COVID-19 develop online service platform of multi-modal interaction in Higher Education for teaching and learning: a university-case analysis

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Abstract: With the development of science and technology, people are more and more prefer to share knowledge and interact with each other. The construction of multi – modal information network social platform in higher education is an important way to enhance online interaction between teachers and students. This paper summarizes and analyzes the application status, existing problems and further needs of teachers and students of online service platform in higher education in China and some other countries due to the COVID-19. Combined with the current Internet technology and artificial intelligence technology, this article aims to build a multi-modal interactive operation mode of higher education comprehensive network service platform. Taking the University of Chinese Academy of Sciences as the research object, 263 students and nearly 100 teachers were randomly investigated on the demand of online teaching service platform, including students, teachers, teaching administrators, supervision experts and other personnel. Based on the theory of "teaching interaction hierarchy tower", the multi-modal interactive operation mode of online teaching and learning service platform for higher education is constructed. The operation mode of teaching and learning service platform will be changed from single information release and resource sharing to multi-modal information and resource sharing to assist teaching and learning. Combined with big data analysis technology, the management ability of teacher and the study service of higher education courses will be improved, especially, teaching evaluation system for teacher will be optimized and upgraded, and the student-centered educational mode will be improved.

1. Introduction

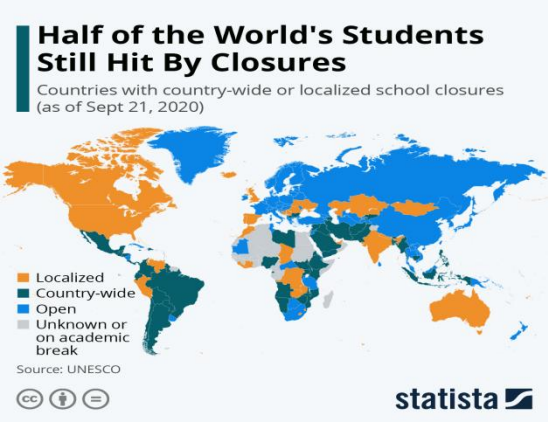

Figure 1 Half of the World's Students Still Hit By Closures

The COVID-19 outbreak 2020 was declared a public health emergency of international concern. The new crown pneumonia epidemic in the world has also brought unprecedented challenges to the education field on how to provide high-quality services in public health emergencies, which is a hitherto unknown problem in the World Health Organization. The WHO has been a public health emergency. Become a common concern in the field of education and teaching[1]. Despite the outbreak of COVID-19 last over one year, the blow to the global classroom is still not neglecting, and the

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demand for online teaching is stronger than ever. As shown in Figure 1, there are still more than 800 million learners who cannot participate in classroom learning as of covid-19 by mid September 2020 Data released with UNESCO in April 2020, namely 1.6 billion students - over 90 percent in the world, did not attach in person classes, the number of countries that closed schools in September 2020 has dropped from 138 to 52. However, the future of in person classes for colleges and universities still with much uncertainty due to the continue infection of the COVID-19.

According to the research results of Xu Jinjie, the operation and management of customized online teaching and learning service platform in the field of education is the biggest challenge for most national education systems to carry out large-scale online education. To cope with the impact of COVID-19 on education, the institutions of higher education in the United States, European countries, Australia and other countries have focused their efforts on developing or using existing online teaching platforms (virtual classroom), providing online teaching and interaction between teachers and students, such as My class at home[2] . Indeed, COVID-19 has increased virtual mobility and/or collaborative online learning as alternatives to physical student mobility[3]. Although the UK, the United States, France and other countries have taken measures to suspend classes and continue education activities in the form of online classes, they have not provided a comprehensive online teaching and learning service platform to provide resources sharing, teacher-student interaction, learning exchange, teaching experiment simulation and other functions.

China is one of the countries which are influenced by COVID-19 in 2019. The normal teaching of higher education institutions is seriously hindered. In view of the development of the epidemic situation, in order to prevent the epidemic from spreading to university campuses [4], the Ministry of Education issued the "guidance on the organization and management of online teaching in Colleges and universities during the epidemic prevention and control period" in February 2020, which requires the government to take the lead, universities as the main body and social participation, We will jointly implement and guarantee online teaching in Colleges and universities during the period of epidemic prevention and control, so as to achieve the goal of "teaching without stopping classes, and learning without stopping classes". According to the data of Wu Yan [5], the Department of higher education of China quickly organized 37 online course platforms and technology platforms with good foundation and strong strength (see Figure 1), taking the lead in opening 41000 online courses such as MOOCS and virtual simulation experiment courses to colleges and universities nationwide free of charge, and a number of social and university course online platforms were actively involved. As of February 11, 2020, more than 130 online education companies provide a variety of online resources and education services [6]. The mode of students' self-learning by using network resources at home is more rapidly developed and widely accepted.

However, nearly 100 online teaching service platforms have different functions and service quality. Teachers often use multiple teaching platforms to complete teaching tasks, which brings a lot of inconvenience to teachers and students[7]. Most online teaching platforms have realized teachers' teaching of course content, but it is difficult for teachers to master students' classroom learning effect. There is a lack of interaction between teachers and students, and there is a lack of communication between students[8]. Due to the outbreak of the epidemic, College Teachers are not prepared for online teaching, lack of online teaching experience, and have not received good training, There are few online teaching resources[9]. The common problems of online platform include lack of teaching resources, lack of interaction and communication, and the quality of course teaching needs to be improved.

Based on the theory of "teaching interaction tower" proposed by Professor Chen Li [10], this paper analyzes the needs of 59 teachers, 263 students, 13 supervisors and several teaching managers on different dimensions of the social network platform of "teaching and learning", In view of the problems existing in online teaching and learning service platform and the needs of teachers and students, a multi-dimensional social network platform of "teaching and learning" is constructed. The platform has the functions of teaching resource sharing, curriculum design service, teacher-student interaction, student communication and cooperation, virtual simulation practice and experiment, data visualization, etc., and provides a channel for multimodal information and resource sharing and

interaction, The purpose of this paper is to break the boundary between traditional schools and classrooms, advocate the education concept of learning as the center[11], and provide a feasible scheme for the deep integration of science and technology and "teaching and learning". This paper introduces the multi-modal operation thinking of social network platform in colleges and universities in detail, which has certain feasibility.

2. Literature review

Internet technology and AI technology is an important driving force leading the new round of technological revolution and industrial transformation. It is profoundly changing people's production, life and learning methods, and promotes the human society to usher in the intelligent era of human-machine collaboration, cross boundary integration, and creating and sharing. The development of intelligent technology has promoted the development of social media technology. As shown in Figure 2, from 2017 to 2025, users of global social networks have increased year by year. According to figure 3, China's social network users will reach 926.84 million in 2020, accounting for about half of the population in China, far more than other countries, indicating that Chinese people have a strong demand for knowledge sharing and interaction.

It is not difficult to see from the data that the development of social media technology is basically in line with people's interactive needs, and has become a part of almost everyone's life and an important cornerstone of the Internet. BBS, the embryonic form of early social media, is known as the forum by the public. Compared with the point-to-point communication form of e-mail, BBS has evolved social media into a point-to-face communication form, reducing the communication cost. In 2004, the emergence of entertainment social media makes people feel the convenience of Internet social interaction. They can share their feelings and life experiences on the website, comment on friends' photos and articles, etc. compared with forums, entertainment social media is more entertaining and interactive; Micro information social media micro blog, as a new form of social media, appears, short, concise text has good communication; Vertical social media applications are not created at the end of these three social media applications. At present, vertical social media is mainly combined with games, e-commerce, classified information, etc., such as wechat, Yixin, public comments, etc., which can also be called a favorable attempt to explore the business model of social media; Tiktok has entered the 4G/5G era, and the micro video social media is becoming more and more popular, such as jitter, fast hand, etc., using short videos, and using fragmented time to understand and understand people's interest.

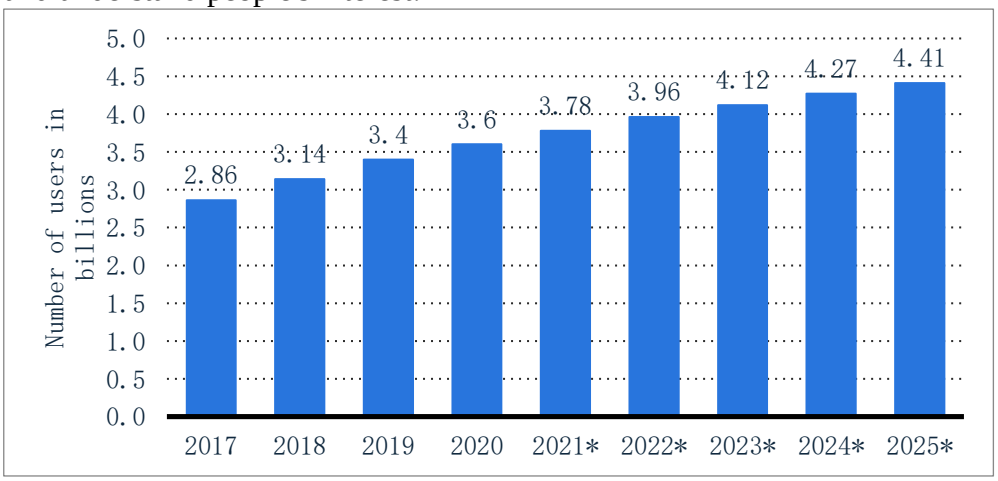

Figure 2 Number of social network users worldwide from 2017 to 2025 (in billions)

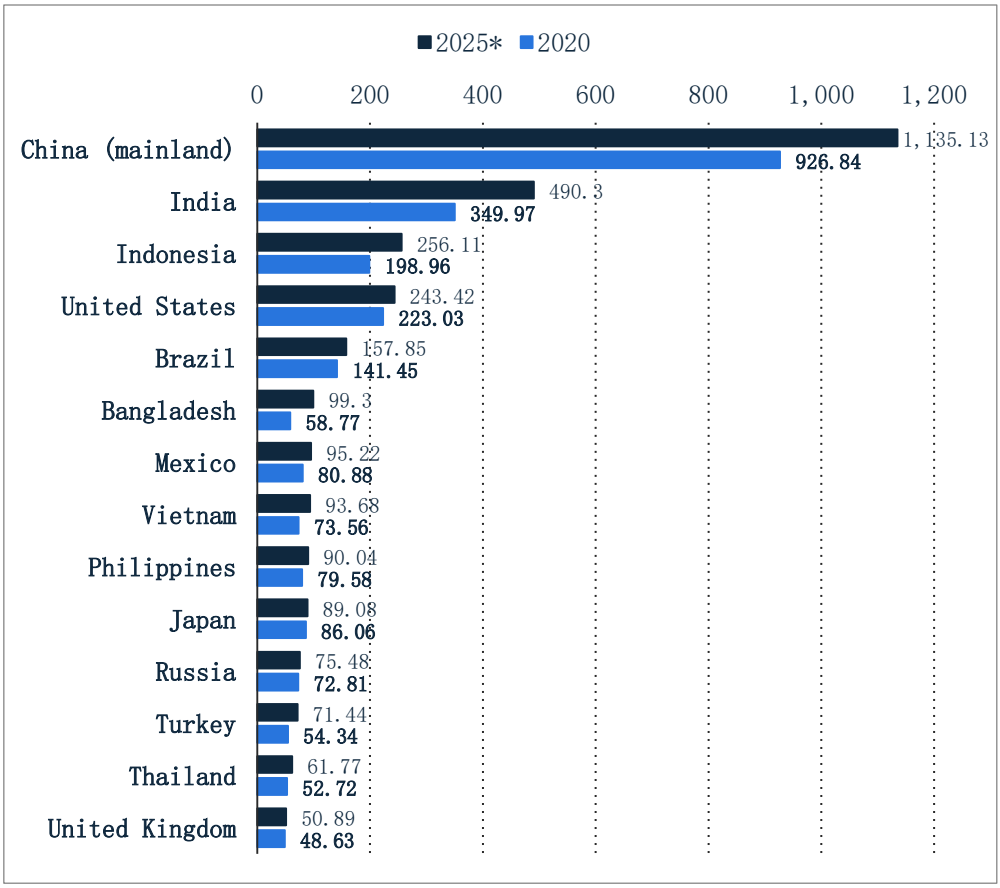

Figure 3 Number of social network users in selected countries in 2020 and 2025 (in millions)

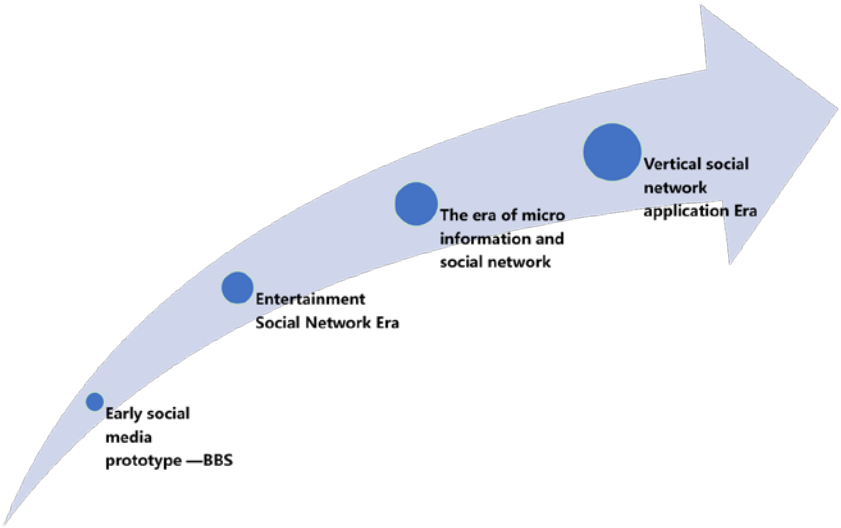

Figure 4 the development of social network in China

Further, 5G technology improves the speed, delay and capacity problems in the application of intelligent technology, and provides strong hardware support for the reconstruction of the new education ecology in the information age (from China Mobile). The integration of intelligent technology and education greatly promotes the degree of education informatization. However, the deep integration of intelligent technology and education still needs to be improved [12]. At the same time, whether the interaction mode of social network can be integrated with education to provide students with multimodal learning and interaction resources is also worth further exploring.

Since 2008, central China Normal University and Fudan University have formed their own online education platform based on Sakai system of Oxford University. In 2014, universities can create their own MOOC platform on BB MOOC platform[13]. In recent years, teaching systems with artificial

intelligence as the core appear sporadically. For example, the online MOOCS of Tsinghua University School add the function of artificial intelligence assistant, which can help teachers automatically reply to the common problems of students and reduce the workload of teachers [14]. After the outbreak of the epidemic in 2019, with the support of government policies, universities and enterprises jointly set up online teaching and learning service platform to ensure online teaching during the epidemic period. The online teaching platform of colleges and universities includes not only the learning management system based on PC and mobile terminals such as edmodo, Moodle, yuketang and Chaoxing Xuexitong, but also social software such as wechat and QQ, and remote office and conference software such as nailing, welink and zoom[15].

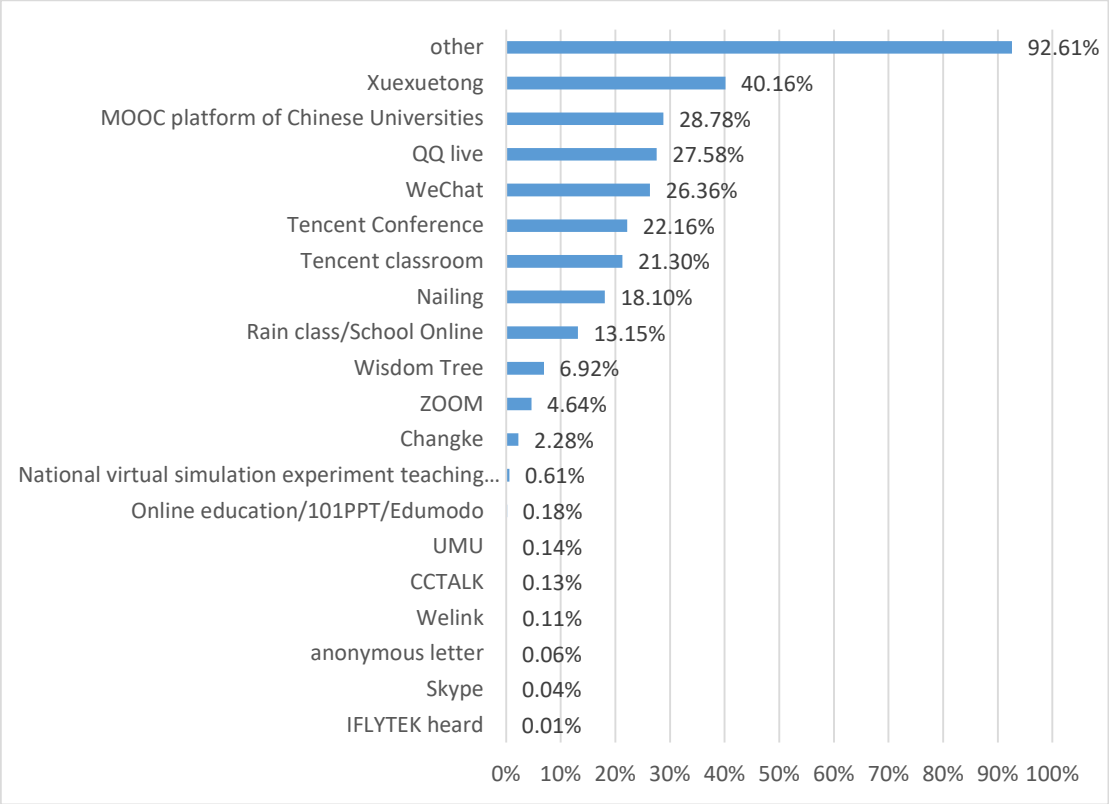

Figure 5 Platform often used by teachers (Wu Daguang,2020)

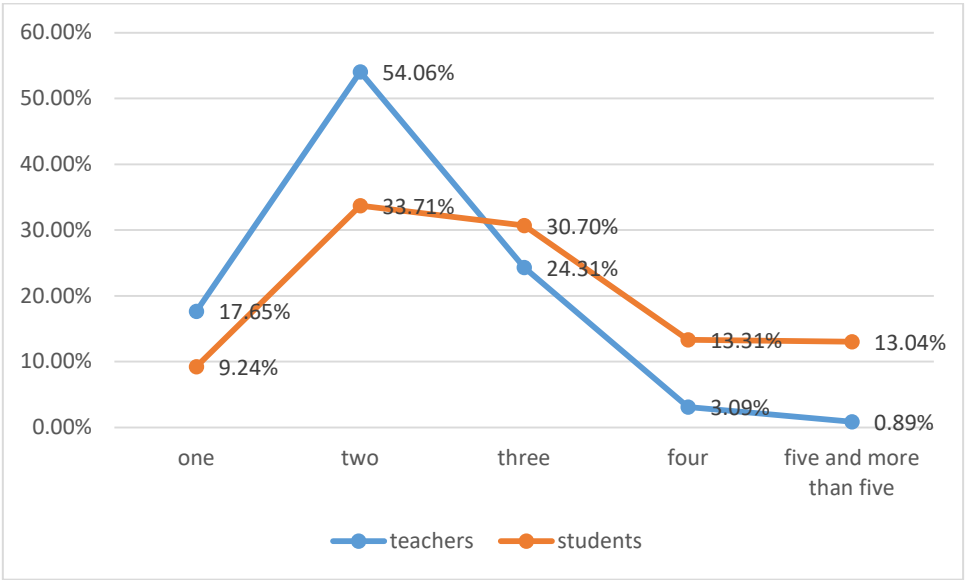

Figure 6 Distribution of the number of teaching platforms used by each course

However, facing the complex teaching service platform, colleges and universities are in a passive position. According to the survey, there are 5443 teacher questionnaires and 118191 student

questionnaires in 97 universities across the country. The survey results show that 79.57% of the teachers have not carried out online teaching before the epidemic, with an average of 6.9 platforms used by each school, and the average number of platforms used by each teacher in Universities is 2.16 [7]. For example, in order to make up for the lack of a single learning management system, South China Normal University uses the self-developed "liruyun classroom" with Tencent classroom live broadcast, and then uses wechat group to enhance the "presence" and interaction [6]. Therefore, the use of multiple platforms causes a lot of inconvenience for teachers and students, and increases the time cost for teachers and students to learn the familiar software.

According to Wu Daguang's research, as shown in Figure 7, most of the platforms have the functions of live recording teaching, e-mail notification, sending and receiving homework, data distribution, etc., but the functions of electronic data analysis of students' learning behavior, online education testing and scoring, online classroom discussion, online experimental demonstration, etc. are weak. In addition, the online teaching platform also needs to start from the students, through the analysis of data such as students' browsing records, downloading resources, and the content of communication in the community, to push the corresponding resources and learning programs for the students, and improve the students' use experience[16]. It is also necessary to build an online teaching resource sharing and exchange community for teachers and provide a good teaching support environment for teachers[17].

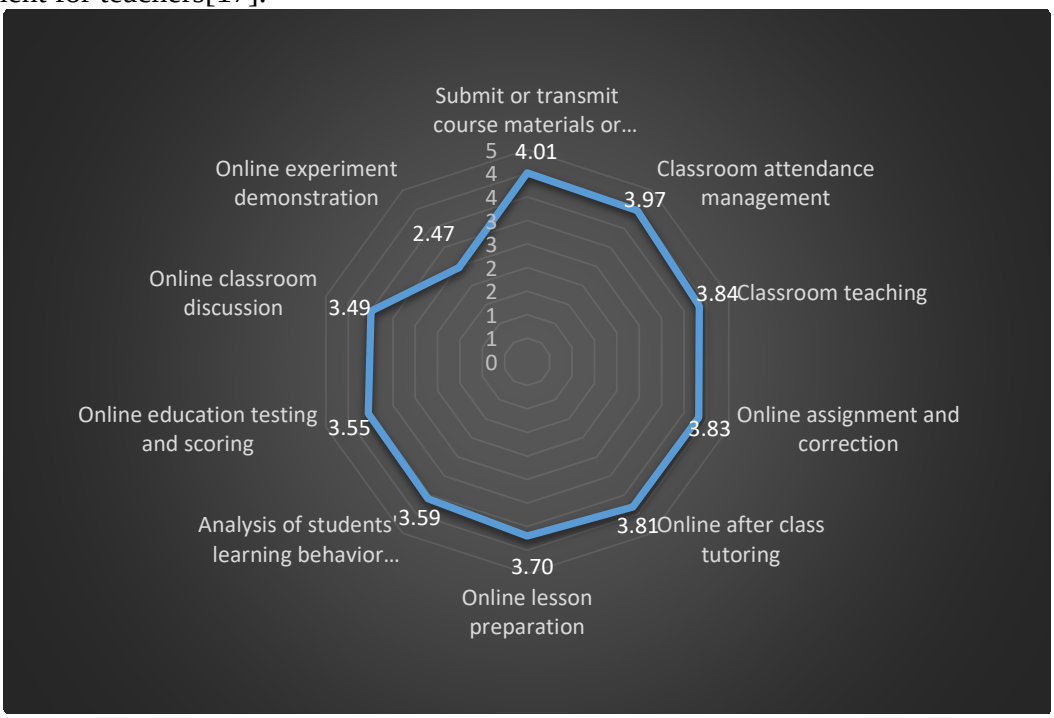

Figure 7 Evaluation of various teaching platforms to meet the needs of teaching activities

In conclusion, the mode of realizing the online interaction of multimodal teaching information and resources through a comprehensive platform has aroused some educators' thinking. First, it can deal with emergencies and carry out online teaching work on the comprehensive teaching and learning service platform quickly, so as to reduce the impact and impact on teaching; Secondly, it can make the information and resources interactive channels, realize the interaction between teachers and students, share resources and support students' personalized learning, and make the school talent training mode gradually transition to the student centered talent training mode; Third, through the visualization of comprehensive teaching service platform, the teacher teaching evaluation system is constantly improved, and the ability of school education and teaching management is constantly improved.

3. Research method

According to figure 8, Professor Chen Li's "teaching interaction hierarchy tower" theory divides

teaching interaction into three levels, namely operation interaction, information interaction and concept interaction. The theory was initially applied to distance education, and its interaction model, elements and levels are also suitable for online and offline teaching interaction environment. Operation interaction is the interaction between human and technology platform or equipment. Operation interaction can help students set up personal learning environment and form group learning environment; Information interaction is a process of learning multimodal information resources on the platform of learning technology, which expands the breadth and depth of interaction; Conceptual interaction means that after communication and interaction between students and teachers or students, it stimulates self-analysis and evaluation, ultimately affects the cognition of original concepts and theoretical structures, and produces new concepts and structures [18]. Therefore, the theory is used as one of the theoretical basis of this paper.

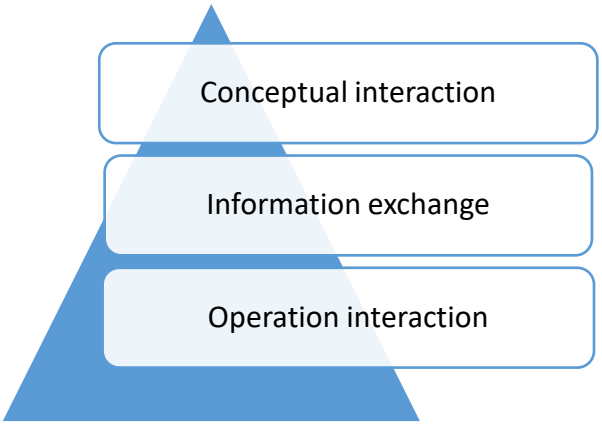

Figure 8 Hierarchical tower theory model of teaching interaction[10]

Table 1 The extension of the classification of teaching interaction [19]

technology	two way communication	intelligent agent	Social software	Social network environment
extension of interaction type	students and students/ students and teachers/ Students and learning resources (Moore,1989)	content and content/ teachers and teachers/ teachers and content (Anderson,2003b)	students and groups/ groups and groups/ groups and learning resources/ teachers and groups (Dron,2007)	learners and social networks (Resource aggregate)/ learners and the whole network (Ostashewski & Reid,2010)
	students and Interface (Hillman,Willis & Gunawardena,1994)			
learning style	Audio visual learning	Intelligent learning	Social learning	Network learning

New learning needs and various teaching platforms lead to the continuous expansion of teaching interaction, which makes the emergence of comprehensive multimodal interactive learning platform become an inevitable trend. From Table 1, it can be seen that the types of educational and teaching interaction are constantly changing according to the development of the times. From the initial learners' listening and learning, one-to-one interaction with teachers and other learners, it can be extended to intelligent learning, that is, interaction between learners and groups, and social learning, and extensive interaction through the network according to their own needs. It makes learners get more opportunities for interaction, more flexible ways and wider space for interaction in online education environment, and the advantages of online learning are increasingly emerging[19]. According to Wang Yiyan [20], multimode refers to the combination of two or more modes. It is multimodal learning to learn the consistency and complementarity of each mode and complete the information conversion and communication between the modes. That is, the basic characteristics of

the social network teaching and learning platform of multimodal operation mode can be understood as the interaction of teachers and students through various modes of information such as text, image, video, etc., thus producing high-level conceptual interaction, improving the quality of curriculum teaching and achieving corresponding teaching objectives and objectives.

This paper adopts the methods of literature research, investigation, case analysis, functional analysis and so on. The survey method includes questionnaire survey and outline interview. The questionnaire includes teacher questionnaire and student questionnaire. Based on the analysis of research literature at home and abroad, and combined with the current operation status of online teaching and learning service platform of the University of Chinese Academy of Sciences, the project team has drawn up the topics and interview outlines of the questionnaire, including 21 questions for teachers and 23 questions for students. A total of 300 questionnaires were randomly distributed, 263 of which were returned and 263 of which were valid. The effective recovery rate was 87.6%, which met the statistical requirements of questionnaire research. A total of 60 questionnaires were distributed and 59 were returned, of which 59 were effective, with an effective rate of 98.3%. In order to understand the situation of teachers and students, the project team will make statistics on the survey results of teachers' questionnaire and students' questionnaire respectively.

In order to carry out the investigation effectively, the project team contacted the teaching management personnel of each department in advance to assist in the investigation. In order to obtain the real situation of students and teachers, the anonymous answer method was adopted. Through the interview, we contacted these departments in advance, and then had face-to-face communication with teachers, students, supervision experts and teaching management personnel in a planned and organized way. Before the discussion, the project team worked out a number of questions in advance. After investigating the current situation, functions and resource utilization of the teaching platform, and the needs of teaching and learning under the network environment, they asked questions and obtained rich first-hand information. The project team cleaned and sorted out the survey data, summarized and classified the contents reflected, processed the results of the question and answer, and finally combined the results of the two aspects, made detailed statistics and comparative analysis on each type of questions, combined with the content of the interview, and finally came to a conclusion. There are many tables involved in this survey, which are limited to space and cannot be listed one by one. The following gives several related questionnaires and analysis, and then summarizes the results of the questionnaire and interview, and gives a comprehensive analysis.

4. Findings and results

The demand data of teachers, students, supervision experts and teaching management support personnel reflects the different needs of different users for the platform. Teachers' needs are mainly reflected in the acquisition of rules and regulations, on-the-job training, sharing of teaching resources and curriculum resources. Students' needs are mainly reflected in teacher-student interaction, practical learning, digital reference room construction and learning exchange. Supervision experts' needs are mainly reflected in difficult supervision problems, resource sharing and teaching guidance, The demand of teaching managers is mainly reflected in the visualization of teaching data, better optimization and improvement of teaching quality assurance system and teachers' teaching evaluation system.

4.1 Teacher Demand

As a popular course, ingenious teaching design and attractive teaching methods are essential. In the course preparation work, teaching analysis, teaching planning, material preparation, writing teaching plan and other work, according to the analysis of teaching content, determination of teaching objectives, formulation of reasonable teaching methods, presentation document design, blackboard writing design are very important.

As shown in Figure 9, in the survey, it is found that 66.1% of the lecturers have the need to observe excellent teaching plans, 38.98% of the lecturers have the need to obtain teaching PowerPoint templates, in addition, there are the needs of teaching design methods.

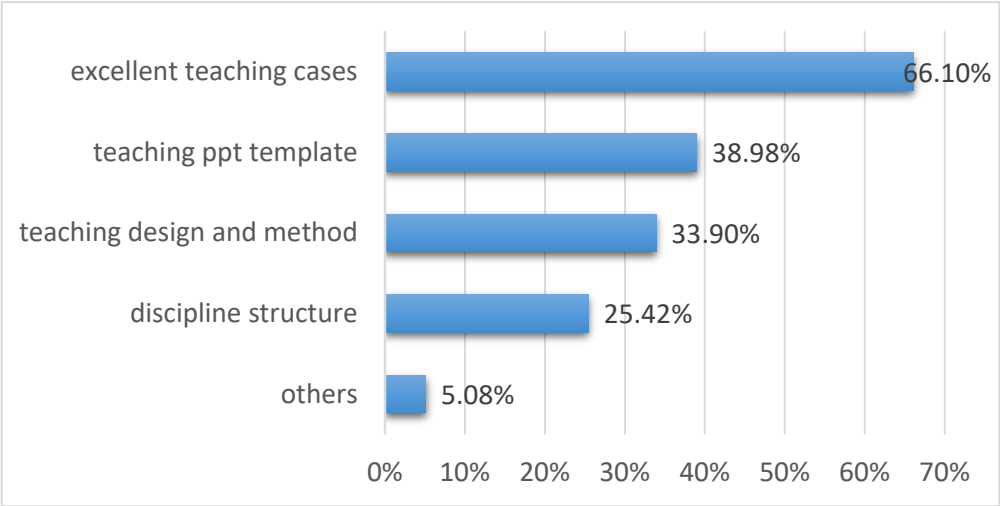

Figure 9 The demand of teachers engaged in teaching work

Through the detailed analysis of the data, teachers' demand for comprehensive social network platform is mainly reflected in the following aspects: obtaining rules and regulations, providing pre-training, finding teaching design, and observing excellent courseware.

As shown in Figure 10-1, it is particularly important to train the new lecturers on the front line as the preparation before class. Through adequate preparation in the early stage, not only can the course content be effectively taught to students, but also can avoid the embarrassing situation of unclear logic and inaccurate expression in class. It is found from the survey that more than half of the lecturers think that on-the-job training is necessary. As shown in Figure 10-2, through the investigation on the access to rules and regulations, it is found that 38.39% of the lecturers think that they can obtain the relevant rules and regulations of the school through the teaching related network platform, and 44.64% of the lecturers think that they can obtain the relevant information through e-mail, but in their long-term work, they find that the e-mail will have some difficulties such as omission and search, Unable to obtain relevant information in time when needed. As shown in Figure 10-3, 79.66% of the lecturers need to observe the classroom or courseware of excellent teachers. As shown in Figure 10-4, 64.41% of the lecturers need materials related to subject instructional design methods and techniques.

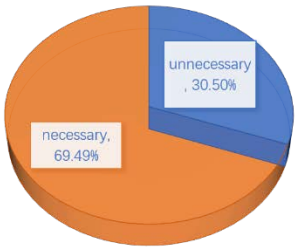

Figure10-1 Is it necessary to conduct pre job training for teachers

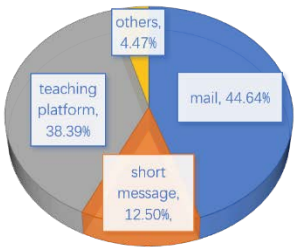

Figure10-2 Access to rules and regulations

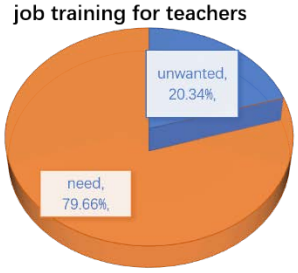

Figure10-3 Whether to observe the excellent classroom or teaching courseware

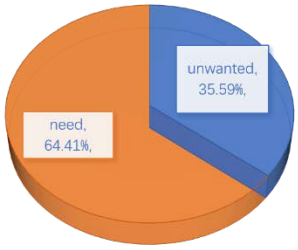

Figure10-4 Whether the relevant materials of teaching design methods and skills of the subject are needed

Figure 10 Teachers' needs of resources

In the selection of teaching sharing resources, we can obtain some courseware from other super teachers or excellent teachers in colleges and universities through paid access, record a video about

teaching design, teaching methods, teaching PPT presentation, and upload it to the platform for the lecturer to watch; In addition, we can also get some valuable teaching resources from our special grade teachers and excellent teachers for the use of related subject lecturers. As shown in Figure 11, 79.66% of the lecturers are willing to share teaching materials. It can be seen that it is necessary to share teaching resources in teaching work. How to form the sharing of teaching resources in various disciplines is a problem worthy of consideration. Through the construction of teaching and learning platform, teachers can timely obtain curriculum resources that can be used for reference, which is not only in line with the current curriculum content design, but also in line with the teaching characteristics of the discipline, it reduces the acquisition cost and time cost of teaching materials.

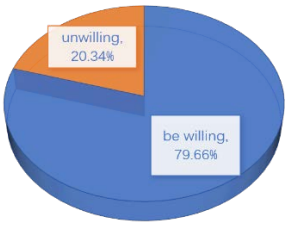

Figure 11 Is the lecturer willing to share teaching materials

In addition, in terms of curriculum system, curriculum syllabus and students' situation of course selection, subject structure, curriculum system and curriculum setting are added to the curriculum resources for the lecturers to check at any time, so as to have a clear understanding of the whole curriculum system. Create different subject groups, add the syllabus to the course resource sharing, convenient for the lecturer to consult, according to the relevant course content, teachers can communicate with each other, to avoid the phenomenon of repetition of class content. As shown in Figure 12, from the survey of 59 lecturers, it is found that 66.1% of the lecturers think it is necessary to establish an interactive platform between teachers and students.

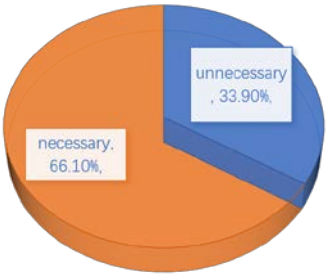

Figure 12 Is it necessary to establish an interactive platform between teachers and students (from teachers)

4.2 Student Demand

In terms of basic curriculum learning, students can have the interface with the existing real-world classroom design of the school, which is completely open to students. The lecturer can propose the learning requirements of the basic courses according to the content of the course, thus reducing the difference of knowledge base of the students in the course selection, and facilitating the teaching. As shown in Figure 13, from 263 student surveys, 91.63 percent of students were willing to take the basic courses required by the course on their own. The platform can design selected materials and build a digital library of disciplines, which is also in line with the needs of most students. As shown in Figure 14, 92.78% of students found that it is necessary to build digital data room from 263 students' survey.

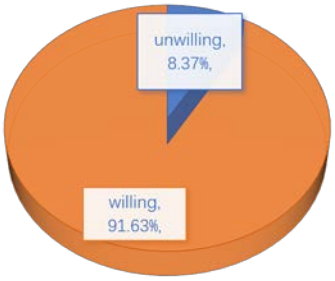

Figure 13 Are you willing to teach yourself reference room

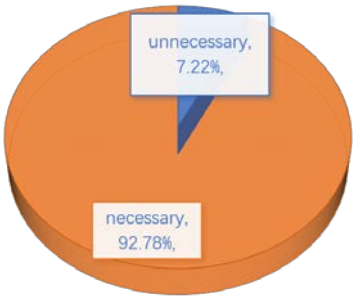

Figure 14 Is it necessary to build subject digital basic courses online

In the usual interviews with students participating in the course learning, students generally believe that most of the courses are interdisciplinary courses. If there is no corresponding reserve of basic knowledge of the course, the course learning is very difficult, and can only rely on the usual remedial measures. However, when the remedial measures are taken, the goal is often not clear and the learning efficiency is low, There are many difficulties without the guidance of teachers. It can be seen that it is necessary to develop and construct the real classroom (excellent course) and digital reference room.

In terms of teacher-student interaction, the platform design allows students to ask questions to the lecturer of the selected course. The lecturer can answer the questions by himself or entrust the assistant to answer the questions. Teachers can also exchange and cooperate with other teachers in the subject. As shown in Figure 15, according to the survey of 263 students, 90.87% of the students reported that it was necessary to establish a network platform for teacher-student interaction and course question answering. It can be seen that the construction of a bridge for teacher-student interaction is still very important in the current course learning process. In addition, students can invite friends to join, expand their own circle of learning and friends, to meet the needs of learning in the interaction. Students make full use of this learning platform to encourage each other, which reflects the social influence factors of social media acceptance model.

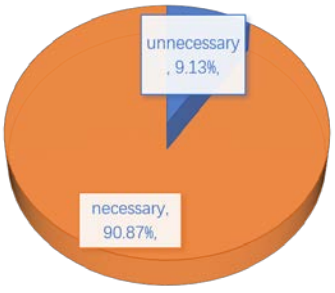

Figure 15 Is it necessary to establish a network platform for interaction between teachers and students and answering questions of courses

In the aspect of learning interaction, it takes students' learning as the center, provides students with extensive intellectual support, improves learning efficiency and cultivates innovative thinking. In the aspect of learning communication, the flexibility of learning resources acquisition is the prominent feature of learning platform, which mainly provides learners with learning tools such as information

acquisition, situation creation, communication and communication to help them create personalized learning situations. For example, teachers and students can invite their friends to form their own teams; Teachers and students are allowed to initiate discussion on learning problems, share learning documents and reference materials, and receive comments and feedback from others.

In addition, the experiment and practice can be divided into subject groups, such as psychology, physics, etc. according to the type of experiment, the unified purchase of experimental instruments and equipment for school teachers and students to borrow and use, that is to reduce the experimental cost and maximize the value of the equipment; In the aspect of online practice, the virtual simulation laboratory is set up according to the characteristics of the subject to complete the content of the practice experiment online. For example, the program practice of the computer subject can be completed online. As shown in Figure 22, according to the survey of 59 lecturers, 49.15% of them think that online practice platform needs to be built. As shown in Figure 23, according to the survey of 263 students, 88.59% of them think that practical experience is important in course learning.

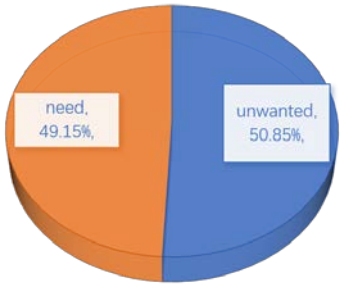

Figure 16 Whether or not need to build online practice platform (from teachers)

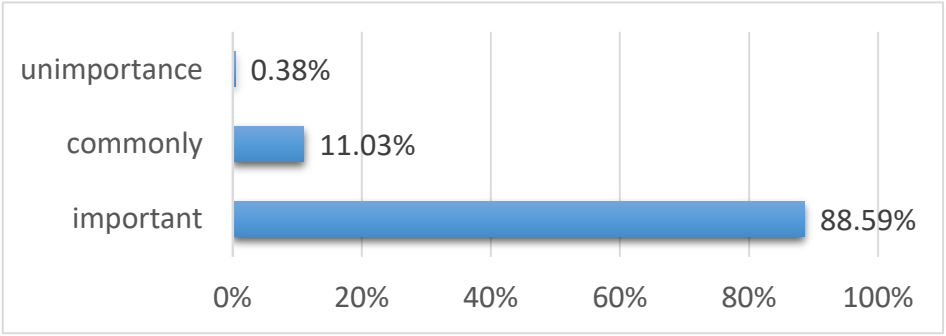

Figure 17 Is practical experience important in course learning (from students)

Therefore, it is very important to increase the teaching of practice. At the same time, the development of experimental practice platform reflects the talent training mode of combination of production and education, and lays the foundation for the construction of double first-class disciplines.

4.3 Demand of supervision experts

Teaching supervision is an organized activity to improve the quality of teaching. Its functions include inspection, inspection, supervision, evaluation, feedback, guidance, consultation and service. How to make the teaching supervision work more efficient and effective, is worth thinking about. With the development of Internet technology, in order to improve the convenience of the supervision course of teaching supervision experts, we can carry out the supervision work by combining online with offline, and timely feedback the supervision results to the lecturer on the platform. The lecturer can check online for the first time, and communicate with the supervision experts, so as to continuously improve the teaching work.

In the division of supervision courses, it can be distributed according to the professional fields of each supervision expert. At the end of the semester, a comprehensive supervision report will be formed and submitted to the director of the teaching supervision committee, so as to facilitate the director to control the teaching supervision work comprehensively. The supervision opinions and suggestions in the platform can be completely open for the college managers, forming a series of data,

which can provide the basis for teachers' teaching assessment. In addition, through the investigation, most of the supervision experts are willing to share the subject resources and teaching materials in their related fields to the teachers, so as to enrich the subject information and promote the sharing and co construction of the subject resources.

4.4 Demand of management support personnel

Conceptual retrieval and data allocation are carried out for the data resources in the platform. Massive data are calculated and analyzed. The value of data information is deeply mined to find out the hidden association between different data. Optimize and upgrade the teaching evaluation system, and organize the evaluation of all kinds of teaching awards fairly and reasonably. Optimize the teaching quality monitoring and guarantee index system, form visual data report on the basis of data, make teaching data open, fair and transparent, enhance teachers' sense of responsibility and honor, and promote the improvement of school teaching level with big data.

5. Discussion

In order to further improve the quality of teaching service in colleges and universities, improve the teaching level of teachers, strengthen the communication and interaction between teachers and students, develop the student-centered teaching mode, and promote the continuous improvement of the quality of personnel training. Around the two aspects of "teaching and learning", this paper constructs a comprehensive social network platform interaction model of teaching and learning between supervision experts and teachers, teachers and teachers, teachers and students, students and students, so as to better serve teachers' teaching and students' personalized learning (as shown in Figure 18)

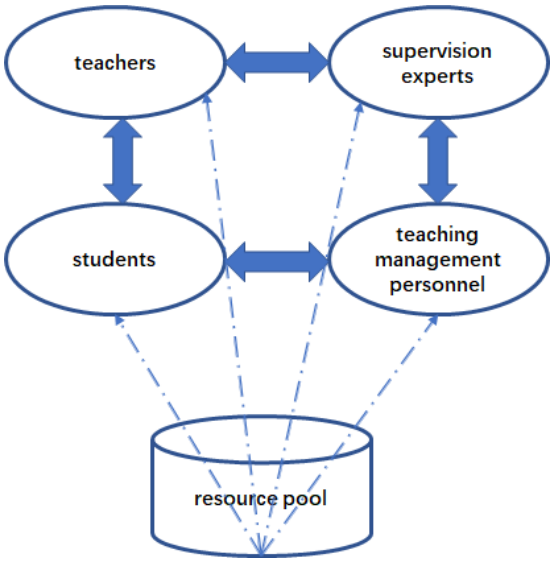

Figure 18 "1+4" interactive model of comprehensive teaching and learning social network platform

In the field of artificial intelligence, mode refers to the specific way that the agent receives and outputs information (Wu Yan, 2020). The main modes of AI research include voice, text, image, video, etc. Based on deep learning technology, the first mock exam research area, such as language and vision, has made breakthrough progress in recent years. This paper focuses on the user needs, to build a comprehensive teaching and learning network social platform functional framework and multimodal operation mode. The purpose of social platform construction is to serve teachers in all directions, provide teaching services, teaching guidance and teaching resources for reference, enhance interaction between teachers and students, strengthen experimental practice teaching, make teaching effect transparent, strengthen teachers' quality awareness, enhance teachers' sense of responsibility and honor for teaching, and promote teachers' investment and enthusiasm in teaching, To build a high-quality college teachers with reasonable knowledge structure, top level of education and scientific research and great international influence; Strengthen the interaction between teachers

and students, analyze the problem-solving rate of students, combine the theoretical knowledge learning and practical learning of students' curriculum, pay attention to the students' learning effect, form a visual learning effect map, analyze the students' self-study situation, and outline the individual chemistry learning of the same type of students as the track.

Starting from the service, we should strengthen the service quality of teachers' teaching work. Starting from the source of improving the teaching quality, we should provide systematic teaching data database and teaching resource database for reference, so as to help lecturers improve teaching methods and teaching level. At the same time, teachers can constantly improve the teaching content on the basis of full understanding of the college curriculum system. Teachers can also put forward opinions and suggestions on the curriculum system, continuously optimize the curriculum system, and play a positive role in promoting the discipline construction.

The interaction between teachers and students, students can ask questions to teachers, doubts can be solved; The teacher can feedback the corrected homework to the students in detail, which helps to make the students' learning effect consistent with the teaching objectives. Learning exchange among students can stimulate the initiative of autonomous learning on the social media platform, obtain more extensive learning support, enhance students' interest in autonomous learning, promote knowledge sharing and knowledge innovation, and then realize the purpose of personalized development.

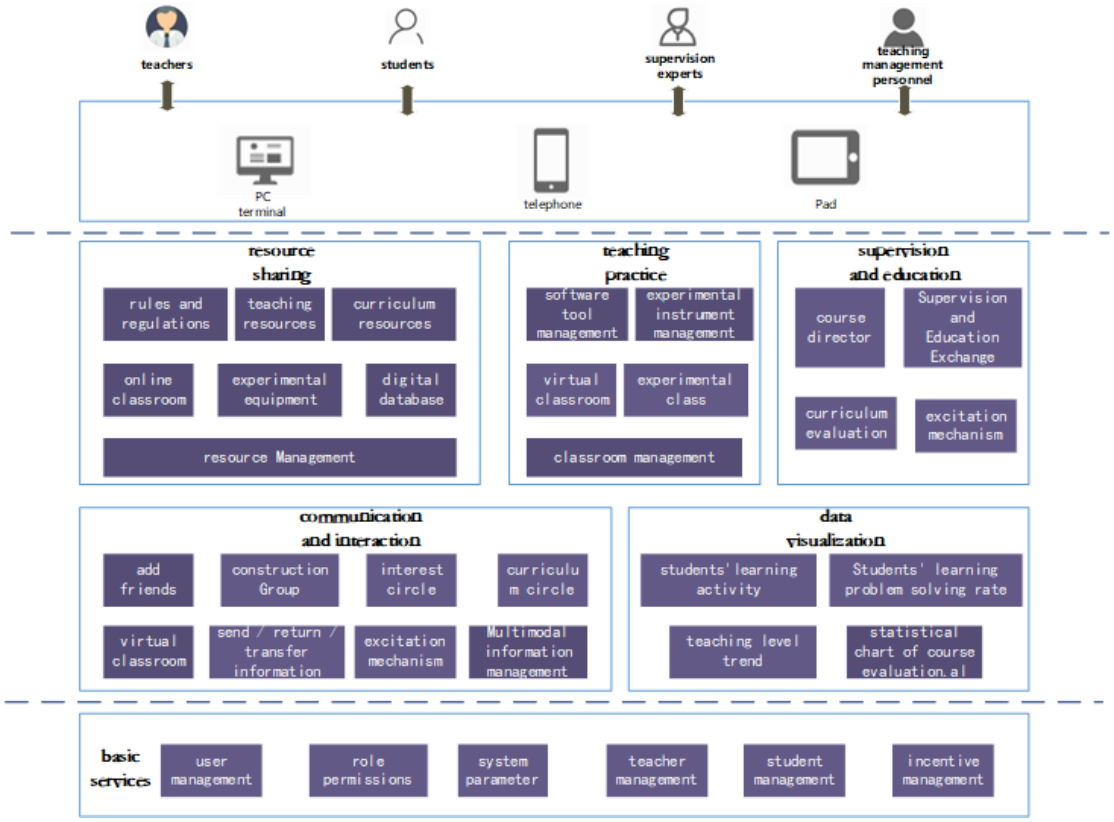

Figure 19 Functional application architecture of social network platform under multimodal operation of teaching and learning in Higher Education

In view of the current problems in teaching and learning, the solutions of the platform probably include five parts: first, serve teachers' teaching work and students' learning, share teaching resources of the same discipline, encourage teachers and students to share teaching resources with other teachers and students on the platform, and establish a teacher training system to provide a platform for them to effectively improve their teaching ability, Fully meet the needs of teachers and enhance teachers' interest in acquiring knowledge and skills; Second, the interactive links between teachers and students are built on the platform, and the interactive materials can be classified and saved for different users to query; Third, build a communication platform between the supervision experts and the teachers, so that the experts can feed back the supervision opinions and suggestions to the teachers in real time after the course supervision, so that the teachers can improve and optimize the course teaching

methods in time; Fourth, build a teaching experiment and practice platform, share experimental instruments and software tools within the discipline, and effectively save the data of students' experiment and practice results; Fifth, teaching data visualization, combined with the indicators of teaching quality assurance system and teaching evaluation system, excavate and analyze the platform data to form quantifiable assessment indicators, so as to optimize the teaching quality assurance system and teaching evaluation system.

As shown in Figure 19. The overall application architecture of the platform is divided into three layers: presentation layer, functional layer and basic service layer. The presentation layer represents the terminal directly interacting with users, including pc-web and mobile terminals; The function layer is a business unit that provides services to users according to user needs and domain; The basic service layer mainly provides support services for the upper layer and sinks the function of back office management to this layer.

6. Conclusion

This article analyzes the practical foundation of the multi-mode operation model of the social network platform in Colleges and Universities under the background of COVID-19. Based on the development of Internet technology, artificial intelligence technology and 5G communication technology, this article puts forward the countermeasures and perspectives for improving the operation mode and online teaching and learning service platform in China and some other countries. The construction of the platform is not only research and design for software, but also includes the construction of discipline system, teaching content, teaching methods and skills, teaching management, teaching resources, etc. compared with the previous research. This model builds a multiple interaction channel on information and resource based on the theory of teaching interaction. It helps to meet the needs of the interaction between teachers and students in higher education and combine the supervision mechanism to guide and optimize the teaching content, method and skills of the teachers in real time. More teachers and students are linked to share and even create resources and improve the level of personalized learning support for students. In addition, based on the big data analysis technology, the article outlines the trend of teachers' teaching quality and the students' learning track, and on this basis, it optimizes and improves the teaching evaluation system and teaching quality evaluation system. In the practical application process, it is necessary to optimize the discipline system according to the operation mode of the platform. For teachers and students in teaching and learning, it would have a wide range of popularization. The construction process of the platform is to promote the reform of teaching, integrate educational resources, accelerate the construction of disciplines and courses, and optimize the support for teaching and learning environment. Its construction and effective use also promote the educators to constantly update their educational concepts and accelerate the process of education to the world and realize the modernization of education.

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