

Intelligent Education Cloud is the Solution Paradigm to the K12 Education Imbalance Problem in 3/4 Tier Cities

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Abstract. K12 education is now a big problem facing by the government, especially for that of third and fourth tier cities. The reasons for this problem come from many aspects, and cannot be solved easily by traditional methods. In the paper, we propose the intelligent education cloud platform (IEC), which can be deployed in the city and help the K12 education through all schools in the whole city. The IEC can be copied and deployed in many places and give great performance simultaneously, and is the solution paradigm to the K12 education imbalance problem in 3/4 tier cities.

Introduction

According to the central government plan, the digital gap between urban and rural schools should be narrowed down within 5-10 years. This work will include the improvement of the information infrastructure construction of K12 education, and the realization of a big coverage of broadband networks at all levels and all kinds of K12 schools, and also the comprehensive popularization of network teaching environment. We will also need to speed up the coverage of high-quality education resources to the rural areas through education informatization, and share the achievements of education development. The third and fourth tier cities in China have a certain scale of infrastructure construction, but on the other hand are lack of the capital, excellent teachers, software and hardware environment possessed by the big cities [1, 2]. This means, that the third and fourth tier cities have the potential to improve the K12 education imbalance therein and benefit almost one third of the student population in China.

On the other hand, with the development of big data, Internet, multimedia and other technologies, the era of cloud computing has come. Many advanced computer software of different applications have been developed and deployed onto the cloud platform, improving the information processing smoothly and robustly. As an important application field of cloud computing, education industry has developed a lot of computer software, covering school education, scientific research, logistics, office and other fields, greatly improving the level of education informatization.

This paper proposes an intelligent education cloud platform which combines big data and education application, optimizes relevant resources by activating existing network communication resources, curriculum content resources, excellent teacher resources, campus security resources, campus equipment resources, etc. This platform sources all the resources to the cloud intensively, and customizes characteristic education services online and offline together with the local education government and schools, with the aim to strongly improve the K12 education.

Cloud Technology and the Current Online Education Platform

Cloud computing [3, 4, 5, 6] is a form of distributed computing. It uses the network cloud to break up huge data processing programs into countless small programs, and then processes and analyzes these small programs through a system of multiple servers and returns the results to users. It is characterized by high flexibility, extensibility and high cost performance.

Big data technology [7] is the technology of data analysis and processing. It is developed because the data scale becomes so large that it is beyond the scope of traditional database software tools in

terms of acquisition, storage and processing. In essence, it is the rational use of a large amount of data. It has the characteristics of massive data scale, fast data flow, complex data authenticity, and low efficiency value density and so on.

With the rapid development of science and technology, online K12 education interaction has become an important research direction of online education. Therefore, many scholars focus on analyzing the model of online education interaction platform based on big data, and by studying the current situation of students' online education interaction. How to use big data and cloud computing technologies to provide guidance for interactions is worth exploring. As a result, many scholars study aspects such as teachers, students, goals, content, resource, culture and education, and use questionnaire investigation to analyze the education virtual community interaction effect factors. The results show that, the teachers, students, the network environment and their interaction plays an important role in the K12 education.

Network Architecture of the Intelligent Education Cloud Platform (IEC)

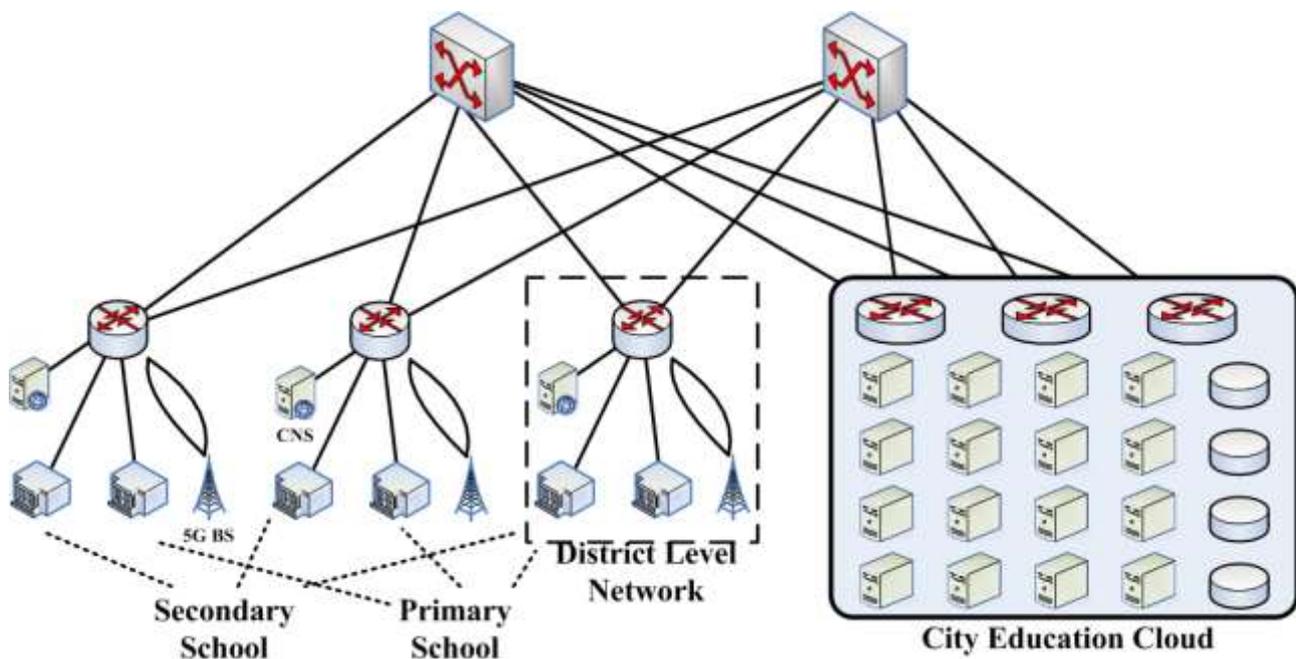


Figure 1. Structure of the Intelligent Education Cloud Platform (IEC).

Based on the practical problems faced by the operators and the carrying requirements of future education cloud services, this platform adopted the international general standards, and all services are carried uniformly within the scope. In Fig. 1 shows the structure of the intelligent education cloud platform.

According to different requirements of education government or schools, the business layer realizes end-to-end connectivity through the controller, and adopts the same network architecture and modular mode of box equipment as OTT (over the top). Taking 10GE/100ge standard Ethernet interface as the basic interface unit, a new architecture for intelligent education is established. This network architecture can better adapt to the needs of the development of education cloud convergence services in the 5G era, solve the existing network problems, and have the scalability of technology and the needs of IEC for long-term evolution in the future. In essence, intelligent platform adopts the idea of data center (DC) as the center and cloud as a whole, and uses other new routing protocol technologies to reconstruct the IEC.

For the comprehensive bearing of cloud network elements and users, the "core + edge" forwarding architecture and integrated core equipment are adopted to realize the unification of the architecture. Multiple edge devices are adopted to realize the bearing of 5G, school broadband and communication cloud network elements. The goal of building an IEC is to build a flat and unified network centered on the communication cloud DC. Various users, such as school broadband, access different types of edge devices through base stations, integrated access points, residential and office buildings, and then enter the unified communication cloud or edge cloud to obtain service resources.

Applications of IEC

Through the sharing mode of intelligent education cloud resources on the intelligent education cloud platform (IEC), the development mode of "Cloud + students" can be fully utilized to share high-quality education resources. Teachers can learn through network media, master modern information technology education means, and learn to share and use public quality resources and apply them to the teaching process. This is the most direct and simple way for teachers in third and fourth-tier cities to use information technology in teaching.

Relying on the intelligent education cloud services platform and other media from local education department, teachers can login through registration and share the high quality education resources, select and download high quality teaching case. This can happen in online teaching or offline teaching. It can greatly help to solve the problem of lacking excellent teachers, or even normal teachers, and those students in three or four line city under K12 education can enjoy the classes of the same quality as in big cities.

Conclusions

In this paper, we introduce the intelligent education cloud platform (IEC) for the K12 education, especially for that in the three or four line city. It can help the education government to solve the problem of lacking teacher, can help the teacher to further focus on teaching itself, and help the students by providing better education resources. IEC can be the solution paradigm for the K12 education imbalance in all of the three or four line cities in China.

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