Study on the Difficulties of Multi-campus University Student in the Practical Activities of Science and Technology

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Abstract. With the expansion of university scale, more and more universities choose multi-campus school running mode to enrich teaching resources, and the Chinese government proposes to speed up the construction of an innovative country. Based on the above background, universities pay more and more attention to the cultivation of students' practical application ability and the expansion of scientific research thinking. This paper adopts the methods of literature survey, case study, and questionnaire survey to analyze the research practice dilemma brought by multi-campus school running mode to students, and proposes solutions. At the same time, carried out practical exploration on two campuses of Zhejiang University of Science and Technology and achieved good results. This has a certain enlightening significance to the cultivation of applied talents in multi-campus universities.

Keywords: Multi-campus · Personnel training · Practical teaching · Project teaching · Science and technology innovation

1 Introduction

To meet the needs of rapid social and economic development in China, the scale of universities has been constantly expanding, and higher education has entered the era of popularization. Under the background of co-construction, cooperation, and merger, the lack of educational resources is an important factor for universities to expand the scale of running schools [1]. For the demands of construction and development, universities actively seek external development space and build new campuses in different places. Under the current background, the multi-campus model plays a greater role in integrating university resources, improving the level of university education, and alleviating the shortage of educational resources. Therefore, the multi-campus model is being adopted by more and more universities. As shown in Table 1, most universities in Zhejiang province adopt the multi-campus model of running schools, and most of them run schools in other places. With the deepening of education reform, society pays more attention to students' practical application ability and innovative thinking in research.

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Students' practical application ability and innovative thinking need to be cultivated through progressive project practice. Universities open independent practice platforms, encourage students to participate in scientific research projects, discipline competitions, patents, and other practical activities, improve the professional quality of teachers and practical guidance ability, and other measures to create conditions for the cultivation of application-oriented students [2,3].

Table 1. Campus establishment of undergraduate universities in Zhejiang Province

University	Campus Distribution	Whether a long-distance
Zhejiang University	Seven Campuses	Yes
Westlake University	A Campus	No
China Academy of Art	Three Campuses	Yes
Zhejiang University of Technology	Three Campuses	Yes
Zhejiang Normal University	Three Campuses	Yes
Ningbo University	Three Campuses	Yes
Hangzhou Dianzi University	Five Campuses	Yes
Zhejiang Sci-Tech University	Four Campuses	Yes
Zhejiang Gongshang University	Three Campuses	Yes
Zhejiang Chinese Medical University	Two Campuses	Yes
Wenzhou University	Two Campuses	Yes
Hangzhou Normal University	Three Campuses	Yes
China Jiliang University	Three Campuses	Yes
Zhejiang Ocean University	Two Campuses	Yes
Zhejiang A&F University	Three Campuses	Yes
Wenzhou Medical University	Three Campuses	Yes
Zhejiang University of Finance &Economics	Four Campuses	Yes
Zhejiang University of Science & Technology	Two Campuses	Yes
Communication University of Zhejiang	Two Campuses	Yes
Jiaxing University	Two Campuses	Yes
Huzhou University	Three Campuses	No
Shaoxing University	Four Campuses	Yes
Taizhou Univesity	Three Campuses	Yes
Lishui University	Tow Campuses	Yes
Quzhou University	A Campus	No
Zhejiang Police College	Two Campuses	Yes
Zhejiang Wanli University	Two Campuses	Yes
Zhejiang Shuren University	Two Campuses	Yes

2 Multi-campus Practice Teaching "Bottleneck" Problem

Multi-campus school running mode is a creative initiative for universities to broaden the space of development and enhance social impact. Under the condition of multi-campus, from the perspective of management, according to major subjects and student grades the school allocates students and educational facilities among different campuses. As a result, the subject nature and subject culture between campuses are uneven and the unified organic whole formed by each of campus still lacks comprehensive advantages in the performance of interdisciplinary integration. However, there are some problems with the project practice of students. As the project practice team members and mentors come from different campuses, the division of labor among team members, the confusion of project research objectives and plans, and the lack of project communication between team members and mentors make it difficult for teachers to control the phased research progress of student projects and project difficulties.

2.1 Teachers Aspect

The Problem of Limited Teacher Guidance. Multi-campus school running mode brings space inconvenience to teachers' guidance. Most faculty teach different majors, which are located on different campuses, and have limited guidance for students scattered across different campuses. There is a lack of communication between teachers and students in projects [4], it is difficult for teachers to control the difficulties and phased achievements of student projects, and students cannot understand the expected goals and development direction of teachers. In the case of decreasing interaction between teachers and students, the improvement of projects quality will be affected, and the projects achieved by students may deviate from the expectations of teachers.

The Problem of Restricted Teaching Management. There are unavoidable time and space barriers between different campuses [3], so teachers are inconvenienced in managing teams of students. The lack of project practice knowledge and ability development of junior students lead to deficiencies in the independent management of project practice, which require teachers to control and monitor their project research progress in real-time. Teachers are busy traveling among different campuses, and students are busy with the busy school curriculum. Under the obstacles of time and space, teachers and students actually spend less time on project discussion and analysis. It is also difficult for students to grasp the true intentions of teachers. The lack of effective communication between teachers and students will result in less positive feedback captured by students, which will affect their confidence in project cooperation. In the process of project development lasting a long time, most students will be inert.

The Problem of Increasing the Repetition of Teaching. Similar project problems were repeatedly emphasized in different campuses, which are greatly

increased the workload of teachers in managing student team projects. The same project problems are repeatedly taught in different project teams on different campuses, which invisibly increase the amount of labor for teachers. Under excessive work, teachers' teaching model will gradually change, which is not conducive to the development of teachers' and students' innovative spirit in the discussion of project problems.

2.2 Students' Aspect

The Problem of Student Cooperation. Students choose their partners for project practice according to their wishes. At the same time, students are encouraged to form teams across grades and majors. However, whether teams are formed by grade or by major, team members may be distributed on different campuses, and there are regional inconsistencies in collaboration, which affect the progress and completion of team research projects. Student team project cooperation require the participation and discussion of all members. It is worth mentioning that it is difficult to find a time node and space region where all members are free. This will undoubtedly set obstacles for students' innovative practice projects and affect the development of students' enthusiasm.

The Problem of Inheriting-Helping-Guiding Lower Between Different Grades. *Inheriting-helping-guiding* is an effective and practical way for senior students to guide junior students [5]. Senior students help and guide junior students through the complete project development process, and recommend appropriate development software and knowledge to them. Lower grade students still have the mindest of high school. In the new environment of college life, it is necessary for higher grade students to guide them to carry out student project practice and cultivate the innovative thinking ability and practical ability of engineering talents. However, when senior and junior students are located on different campuses, senior students often have little time to discuss project experiences with junior students. There are only junior or senior students on the campus, which are not conducive to the healthy development of student teams. The senior students have rich experience in application practice, and the junior students inject fresh blood into the development of the team.

The Problem of Limited Sharing of Student Resources. It is difficult to share teaching resources, experimental equipment, and practice environments on different campuses [5]. Given the inconvenient geographical situation of the campus, the college will make appropriate adjustments to students' schedules. Some cross-campus courses may be postponed until students' sophomore or junior year. Due to differences in campus resources, there are barriers for students who participate in the project but are scattered across different campuses.

2.3 The Problem with the School Practice Platform

The construction of the practice environment is the basic element for students to carry out project practice. Before the practice environment is built, students may study in the cafeteria, dormitory, library, and these environments, which are conducive to the situation of students studying alone. However, it is unfavorable for the team to carry out project research and development and affects the progress of the team project implementation.

3 Influencing Factors

Student project practice enriches the teaching form of universities. The effectiveness of project practice is influenced by several factors, including teachers, students, and schools.

3.1 Teachers Aspect

Factors of Teachers Themselves. The new campus has a low amount of information, unsynchronized teaching resources, and low utilization of research resources [5]. Teachers are busy on different campuses for a long time to guide students' practice teams, which brings a great burden to teachers both physically and psychologically. In the process of guiding students, teachers not only supervise the progress of the project, and solve the difficulties of the project, but also include the process of teachers' emotional output and the ideological collision between teachers and students. Among them, teachers' emotional attitudes, academic attitudes, and scientific research styles have different degrees of influence on students' learning attitudes [6].

Factors of Professional Guidance Teachers. Although there is a help mode for senior students for junior students, the role of teachers' guidance can not be replaced. The development of a guiding faculty team not only promotes the improvement of students' scientific research and innovation level but also promotes the social service level of applied universities. While the school pays attention to the improvement of the ideological quality of teachers, it also needs to strengthen the improvement of teachers' ability to guide and teach application-oriented projects, which directly affects the cultivation of students' ability to practice and innovate projects.

3.2 Students' Aspect

Students are an indispensable part of project practice. Students' knowledge dimension, practical ability, teamwork ability, self-management ability, and other aspects affect the progress of research projects. Project scientific research practice is an extension of classroom theoretical teaching, which helps students to understand theoretical knowledge and improve their practical ability.

3.3 School Aspect

Factors of the Incentive System. A good system is a necessary guarantee for students' practice and teachers' project guidance. The necessary incentive system can stimulate the enthusiasm of teachers and students to participate in scientific research practice.

Factors of Practice Site. An independent environment is a basic element for students to carry out project practice. The practice base has necessary hardware equipment, and students can arrange their study time independently and carry out a theoretical study of the project independently, without interference from external factors, to ensure that students will devote all their time and energy to scientific research practice.

Factors of Traffic. While the multi-campus school running mode expands the scale of university operation, there is also the problem of inconvenient transportation between different campuses. Among them, multi-campus teaching brings great inconvenience to the scientific research practice of teachers and students. In remote school districts, campus commuter bus is a necessary factor to ensure the scientific research practice of teachers and students.

Factors of Campus Management Model Variation. The differences in campus management models have an impact on the adaptability of students and teachers on different campuses. A good campus management model can promote the development of the scientific research practice of teachers and students and is conducive to the personalized and independent cultivation of students' scientific research innovation ability. In the campus management mode, diversified laboratory management schemes are implemented, and students manage their learning progress independently according to their own needs, interests, and goals.

4 Solutions

Given the many problems of students in project practice under the multi-campus school running mode, the following three-level solutions are put forward: teachers, students, and schools.

4.1 Teachers Aspect

Teacher Training. In project teaching, teachers should have the ability to guide students. First of all, teachers should have a rich knowledge base, a broad scientific and cultural knowledge system, and a profound professional knowledge system. Expand educational thinking through continuous learning of new knowledge. Secondly, teachers also need to strengthen the ability of scientific research innovation and scientific research practice and provide technical guidance for students'

scientific research practice. In addition, teachers should fully understand the interests, abilities, and needs of students, solve the difficulties of students' projects and grasp the direction of project research. Professional instructors can promote students' practical ability. The cultivation of teachers' guiding ability can be realized using expert guidance, teacher discussion, and guiding students' project practice.

Build a Teacher Studio. Professional teachers can promote the cultivation of applied students. The construction of the teachers' studio is aimed at improving teachers' project guidance ability and cultivating a group of teachers with rich professional knowledge and guidance experience. The studio collects and grasps the dynamic teaching situation and existing problems of teacher-guided student project practice, and conducts discussion and in-depth research based on this problem, to form a benign teacher team management system.

4.2 Students' Aspect

Develop Students' Interest in Project Practice. Interest is the source of one's continuous progress. Combine students' majors and interests to carry out project practice [7]. We develop students' interest in project practice and encourage them to participate in research competitions held by the university, province, and national innovation and entrepreneurship competitions. Students, driven by their interest in learning and honed by a period of project practice, can fully realize the importance of what they have learned.

Strengthen Students' Sense of Cooperation. The development and implementation of the project need students and teachers to pay a lot of energy and time. Students need to go through the stages of team break-in, project planning, and task division. For the teacher to better guide the students and the student team to work together more harmoniously, the teacher and team members need to understand each other's purpose of participating in the competition.

4.3 School Aspect

Create a Practice Platform. The practice base provides a place for students to carry out project teaching practice activities. Students learn theoretical knowledge in an independent and autonomous environment. The good learning atmosphere in the practice base promotes the cooperation of team projects and improves the quality of projects.

Designing a Project Practice Management System. In the process of project practice, the team will inevitably encounter project process management problems. The practice management system is designed so that team members can clarify the task planning process. The practice management system records the progress, completion quality, application of key technologies, and regular feedback information of the team in each stage of project research so that teachers can check the progress of project research in time and give corresponding guidance.

Adding Incentive System. The cultivation of application-oriented students needs benign system construction. Under the guidance of the benign system, the initiative of teachers and students to participate in scientific research projects is promoted to create a good campus atmosphere. Similarly, a positive campus atmosphere has a significant impact on students' abilities, innovative thinking, learning habits, and attitudes.

5 Practice and Effectiveness

Zhejiang University of Science and Technology is one of the first pilot units of the "Outstanding Engineer Education and Training Program" of the Ministry of Education of the People's Republic of China. It is committed to cultivating the practical innovation spirit and practical ability of engineering talents, and enriching the project practical guidance ability of teachers. The goal of engineering education at the Zhejiang University of Science and Technology is to cultivate students with a proficient technical foundation and a wide range of professional abilities [8]. In response to the problems of students in project practice under the multi-campus school running mode, the following practices are carried out.

First of all, we implement the management model of the school system on the campus and establish the "Blue Space" innovation practice base. Encourage students to take the initiative to participate in scientific research practice by combining their interests with their majors, to promote the cultivation of students' practical application ability and innovation ability. As shown in Fig. 1, Fig. 2 and Fig. 3.

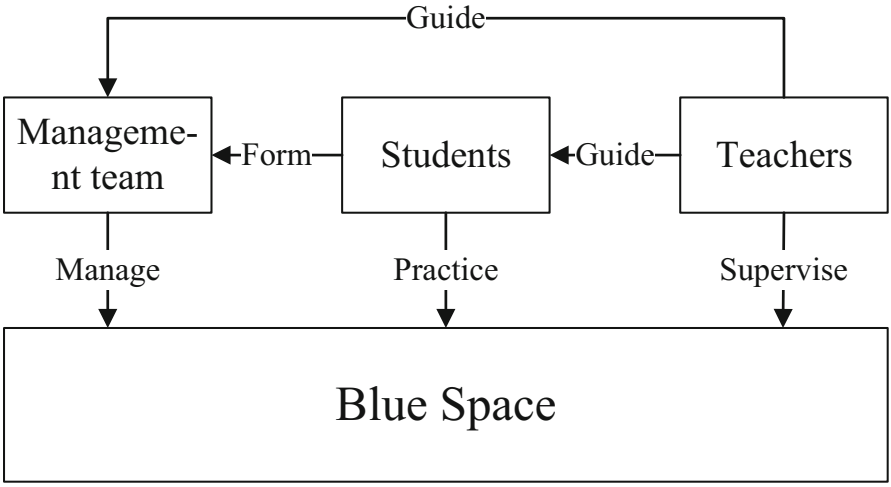

Fig. 1. "Blue Space" management mode.

Secondly, create a master studio to develop teachers' project-guided teaching ability and cultivate students' application practice and innovation ability. The studio is composed of provincial teaching master teachers and professional backbone teachers, and students choose their role tasks in team practice through their interests combined with their majors.

Furthermore, by expanding the construction of the practice environment on different campuses, students are free to deploy some of the equipment in the laboratories as well as have the autonomy to manage the practice base and laboratories, and the openness of the environment promotes students' sense of self-management. As shown in Fig. 3 and Fig. 4.

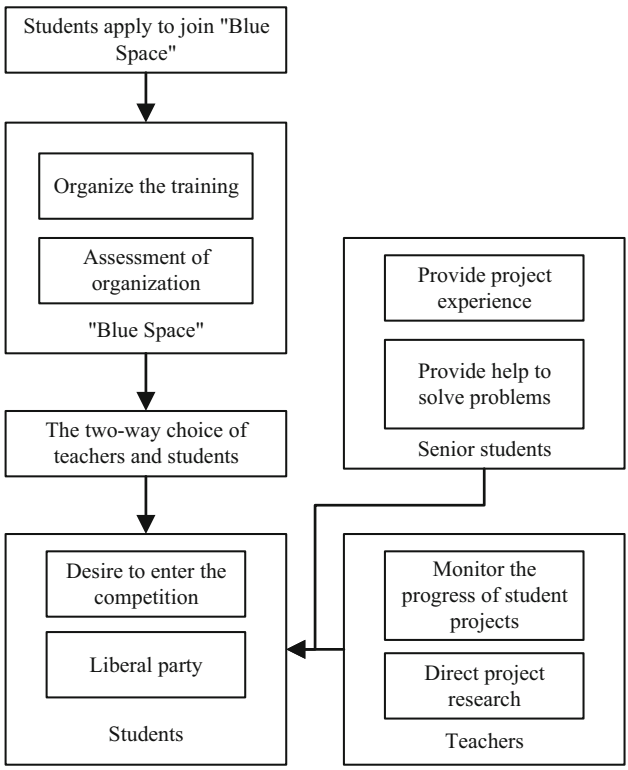

Fig. 2. The course of practice in "Blue Space".

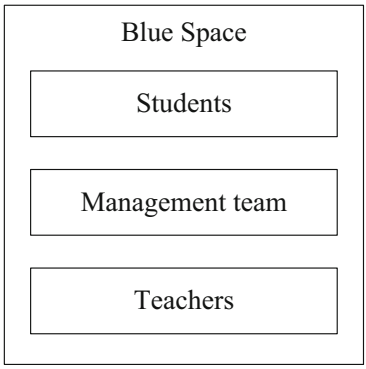

Fig. 3. "Blue Space" Personnel composition.

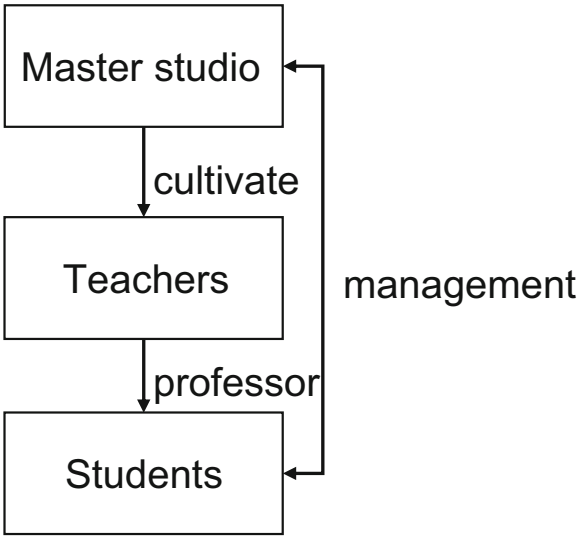

Fig. 4. Sketch of master's studio.

Finally, the design of a process-oriented management system for college students' science and technology innovation projects [9], realizes process-oriented supervision and management of student research projects by teachers, clarifies the problem of division of labor among teams and improves the progress of project completion.

With the help of the "Blue Space" student Practice innovation base, student practice teams such as "one Five Innovation", "Panda" and "Late Sleeper" have achieved good results in scientific research competitions and carried out innovative practice in the multi-campus context. Since 2015, each practice team has hosted 84 national and provincial practice projects, won 212 national and

provincial discipline competition awards, published 87 papers, and authorized 37 software works and invention patents, fully completing the project process and achievement transformation of innovative practice learning. The base encourages students to study, drives students to participate in scientific research practice, and creates a good scientific research practice atmosphere for the school.

6 Conclusion

After the reform of the higher education system, higher education has developed from elite talent training mode to popular mode. In order to better serve society, colleges and universities began to seek to expand the scale of running schools, and multi-campus school running has gradually become the mainstream trend. The national demand for the cultivation of talents with practical and innovative abilities is increasing day by day. We must break through the dilemma of students' scientific research practice under the multi-campus school running mode. The corresponding countermeasures proposed in this paper have proved to be effective and have achieved the purpose of promoting the cultivation of students' practical abilities. At present, more and more universities join in multi-campus school running mode. Multi-campus school running mode has become the inevitable trend in the future development of universities, which is both an opportunity and a challenge for universities. Universities should be based on their own actual development needs, with the goal of training application-oriented and innovative talents, and pay attention to the construction of a practical environment while improving the practical ability of talents.

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