The exploration of PBL mixed teaching mode in secondary vocational classes

Guoqin Li*, Wen Zhang and Sai Lou
Tianjin University of Technology and Education, China

*Corresponding author. Email: guoqin_li@163.com

Abstract. The large area coverage of network and the upgradation of intelligent software promote the further reform of network teaching. With the discussion of hot topics of Online teaching and Network teaching, teachers are also experiencing how to adopt appropriate teaching methods to solve the teaching problem of "being apart from each other" between teachers and students. The rise of platform technology and technical resources also promote the innovation of teaching. This paper will research on the mixed teaching mode based on PBL learning method, using platform tools to explore the practical significance of this teaching mode in secondary vocational classes, it provides a kind of thinking framework for teachers' reference.

Keywords: PBL learning method, mixed teaching mode, online teaching.

1. Introduction
In April 2018, the Ministry of Education issued the Education Informationization 2.0 Action Plan, asking for active promotion of "Internet + education" and insisting on the core concept of deep integration of information technology and education and teaching. Vocational education as a type of education has certain particularity in professional courses, teaching methods, learning process and other aspects [1]. The wider choices of courses, the more complex teaching methods and the more flexible learning process and so on all promote the application of education informationization in secondary vocational classes.

Mycos' research data shows that most teachers think online teaching whether in course resources or in learning time, its "freedom to be flexible" becomes its main advantage. The application of MOOC, Construction of National Excellent Online Courses, Blue Ink Cloud Class, Rain Classroom and Learning Pass and so on all provide a solid foundation for online teaching [2]. These technical resources and platform tools come into the classroom which has a great influence on the classroom teachers' "teaching", students' "learning" and schools' "management" and other educational forms [3]. This paper integrated PBL learning mode, mixed teaching mode and platform tools which makes their advantage complementary, form melted and effect promoted mutually.

2. PBL learning mode
PBL (Problem-Based Learning) is the learning mode based on problems. It is also the learning mode based on reality and student-centered. PBL connects learning to reality problem, according to the concepts, basic principles to be mastered and the problems that the basic principle design to solve
Let students master the concepts, principles and theoretical methods to be learned in the process of problem solving through self-exploration and cooperation.

3. **Blended teaching model**
Blended Learning is a kind of "online" + "offline" teaching that combines the advantages of online teaching and physical classroom teaching. Professor Hogg Kang proposed the concept of Blended Learning at the 7th Congress of Global Chinese Computer Education Application, he actively advocated the introduction of Blended Teaching into the curriculum and integrated online teaching with physical classroom teaching to gradually introduce learners' learning into deeper learning and promote the development of students' thinking [5].

4. **The platform tools**

4.1. *Introduction to Platform Tools*
In recent years, the application of platform tools lays a foundation for online teaching, its application has promoted the teaching innovation. Mycos' data shows that 55.4% of teachers agreed students to bring electronic devices into the classroom, which can enrich teaching methods.

Blue Ink Cloud Class is an educational software that is free to use on both mobile phones and computers. There are resources sharing, q&A discussion, brainstorming, job mutual evaluation, data export and other functions in this educational software. It provides the conditions for teachers and students to carry out remote synchronous online learning. Teachers learn online with students after class through the teaching platform, there is no limitation of space and time [6]. The teacher-directed teaching process will be transformed into a process in which teachers and students communicate and learn together.

Rain Classroom is an educational learning software launched by Tsinghua University. It has many functions such as PPT making, real-time answering, multi-screen interaction, q&A bullet screen and so on. The functions of “You can point where you do not understand” and “Submit questions in class” not only promote the interaction between teachers and students, but also adjust the teaching schedule and rhythm according to the needs of students [7].

The functions of Blue Ink Cloud Class and Rain Classroom are both repetitive and unique. According to the comparison between the two, Blue Ink Cloud class has more obvious advantages in the use before and after class and the advantage of Rain class is more obvious in class. So in the choice of platform tools, using a combination of the two. Blue Ink Cloud class is adopted to monitor students' preview before class and homework completion, the Rain Classroom was used to record the learning process and participation of students in class.

4.2. *Application of platform tools*

4.2.1. **Before class.** PBL learning model requires problem-oriented to train students' ability to raise, research and solve problems. To stimulate students' enthusiasm for the classroom, cultivate students' ability of independent learning and awareness of using knowledge to solve problems.

Students need to be inputted knowledge before class, guided to understand the course content information to prepare the course content in advance. Teachers upload courseware and other course resources to the Blue Ink Cloud class platform, let the students study independently, ask questions based on what you have learned. Divide the students into groups, about 4-6 students are divided into groups, explore and research the questions raised in the study. Groups work together to prepare materials.

4.2.2. **During the class.** Based on the questions designed by the team members to collect and organize data. In class, the group's results were displayed on the Rain Classroom platform. Students become teachers, a teacher becomes an assistant. The Rain Classroom can promote courseware, conduct
bullet screen interaction, submit questions, unit test and so on to make the classroom be the home court of the students, and to arouse students' enthusiasm for study.

4.2.3. After class. The learning process is not episodic but continuous, it should not be confined to the classroom [8]. After class, students need to broaden their knowledge. To assign students tasks that can help them think outside the box and develop students' creativity. Let the students succeed in a special field of study, use what they have learned flexibly, and cultivate students' ability to solve practical problems with what they have learned.

5. PBL BLENDED Teaching mode architecture

The thinking structure of PBL blended teaching mode is divided into three modules: before, during and after class (See Figure 1). It also includes three parts: teaching environment, teaching activities and teaching evaluation (see Figure 2). The teaching environment needs abundant resources and a teaching platform for uploading materials expeditiously. At the same time, it also requires centralized teaching in digital classrooms, in the course of teaching, platform tools are also used to enrich teaching methods and guide students' learning attention. Teaching activities mainly focus on students' independent inquiry learning, in the way of group cooperation to discuss, research and summarize the achievements of problems designed by teachers. Students are guided to expand their knowledge structure and present their learning achievements in a way of centralized teaching. Finally, Adopting process evaluation, summative evaluation and other evaluation and self-evaluation to evaluate the teaching effect of PBL blended teaching mode.

![Figure 1. The thinking framework of PBL blended teaching mode.](image)

![Figure 2. PBL hybrid teaching mode.](image)
Most secondary vocational students are addicted to video games, have weak control force in the electronic devices. Secondary vocational schools usually ask students to hand in electronic devices in class, students are not interested or enthusiastic about lessons, very few students are listening attentively. Applying PBL blended teaching mode to convert teacher instruction into student learning. The teacher is no longer the center of the classroom, the classroom atmosphere with students as the principal part is much better. Letting electronic devices enter the classroom, this new teaching method will greatly arouse students' interest in learning, more interaction between teachers and students, the participation of students in class will also be greatly increased. However, as for the students' weak ability to control electronic devices in class, teachers should design the teaching process of using electronic equipment well to use electronic devices reasonably to help students manage and control themselves.

6. The significance of PBL BLENDed teaching

6.1. Integrating information technology deeply into the classroom, promoting information-based teaching reform

It is clearly proposed in the article 20 of Vocational Education to promote the further development of "vocational education + Internet". The construction of technical resources and platform tools lay a foundation for the implementation of PBL blended teaching mode. In the course of teaching, teachers should use the teaching platform to change the teaching method, enrich the course content and enliven the classroom atmosphere. Information-based teaching can break through the limitation of time and space, with more abundant teaching resources, broaden students' knowledge horizon and renew their knowledge system. In the implementation of teaching, information technology and classroom in-depth integration to promote information-based teaching reformation in vocational education, under special circumstances, it can also be done without stopping classes.[9].

6.2. Improving the teaching ability and quality of teachers

PBL blended teaching mode requires teachers to design problems according to reality, let students master the concept and theoretical basis of knowledge in the process of solving problems. This requires teachers to carefully design the teaching process, improve teaching ability to design. Teachers use the teaching platform and network resources to enrich the classroom, teachers are required to operate the network skillfully and keep pace with The Times. PBL blended teaching model breaks the defects of the closed learning model, make network resources and information technology flow into the classroom [10]. Teachers can use the teaching platform to supervise the whole process of students, monitor the whole process of students' learning behavior. It is helpful for teachers to give targeted guidance to students, to better control the teaching schedule and guide students to learn. By analyzing the data of the teaching platform to understand the teaching effect and improve the teaching quality.

6.3. Changing students' learning style and improving their independent learning ability

One of the essence of learning is learning to learn. PBL blended teaching mode is active learning in the real sense, the classroom becomes the students' home - court show. Teachers cannot stand by and watch, they should be a learner facilitator and assist students in their study. To set up the learned conceptual theory in the real, complex and meaningful practical problems, let students work in groups to solve problems to learn the hidden knowledge concepts, theories and skills. Team members are required to present their results in class, it can exercise students' ability to express. The questions raised by students in the course of listening to the lecture are putted forward through their own thinking, it can train students' ability to think. The introduction of network resources makes students' learning scope more extensive and learning resources more convenient [11]. The presence of these conditions can change the way that students learn, stimulate students' interest in learning, promote students' independent learning.
7. Conclusion

The establishment of PBL blended teaching mode provides a reference for teaching reform. The questions should be based on the student's original foundation, teachers are required to fully understand the students. The introduction of teaching methods requires teachers to take the initiative to guide, learn with students, and actively accept students' opinions. PBL blended teaching mode is conducive to the cultivation of students' comprehensive ability, but efforts should be made in all aspects to improve the teaching mode.

References

[1] Xu Dan. Exploration and Practice of mixed teaching based on PBL engineering Drawing [A]. Science and Engineering Research Center. Proceedings of 2019 3rd International Conference on Advanced Education and Management Science (AEMS 2019) [C]. Science and Engineering Research Center. Science and Engineering Research Center, 2019: 4.

[2] Qi Yuanyi, Zhang Yongzhong. Research on mixed Learning Activity Design based on PBL [A]. People's Education Press digital Education Research Institute. Digital Teaching Materials • Digital Teaching -- The fourth Digital Teaching Symposium for Primary and Secondary Schools [C]. Institute of Digital Education of Human Education, People's Education Press: Seminar on digital Teaching in Primary and Secondary schools, 209: 6.

[3] LAN Juping, Xu Haokai. Research on the Teaching Effect of PBL Blended Teaching Method -- A Case study of "Logistics Management" course [J]. Journal of lishui university, 2019, 41(04): 87-94.

[4] Zhang Wenjing, LIU Zhenyu, LI Yirong. Application and Thinking based on Mixed Teaching and Rain Classroom in university Computer Foundation [J]. Education and Teaching Forum, 2019(24): 184-185.

[5] Liao Ning. Application research of PBL in Hybrid Learning in Computer Graphics [J]. Modernization of Education, 19, 6(47): 143-144.

[6] Wei Linlin. Design and Application of Mixed Classroom Learning Model based on PBL [J]. Research on Curriculum Education, 2018(05): 29.

[7] Zhu Chengcong. Research on the Construction and Application Strategy of C-PBL Blended Teaching [D]. Zhejiang Normal University, 2017.

[8] Hu Jui, PAN Baisong. Reform of engineering Course Teaching Method based on PBL -- A case study of "Engineering Innovative Design Methodology" course teaching [J]. Higher Education Forum, 2017(04): 63-68.

[9] Liu Duanyang, Liu Zhi. Blended data structure teaching of PBL and LBL [J]. Computer Education, 2015(04): 48-50+58.

[10] Chen Qimei. Research on PBL Blended Classroom Teaching Model and Construction of Resource Platform [D]. Zhejiang University of Technology, 2012.

[11] Liu Huang Lingzi, HUANG Ronghui, ZHU Lingli, ZHENG Lanqin. An action Study on blended teaching [J]. Degree and Graduate Education, 2005(11): 9-13.