 Platform promotion.

In order to adapt to the current teaching ideas and achieve high-quality teaching results, the 5G smart teaching ecosystem needs to introduce new teaching models. At the same time, the new high wisdom teaching mode also needs a higher level of the underlying platform to support, so as to promote the breakthrough of new technologies. New technology can innovate or reshape the application form of intelligent education through a two-way cycle, and inject new vitality into the field of education.

4 Conclusion

With the progress and application of science and technology, it has had a profound impact on the society. Among them, the arrival of 5G technology has brought a huge impetus to the informatization of education, especially the combination with AI, big data, cloud technology, broadband Internet of Things and other high-tech, which has had a profound impact on teaching and profoundly changed the form of intelligent teaching. At present, the ecosystem of 5G smart teaching is gradually expanding to the whole teaching environment, but it still faces some problems. This paper makes an in-depth analysis of the origin, architecture and construction methods of 5G intelligent teaching ecosystem, and puts forward strategic suggestions to realize 5G wisdom teaching, aiming to provide useful reference for the application of "5G + intelligent teaching".

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