Academic Journal of Business & Management
ISSN 2616-5902 Vol. 2, Issue 3: 112-118, DOI: 10.25236/AJBM.2020.020315

Research on the Construction Strategy of Smart Campus Infrastructure in Vocational Colleges in the Age of 5G

Chunxiu Xu*, Lili Xu, Jing Chen

Shandong Labor Vocational and Technical College, Jinan, Shandong 250022, China
**Corresponding Author*

ABSTRACT. *This paper introduces the development status of 5G technology, analyzes the development status of smart campuses in vocational colleges, and analyzes the influencing factors of 5G technology on the construction of smart campuses in vocational colleges.And then, it proposes application-oriented mMTC-based vocational college smart campus infrastructure construction strategy and implementation guarantee, with a view to providing a theoretical reference for future vocational college smart campus infrastructure construction.*

KEYWORDS: *5g, Smart campus, Infrastructure*

1. Introduction

With the continuous development of "Internet +" education, all vocational colleges have actively responded to and implemented the spirit of the Ministry of Education's "Ten Years Development Plan for Educational Informatization (2011-2020)" and practically integrate modern information technology into vocational education [1]. Vocational colleges are the main force of China's education system, and they send a large number of excellent technical talents to the society every year. Therefore, the teaching quality of vocational colleges directly affects the quality of graduates. The factors affecting the teaching quality of vocational colleges are divided into software factors and hardware factors. Software factors include teaching quality, learning rules, etc.; while hardware factors include the experimental equipment for learning and the degree of campus information construction, that is, the construction of a smart campus. At present, the status quo of smart campus construction in most vocational colleges in China is as follows :

(1) The infrastructure is relatively complete while the software supporting level is not high

With the continuous development and improvement of smart campuses, the current campus is equipped with more complete hardware equipment, such as 360-degree monitoring system, WIFI full school coverage, card system, smart classroom

ISSN 2616-5902 Vol. 2, Issue 3: 112-118, DOI: 10.25236/AJBM.2020.020315

and advanced experimental equipment, etc [2]. Although the supporting software is also heavily invested, some software does not meet the actual needs of the college, and does not match the hardware planning, and lacks pertinence. These software are not easy to use, the utilization rate is not high, and the satisfaction of teachers and students is not high. The low degree of software matching limits the integration of campus resources and hinders the development of smart campus.

(2) Templating application system function, lack of personalized design

Most professional software application systems are purchased finished software. These application system functions are not specially designed for the colleges, so most of them are too general and popular to meet the personalized needs. The design of smart campus platform needs to be based on the actual needs of the college. The platform function should fully consider the personalized needs of teachers and students, and constantly update the needs and improve the system function according to the use feedback of teachers and students.

(3) Various types of application systems are independent, and the interface types are inconsistent

Due to the different specifications of functional departments in vocational colleges, there are different types of requirements for application systems. Therefore, most of the different departments of smart campus have strong application system independence, and the overall interface types are inconsistent. The reason for this phenomenon is that there is no overall design before construction and the communication between departments is not timely. The final result is that all departments of the college have built the required system, but the management is still decentralized, the data obtained is still one-sided, the data can not be shared, integrated, and even a large number of data collection work is redundant.

2. Development Status of 5g

5G refers to the fifth generation mobile communication network, which is much better than 4G network in terms of speed, security and energy saving. At present, countries are actively promoting 5G technology research, and the European Union, the United States, South Korea, Japan and other countries are conducting 5G commercial network experiments. China has also launched a large number of 5G network tests and various 5G application tests. 5G network has begun to operate, and we will soon usher in the real 5G era.

3. The Influence of 5g Technology on the Construction of Smart Campus Infrastructure in Vocational Colleges

The smart campus system of vocational colleges includes three parts: infrastructure, digital resources and application services [3]. The application of 5G technology directly affects the construction of smart campus infrastructure. Smart campus infrastructure construction includes: college network center, simulation

ISSN 2616-5902 Vol. 2, Issue 3: 112-118, DOI: 10.25236/AJBM.2020.020315

training system, campus security system, campus life service system and other infrastructure. The infrastructure guarantees the deep integration of the services provided for teachers and students inside the school and the digital services outside the school, and provides smart services for teachers and students in real time and efficiently.

5G technology has the characteristics of high speed, ubiquitous network, low power consumption, low delay, interconnection of everything, reconstruction security, etc., which is a complex system. Although to apply 5G technology to the construction of smart campus would improve the network speed, there is still many problems in upgrading the infrastructure of smart campus. Firstly, comprehensively design the school network, from 4G to 5G. Network upgrading can improve the integration of all kinds of information facilities, comprehensively perceive and capture all kinds of campus information. Secondly, establish a data center. Classify the resources of the school according to the needs of each department, unify the data interface, and provide economic, stable and convenient resource services for the smart campus of vocational colleges. Thirdly, improve the information security system of smart campus in vocational colleges. The smart campus platform is easy to be attacked by hackers, which will bring incalculable losses to educational administration and teaching work. Therefore, it is necessary to provide a safe network environment for the smart campus of vocational colleges in terms of technology, teachers and students' awareness of prevention, etc.

4. The Strategies of Infrastructure Construction of Smart Campus in Vocational Colleges under the Background of 5g Technology

The basic construction of smart campus in vocational colleges should be guided by application. On the one hand, the construction and application of infrastructure should be carried out from the perspective of users, and the system design should be carried out after fully investigating the needs of students, teachers and administrative staff, so as to better serve teachers and students. On the other hand, strengthen the construction of information software resources and human resources supporting infrastructure. It is also necessary to fully consider the characteristics of 5G technology, so as to prepare for the infrastructure construction of smart campus in vocational colleges under the background of upgrading 5G technology [4].

4.1 Composition of 5g Technology

As a new generation of mobile communication technology, 5G's network structure and capacity are very different from 4G. There are a lot of technologies integrated into it, such as OFDM-based (Orthogonal Frequency Division Multiplexing) optimized waveform and multiple access for orthogonal frequency division multiplexing, flexible frame design, advanced new wireless technology, ultra-dense heterogeneous network, etc.

ISSN 2616-5902 Vol. 2, Issue 3: 112-118, DOI: 10.25236/AJBM.2020.020315

4.2 Current Situation of Smart Campus Infrastructure Construction in Vocational Colleges

The smart campus infrastructure of vocational colleges mainly includes: network infrastructure, teaching environment infrastructure, teaching resource infrastructure, office automation infrastructure, campus service infrastructure, databases and servers, etc. Achieve data collection through equipment and network, use cloud storage and other technologies to store data generated by different application modules in the corresponding areas, and finally realize the full perception and interoperability of people and things on campus.

After years of informatization and the construction and improvement of smart campuses, the smart campus infrastructure of most vocational colleges in China has achieved some basic practical results, mainly reflected in the construction of the network environment and the construction of business systems. However, with the rapid development of network technology, insufficient construction funds, weak construction strength, and insufficient attention, the construction of smart campus infrastructure in vocational colleges is lagging behind.

4.3 Application-Oriented Mmtc-Based Construction Strategies of Smart Campus in Vocational Colleges

One of the three major scenarios defined in the 5G era, mMTC (massive Machine Type of Communication), makes mass internet of things possible. 5G, as a new generation of mobile communication technology, will be applied to the whole smart campus in the future, including network security, smart classroom, smart office, campus life and many other aspects, which will bring strong support to the construction of smart campus and become the engine of the construction of the whole smart campus [5]. In the age of 5G, the basic construction of smart campus in vocational colleges should be based on upgrading, that is, at the same time of protecting the existing investment, upgrade to the infrastructure of smart campus of vocational colleges with strong integrity, high integration, high cost performance, compatibility and scalability. We should establish application-oriented smart campus infrastructure vocational college based on mMTC.

Update and upgrade on the basis of retaining the original facilities. First, build a new network system. The new network system needs to be built on the basis of 5G technology, which should be composed of wireless network, wired network and mobile Internet, so that teachers and students can use the network to obtain information resources without time and space constraints. Second, strengthen the construction of Internet of things on campus. mMTC is one of the three scenarios defined in 5G era, so the construction of Internet of things is the key point of campus infrastructure construction. The perfect combination of 5G technology and mMTC enables the traditional facilities such as water and electricity in the public computer room, laboratory and logistics service in the campus to realize the comprehensive perception and interconnection between people and objects. Third, speed up the construction and upgrading of experimental facilities. The laboratory is

ISSN 2616-5902 Vol. 2, Issue 3: 112-118, DOI: 10.25236/AJBM.2020.020315

not only an important place for students to learn and innovate independently, but also an important platform for teachers to improve their teaching and research ability. The upgrading of laboratory equipment can establish a ubiquitous, highly open and intelligent experimental environment for teachers and students. The framework of infrastructure construction of smart campus in vocational college based on mMTC is shown in Figure 1.

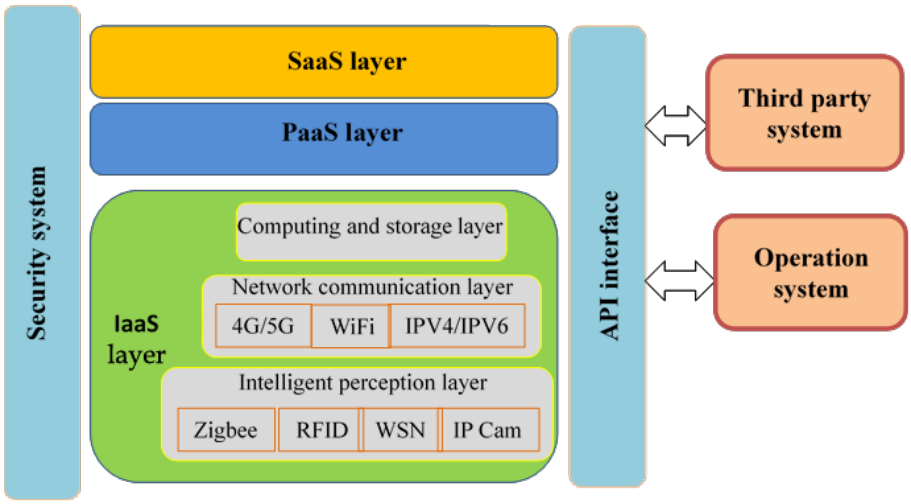

Fig.1 Framework of Infrastructure Construction of Smart Campus in Vocational College Based on Mmtc

The infrastructure layer (Iaas) is located at the bottom of the whole smart campus, which is divided into the intelligent sensing layer, the network communication layer and the computing and storage layer. The intelligent sensing layer includes basic network equipment and various sensors, which are mainly used to collect information; in the network communication layer, 4G and 5G can be used at the same time at the initial stage, but after 5G technology is popularized, it will be upgraded to 5G technology; the computing and storage layer is a resource pool composed of a large number of hardware. It stores the information collected by the intelligent sensing layer. The storage resource pool can effectively and conveniently manage and share resources.

4.4 Implementation Guarantee of the Basic Construction Strategies of the Smart Campus in Vocational Colleges Based on Mmtc

First, guarantee the financial support for the infrastructure construction of smart campus. On the basis of fully considering the cutting-edge technology and future development trend, vocational colleges should carry out comprehensive planning of

ISSN 2616-5902 Vol. 2, Issue 3: 112-118, DOI: 10.25236/AJBM.2020.020315

smart campus infrastructure from the aspects of teachers and students scale, campus layout, financial support, etc., to build smart campus infrastructure that not only meets the existing business needs, but also supports future expansion. Financial support only depends on the strength of the school is far from enough. It needs the support of the government and society. The school also needs to improve its work efficiency and use the funds in practice.

Second, construct group of powerful teachers for information construction. Teachers are developers and users of modern information technology. While building hardware, smart campus must also strengthen the cultivation of teachers' information literacy. The school should pay attention to the concept, implement the action, strengthen the system construction, make a practical teacher training plan, and provide the advanced thought and system guarantee for the construction of the information-based teacher team. Informatization construction of teachers is the talent support for the construction of smart campus, and an important guarantee for the development of smart campus to cultivate high-quality talents [6].

Third, establish the management mechanism of smart campus construction. First of all, we should establish a sound leadership management system of smart campus, establish a leading group with clear division of labor, fully mobilize the enthusiasm of students and faculty, provide constructive suggestions for the construction of smart campus, and jointly build a safe, fast and comfortable smart campus. Then, it is necessary to establish a fund guarantee system. The construction funds of the smart campus should be used for a special purpose. A special financial team should be set up to budget and manage the funds, so as to ensure the clear control authority and transparent use of the funds and the sustainable construction and development of the smart campus. At last, It is also necessary to establish rules and regulations guarantee mechanism, including smart platform system for teachers and students, data security system, infrastructure security system, etc. All rules and regulations must be standardized, rigorous, reasonable and effective. Strict and comprehensive rules and regulations can provide strong guidance and strong system guarantee for the construction of smart campus.

5. Conclusion

With the continuous development of new information technology, such as 5G technology, cloud computing, big data technology and Internet of things, Internet + education has become the mainstream of education in the future and the construction of smart campus escorts the Internet plus education. The perfect combination of 5G technology and smart campus infrastructure will take a long time, and many professional technologies, human and material resources will be involved in the process, such as intelligent recognition technology, learning analysis technology, technician reserve and sensor equipment investment of learning situation. Its promotion needs a gradual and in-depth process. Only through continuous practice and improvement can we better provide a safe and energy-saving intelligent space for teachers and students.

ISSN 2616-5902 Vol. 2, Issue 3: 112-118, DOI: 10.25236/AJBM.2020.020315

Acknowledgement

This work is supported by 2019 research project of China Vocational Association (No. 2019069), and 2019 institute level scientific research project of Shandong Labor Vocational Technology (No. 2019KJ01).

References

[1] X.H. Li (2018). Research on the deep integration of information technology and vocational education teaching. Heilongjiang Science, vol.2018, no.21, pp.74-75.
[2] S.G. Lin (2010). Practice and Research on the construction of “one card” on campus, College of Electronic Science and technology.
[3] H.J. Pan (2018). Research on the intelligent campus design mode of Vocational Colleges Based on “5 + 1” Architecture. Comparative study of cultural innovation, vol.2019, no.17, pp.126-128.
[4] H.Y. Wang, X. Wang, W. Yue, et al. (2017). Exploration and Thinking on the construction of smart campus in occupation Internet schools in the era of Internet plus. New business weekly, vol.2017, no.9, pp.33-40.
[5] G. Chen (2018). Analysis of the construction of smart campus in Vocational Colleges in Internet plus Era. Computer fan, vol.2017, no.9, pp.28-32.
[6] W.L. Luo, R. Wang (2018). Construction and application of intelligent campus in Universities in the era of Internet plus. Digital Education, vol.2018, no.2, pp.33-38.