The Construction of Large-Scale Instrument Sharing Platform and Hybrid Teaching to Improve the Ability of Graduate Students

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Abstract: In the process of higher education reform, the mode of talent training is undergoing major changes, and there is an urgent need for advanced skilled talents with innovative ability. The group of graduate students in universities is the source of innovative talents and the backbone in the era of knowledge economy. From the perspective of optimizing the cultivation mode of postgraduates, study the guidance, cultivation and support of large-scale instrument sharing platform for researchers, and improve the thinking and practical ability of researchers in an all-round way. This paper proposes that the construction of large-scale instrument sharing platform and the development of hybrid teaching play an important role in the ability of graduate students. This paper focuses on the construction of large-scale instrument sharing platform and hybrid teaching methods, and summarizes the importance of optimizing higher education methods to improve the ability of graduate students in China.

1. Construction of Large Instrument Sharing Platform Mode

1.1. Importance of Large Instrument Sharing Platform

Large instruments and equipment generally refer to instruments and equipment with high value, high manufacturing precision or strict use conditions in the fields of teaching, scientific research and production, and have the characteristics of large investment, high operation and maintenance cost and complex operation [1]. Large instruments play an important role in people's cognition and transformation of nature. Therefore, large-scale instruments and equipment are important basic scientific and technological resources for scientific and technological innovation. As an important part of university scientific research and discipline construction, large-scale instrument sharing service platform plays a vital role in improving the level of scientific research and strengthening the cultivation of high-level innovative talents. As the main body of scientific research, medical

eight-year undergraduate and graduate students need the support of experimental technology and large-scale scientific research equipment. At present, most large-scale instruments and equipment in China are concentrated in scientific research institutes. With the rapid development of scientific research in China, the investment scale of large-scale instruments and equipment continues to expand, which has become a necessary facility for scientific research institutes to carry out high-level research [2]. However, the problem of how to make full use of large-scale instruments and equipment comes with it. In terms of the current situation, most scientific research institutes still have problems in the integration of large-scale instruments and equipment resources and equipment use management, resulting in low utilization rate and low sharing level of large-scale instruments and equipment, which restricts the development of science and technology. Therefore, it is an urgent task to establish and improve the open and shared service platform for large-scale instruments and equipment. The purpose is to achieve the development goal of effective utilization of high-quality resources [3], accelerate the opening of large-scale instruments and equipment in scientific research institutes to social users, realize high-quality resource sharing, establish sharing mechanism and platform, and avoid monopoly and division of large-scale instruments and equipment units, Improving the ability to integrate resources, fully releasing the ability of social services, and providing scientific and standardized services for scientific and technological innovation and social needs are effective means to solve the problem of large-scale instrument and equipment sharing.

1.2. Sharing Status of Large Instruments

The funds for scientific research institutes to purchase large-scale instruments and equipment mainly come from the central financial funds, which does not touch the economic interests of instrument and equipment buyers or users. For this reason, the purchase department or user department of instruments and equipment in scientific research institutes is prone to hasty and blind purchase. When purchasing instruments, they often include all the instruments that can be purchased in the plan without long-term consideration and lax purchase demand. Sometimes, due to the shortage of time, the research on the required instrument market is insufficient and the lack of reasonable demonstration, resulting in the high utilization rate or even excessive use of instruments and equipment purchased with a scientific and reasonable plan, while the utilization rate, sharing rate and even repeated purchase of instruments and equipment whose purchase plan is inconsistent with the actual demand are low, resulting in a serious waste of national and social resources.

Thirdly, the ultimate purpose of sharing is to save costs, improve utilization, promote output, and achieve the benign interaction of people, finance, materials and technology. However, a considerable number of scientific research institutions simply understand the purpose of sharing as "increasing revenue and reducing expenditure", that is, reducing the investment and using instruments as low as possible [4]. However, there is no clear understanding of the goal of sharing limited funds into needed scientific research departments, rational allocation and integration of resources, scientific construction of disciplines and achieving the sharing of instruments and equipment. The instrument and equipment management departments of some units believe that the procedure of sharing instruments is too complex and it is more convenient to use their own instruments and equipment. At the same time, the external sharing of instruments and equipment will inevitably increase the expenditure of human, material and financial resources. The subsidies for sharing instruments and equipment are limited, and the basic data obtained by using instruments and equipment can not be shared. Therefore, all units are not enthusiastic about sharing instruments

and equipment and are unwilling to participate in sharing. In addition, some scientific research institutions are fully equipped with instruments and equipment, and their instruments and equipment can meet their scientific research needs, but this also forms a closed mode of "departmental ownership" or "individual ownership". In addition, the scientific research task is heavy and there are not enough personnel to provide shared services. Therefore, the openness of instruments and equipment in scientific research institutes is low and the sharing mechanism is imperfect.

Finally, the scientific research instruments and equipment of major domestic scientific research institutes and universities lack full-time and fixed operators, which is manifested as "no one operates with instruments and equipment". The operation, operation and maintenance of instruments and equipment are mostly undertaken by scientific researchers. It is difficult to ensure the consistency and accuracy of the use effect of instruments. Especially for high-precision instruments, there is a lack of qualified professionals for practical operation or maintenance. Since most scientific research instruments and equipment depend on imports, at present, the instrument and equipment operators are unable to repair the instruments and equipment, let alone upgrade and transform the instruments and equipment, resulting in high repair cost and long time-consuming [5].

1.3. Implementation form of Large Instrument Sharing Platform

1.3.1. Virtual Reality

Virtual reality technology belongs to computer-aided technology, including computer technology, multimedia technology, human-computer interaction and many other key technologies. VR technology is to generate realistic three-dimensional visual, auditory, tactile or olfactory sensory world through computer, and preview and interact with the generated virtual world using virtual peripherals (Interactive handles, data gloves, limb motion capture devices, etc. [6]. It has three basic characteristics: immersion, interaction and imagination. Users will have an immersive feeling under the action of vivid visual images, surround audio effects and sensitive tactile sensing. Virtual reality technology can build virtual experimental equipment and scenes, combined with theoretical operation process methods, provide trainees with real simulation situations, effectively combine theoretical knowledge with practice, and realize the comprehensive mastery of knowledge and skills through virtual observation, operation and training. This technology is applied to the sharing management of large-scale instruments and equipment, which can carry out three-dimensional visual presentation of the appearance of large-scale instruments and equipment, and present the operation process and methods to users in the form of interactive animation, so that trainees can quickly and accurately master the use method of instruments and equipment.

1.3.2. HTML5

HTML5 is the latest generation of Internet development technology standard. It is the most important language way to build and present Internet content in the future. It has many characteristics such as perfect function and good effect [7]. HTML5 can be used in the development of large-scale instrument sharing system, which has the following advantages: (5) HTML5 can be used in the development of large-scale instrument sharing system. (2) Page adaptation: the system can automatically adjust the page layout according to the size of different terminals, which can be widely applicable to one-time design, and can effectively improve the convenience of maintenance of large-scale instrument and equipment sharing management system. (3) Multimedia: HTML5 has

good support for audio and video, and can quickly load audio and video without relying on third-party plug-ins, as shown in Table 2.

Table 1: Implementation mode of large-scale instrument and equipment sharing management system

| Hierarchy		Constituent elements		
application layer	Sign in	user management	Use training	Use appointment
Payment of expenses	Forum exchange	information feedback	back-stage management	
Component layer	Front end UI	Data service component	Data analysis component	Data security component
Foundation support layer	Instrument information editing	Instrument data interface		
User information editing	User data interface			
Training resource editor	Interactive data interface			
Assessment content setting	Data export interface			
Resource information promotion				
Support platform	HTML5			
Unity platform				
Mobile payment platform				
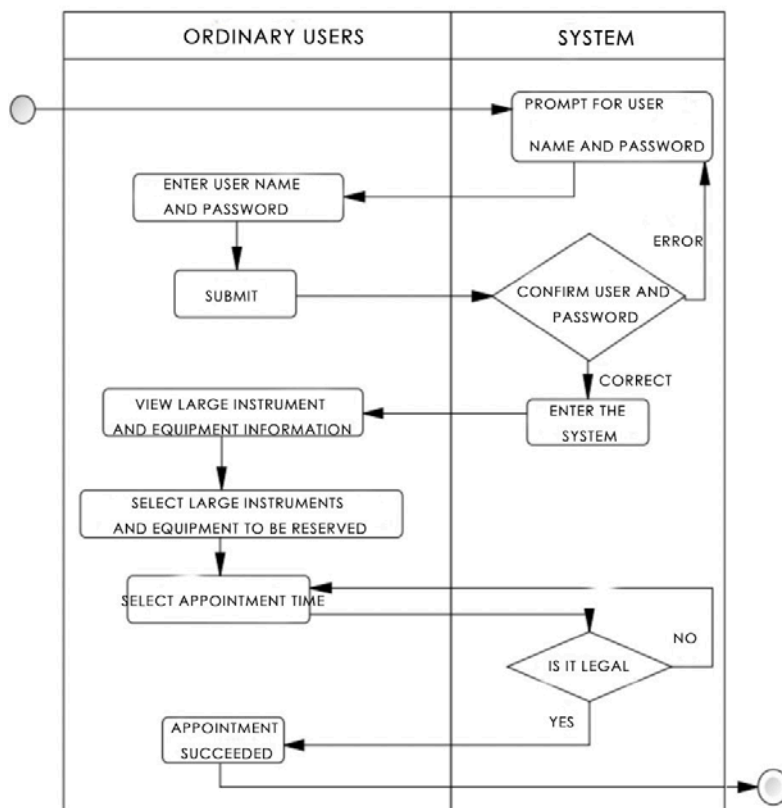
Figure 1: Online booking flow chart

2. Research status of Hybrid Teaching

The practice research and application of mixed teaching mode in foreign colleges and universities is relatively early and mature. Data show that most online courses in American colleges and universities are based on hybrid teaching mode; The proportion of mixed teaching mode in British colleges and universities is 50%; More than 80% of teachers in Colleges and universities in Singapore use the integrated teaching model [8]. In 2006, the American Online Learning Commission (nacol) conducted an international survey on the status of online learning all over the world, and produced an updated report on the development of Hybrid Teaching Model Based on the results. The results show that for the graduate stage, the application of hybrid teaching needs further research [9]. Different experts have basically the same views on the mixed teaching mode. The mixed teaching mode includes multi-level mixing, various forms of mixing and so on. For example, blended learning under the blended teaching mode includes the mixing of multiple levels, including the mixing of different levels such as activities, courses, projects and institutions. The types of blended learning system are mainly divided into mixed, improved mixed, flipped mixed, etc. [10]. At the same time, many new ideas extended under the development of mixed teaching mode, such as project-based teaching, team cooperation teaching method, flipped classroom and so on, which undoubtedly expands the mixed channels that can be used in mixed teaching. Academic circles have further studied the mixed teaching model and put forward three new models: attitude driven model, ability driven model and skill driven model. Teachers give some guidance on the basis of students' learning, and use network information technology to realize the interactive process. In the offline face-to-face courses, teachers and students can jointly explore the understanding and consolidation of knowledge [11].

Compared with foreign research, the research on Hybrid Teaching Model in China is relatively late. Domestic scholars focus on the research of mixed resources, and the research fields are mostly applied in higher education and vocational education. In September 2018, the Ministry of Education issued the opinions on accelerating the construction of high-level undergraduate education and comprehensively improving talent training ability, which put forward the idea of promoting classroom teaching and classroom revolution for the first time, and clearly pointed out that the important thing in the reform is to reshape the teaching form and promote the improvement of the quality of higher education with modern information technology, It also has a clear statement about "constructing a teaching mode combining online and offline" to promote the curriculum teaching revolution: the hybrid teaching mode will become an important carrier and means for colleges and universities to implement educational informatization and promote classroom teaching reform [12]. As shown in Table 2, there are various types of online platforms, and the distribution of various functions is also different. Teachers need to choose according to the actual teaching habits.

Although the teaching paradigm in higher education is changing, the real classroom teaching is still generally teacher-centered and teaching based, which is difficult to stimulate students' learning interest and initiative [13]. In the offline teaching classroom, scholars pay more attention to the process of "interaction" between teachers and students, pay attention to the learning environment under the mixed teaching mode, what changes can be brought to the communication and interaction between teachers and students, and how to carry out the corresponding teaching design, so as to alleviate the teaching pressure of teachers. In the process of teacher-student interaction, teachers play a leading role, so teachers' own ability is also an important factor. The results show that the overall preparation level of domestic graduate teachers for mixed teaching is still in the transition stage from consciousness to exploration, and there is a part of fear of difficulties in the development

of mixed teaching. To carry out mixed teaching, teachers need to have a long-term perspective on teaching, be able to accurately carry out the direction of educational reform and development, be able to carry out open, transparent and fair cooperation and communication with others, have the ability to reflect on themselves, and be able to carry out teaching reform and innovation continuously, Based on this, in the implementation of mixed teaching, we should have the ability of data thinking and practice, and control the mixed teaching strategy [14].

Table 2: Sharing management system

platform	live broadcast	playback	Share screen	Interactive communication	Sign in	Upload resources	job management	Test feedback
Nail nail	√	√	√	√	√	√	√	X
Tencent classroom	√	√	√	√	√	√	√	√
Tencent Conference	√	X	√	√	X	√	X	X
QQ, wechat group chat	√	X	√	√	√	√	√	X

3. Reform the Mode of Higher Education and Help Improve the Ability of Postgraduates

The main purpose of graduate education is to cultivate high-level talents with scientific research and innovation ability, so as to meet the national demand for high-quality innovative talents. Reform graduate education and training, explore ways to adapt to the new era of talent training, and strive to cultivate talents with scientific research and innovation ability. The traditional graduate education mode emphasizes the transfer of knowledge, which usually has little positive impact on the development of scientific thinking and the cultivation of graduate students' innovation ability. Some even follow the teaching mode of undergraduate course knowledge points, lack interactive teaching with students, make them passively accept knowledge, master knowledge not systematically and deeply, and lack thinking initiative [15]. This causes some graduate students to read less scientific research papers during their study in school, passively accept the experimental design of the subject by their tutors, have poor self-solving ability when the subject encounters problems, and lack scientific thinking and innovation ability. Therefore, how to imperceptibly guide students to think, explore a new teaching mode of graduate education and cultivate high-quality talents with innovative ability in the process of graduate theory teaching is the challenge and urgent problem to be solved in graduate education.

3.1. Promotion of Graduate Students' Ability by Large Instrument Sharing Platform

With the development of new technological revolution and industrial transformation, especially the implementation of China made 2025, big data and artificial intelligence, intelligent manufacturing, Internet plus, etc., China has increasingly strong demand for innovative high-level scientific and technological talents with multi-disciplinary background and wide knowledge coverage. The National Graduate conference held in July 2020 clearly pointed out that graduate education plays an important role in cultivating innovative talents, improving innovation ability, serving economic and social development, and promoting the modernization of national governance system and governance ability. The classification and classification management mode of large-scale instruments and equipment in Colleges and universities promotes the open sharing of

instruments, the machine hour utilization rate and service time are significantly increased, and the sharing scope is gradually expanded. This helps to improve the practical ability of postgraduates and give full play to the potential of on-the-job personnel. In addition, the implementation of assessment and incentive measures has greatly improved the quality of experimental technology team, further improved the professional level of large-scale instrument and equipment management and expanded instrument sharing.

3.2. Improvement of Graduate Students' Ability by Mixed Teaching

Graduate education is at a higher level of the national education system. It is an important driving force and foundation for scientific and technological innovation. It undertakes the important task of cultivating high-quality and large-scale innovative talents for China's modernization. The report of the 19th National Congress of the Communist Party of China proposed to continuously improve China's innovation competitiveness, cultivate research and innovation talents, and speed up the construction of an innovative society. Blended education subverts the traditional learning process and model. Students' learning process includes two stages: knowledge transfer and knowledge internalization. The traditional knowledge transfer process focuses on Teacher centered offline education. The process of knowledge internalization is usually completed after class, including graduate evaluation, practice, classroom experiment, tutor guidance and Q & A. Blended education uses information technology to reverse the two stages of the educational process and transfer knowledge from after class to the classroom. The internalization of knowledge is transmitted between classes. Under the guidance of teachers, it is carried out through collaborative research, combination of practice, reflection and generalization, self correction and so on. It can be seen that this learning model can more effectively stimulate graduate students' learning initiative, promote graduate students' self-study and collaborative learning, and help to improve the efficiency of education and learning. Therefore, teachers should closely track the development trend of online teaching mode, improve the applicability of modern teaching technology, guide graduate students to plan their own educational career, explore inquiry learning, discussion teaching and cooperative learning methods, and promote the reform of classroom teaching mode and learning mode. Carry out mixed learning regional projects and school research, effectively manage graduate students' learning process, optimize knowledge organization, and make learning activities scientific and bold, so as to improve graduate students' autonomous learning ability, diversified and personalized training ability.

4. Conclusion

With the development of our country's graduate education system, there are still many problems that need to be paid more and more attention to in order to improve the ability of graduate students. Through the establishment of large-scale instrument sharing platform and the development of hybrid teaching mode, this paper tries to summarize the suggestions and opinions to improve the ability training of Postgraduates in China. Combined with the actual situation of postgraduate ability training in China, find out its influencing factors, especially summarize its characteristics in the training objectives, training process and training results of postgraduate ability. Through the construction of large-scale instrument sharing platform and the development of hybrid teaching, improve the quality of graduate education and cultivate high-quality talents with scientific research and innovation ability. This paper explores the mixed teaching mode based on a variety of classroom teaching platforms, promotes curriculum innovation, builds a large-scale instrument

sharing platform through modern science and technology, shapes a good scientific research resource environment and academic environment, and explores the training methods and evaluation mechanism to improve the scientific research innovation ability of postgraduates.

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